

**MENTAL HEALTH OF ASYLUM-SEEKING CHILDREN AND
ADOLESCENTS IN GERMANY**

Rates, Risks and New Trends in Screening and Diagnostics

Inaugural dissertation for the degree of Doctor philosophiae of the Faculty of
Philosophy and Pedagogy

of the

Catholic University Eichstätt-Ingolstadt

submitted by

Lauritz Rudolf Floribert Müller from Munich

Eichstätt, August 2021



Examiner: Prof. Dr. Rita Rosner

Co-examiner: Prof. Dr. Miriam Rassenhofer

Day of the disputatio: November 9, 2021

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to all those who have supported me on the way to this work, whether by stages or from the start to the finish—to my examiners and supervisors, Prof. Dr. Rita Rosner (thank you very much for all the advice, trust, and professional freedoms that have been given to me), Dr. Johanna Unterhitzberger (thank you so much for the constant support and advice), and Prof. Dr. Miriam Rassenhofer; to my family, Pieps (un besote), Dido (thanks for the linguistic advice!), Albrecht, Abeline, Quentin, and Yorrick (thanks again for coding the questionnaire app!); to all co-authors, Karl Büter (thanks so much for all the shared car rides to the screenings), Katharina Gossmann (thank you very much for all the talks, ideas, and your efforts in the shared research projects), Franziska Hartmann, Dr. Julia König, Svenja Wintersohl, and Regina Schmid; to my BETTER CARE colleagues, Jonathan Thielemann, Barbara Kasparik, Dr. Laura Saupe, Monja Herold, Pia Schwegler, Dr. Cedric Sachser, and Dr. Elisa Pfeiffer; to all my colleagues of the Chair of Clinical and Biological Psychology who have constantly offered my valuable advice; to my friends in Eichstätt and abroad, the WG (thanks for offering co-working spaces and the welcome distraction provided in the form of coffee and chess), the Club (thanks for keep saying that I'm the most serene PhD student you know), and the Isardetektive et al.; to all those who were involved in the studies, first and foremost, the young participants, the social workers, and the interpreters; and, lastly, to the Harry Potter Pomodoro Sessions on YouTube that created some living room atmosphere in a gray lockdown day-to-day routine.

Thank you very much—without you, this dissertation would not have been possible.

TABLE OF CONTENTS

List of Abbreviations	VI
List of Tables	VII
Part A. In Context: Mental Health of Asylum-Seeking Children and Adolescents in Western Countries	8
1. Abstract	9
2. Introduction and overview. Global, national, and historical perspectives.....	10
2.1 Risk and protective factors.....	12
2.2 Epidemiology	15
2.3 Course of symptoms after resettlement.....	19
2.4 Special considerations in screening and diagnostics	25
2.5 Special considerations for working with interpreters.....	28
3. Description of the dissertation project	32
3.1 Relevance and derivation of the research questions	32
3.2 Research questions of the dissertation project	33
4. Synopsis of the publications	34
4.1 Executive summary of Publication 1: 1-year follow-up of the mental health and stress factors in asylum-seeking children and adolescents resettled in Germany.....	34
4.2 Executive summary of Publication 2: A pilot study on ecological momentary assessment in asylum-seeking children and adolescents resettled to Germany	35
4.3 Executive summary of Publication 3: Screening for posttraumatic stress symptoms in young refugees. Comparison of questionnaire data with and without involvement of an interpreter.....	36
5. Discussion and conclusions.....	38
5.1 General discussion of study findings	38
5.2 Implications	41
5.3 Strengths and limitations	46
5.4 Future directions	47
References	50
(References for the umbrella reviews are listed separately at the end of this list)	50
Part B. The Published Papers	65
Publication 1. 1-year follow-up study of the mental health of refugee minors	66
Publication 2. Ecological Momentary Assessment (EMA) of daily mood and post-migration factors in young refugees	78
Publication 3. Evaluation of the Child and Adolescent Trauma Screen (CATS): Comparison of the assessment with and without the inclusion of interpreters.....	99

List of Publications	106
Original research.....	106
Conference contributions.....	107
Eidesstattliche Erklärung [Statutory declaration]	108
Erklärung zu früheren Promotionsvorhaben [Declaration on previous doctorate procedures] ..	109

LIST OF ABBREVIATIONS

BAMF	Bundesamt für Migration und Flüchtlinge [Federal Office for Migration and Refugees]
CATS	Child and Adolescent Trauma Screen
EMA	Ecological Momentary Assessment
PTSD	Posttraumatic stress disorder
PTSS	Posttraumatic stress symptoms
TF-CBT	Trauma-focused cognitive behavioral therapy

LIST OF TABLES

- Table 1.** Overview of reviews ($n_1 = 4$) summarizing studies investigating non-treatment risk and protective factors ($n_2 = 64$) in asylum-seeking children and adolescents ($n_3 = 7665$). p. 14
- Table 2.** Overview of reviews ($n_1 = 8$) summarizing studies investigating levels of PTSS, depression, and anxiety ($n_2 = 113$) in asylum-seeking children and adolescents ($n_3 = 37,366$). pp. 17-18
- Table 3.** Overview of follow-up studies examining mental health changes ($N_1 = 19$) in asylum-seeking children and adolescents ($N_2 = 1993$) including those in the Tam et al. (2017) meta-analysis ($n = 10$, only PTSD), further studies between 1985-2017 focussing on symptoms beyond PTSD ($n = 7$), and studies that have been published since publication of the review in 2017 ($n = 2$). pp. 21-24
- Table 4.** Overview of reviews ($n_1 = 3$) summarizing studies investigating validated screening measures ($n_2 = 9$) in asylum-seeking children and adolescents ($n_3 = 1945$). p. 27
- Table 5.** Overview of reviews ($n_1 = 8$) summarizing studies ($n_2 = 87$) investigating involvement of interpreters in (mental) health care settings. pp. 30-31
- Table 6.** Overview of reviews ($N_1 = 7$) summarizing studies investigating mental health interventions ($N_2 = 60$, of which controlled trials, $n_1 = 23$) for asylum-seeking children and adolescents ($N_3 = 4270$). pp. 44-45



PART A.

**IN CONTEXT: MENTAL HEALTH OF ASYLUM-SEEKING CHILDREN
AND ADOLESCENTS IN WESTERN COUNTRIES**

1. Abstract

Adolescents who have fled to Western host countries show high levels of psychological distress and high risk for mental disorders. During the 2015-17 refugee crisis, Germany emerged as the largest host country for refugees in Europe. Therefore, rapid and valid screenings are needed to ensure assignment to appropriate treatments. However, it is unclear to what extent the situation of these adolescents is comparable to rates of mental health problems from other studies, as long-term studies with validated measures have not yet been conducted in Germany. In addition, procedural challenges exist in the context of valid diagnostics in the field of young refugees, including the question of transcultural validity of screening measures developed in the West and the reliability of interpreter-assisted diagnostics.

This dissertation therefore explored three main questions: Publication 1 traced the natural course of various mental health symptoms in a group of young refugees. It was shown that although symptom severity decreased significantly within one year, a considerable part of the cohort still showed clinically significant symptoms. Publications 2 and 3 addressed the question of valid screening and diagnostics in the group of young refugees. Publication 2 applied smartphone-based Ecological Momentary Assessment in this group for the first time and was able to demonstrate an association between symptom measures assessed in the questionnaires and low-threshold daily-assessed parameters such as low mood and lower sleep duration. This may indicate the transcultural validity of the questionnaires used. Publication 3, on the other hand, examined psychometric parameters of the Child and Adolescent Trauma Screen as a function of interpreter use and showed in a post-hoc analysis that the groups with and without interpreters did not differ statistically. In terms of the reliability of the measurement, the inclusion of lay interpreters, which is common practice, at least did not appear to be disadvantageous.

The implications and limitations of the studies conducted are discussed in the concluding chapter, showing that while promising treatment approaches exist, some research gaps also continue to exist with regard to various issues in the field of clinical research with young refugees.

2. Introduction and overview. Global, national, and historical perspectives

Historically, the scientific study of the mental health of refugee youth is still a relatively young field. To be sure, there are isolated, ethnographic to anecdotal findings on the psychological adjustment of war-afflicted, displaced children dating back to the World War 2 era (Freud & Burlingham, 1943). Nevertheless, the study of the mental health of refugees in general, and of refugee youths in particular, has long been a marginal topic in clinical psychology research. It initially received closer scientific attention in still relatively unsystematic surveys in refugee camps among youngsters from various war-affected regions, including children and adolescents in the Vietnam War (Harding & Looney, 1977), the Middle East conflict, and the Northern Ireland conflict (Rosenblatt, 1983). With the influx of Indochinese (i.e., Vietnamese, Cambodian, and Laotian) so-called “boat people” in response to the war in Vietnam and the genocidal Marxist-Leninist dictatorship under Pol Pot in Cambodia, initial work also emerged on the levels of psychological distress of these refugees resettled to Western industrialized nations, including work specifically on children and adolescents (Eisenbruch, 1988; Krupinski & Burrows, 1986). In Europe, similar questions increasingly came into focus from the 1990s onwards, primarily in connection with the war in Yugoslavia, resulting in research works on the psychological adaptation of both internally displaced children as well as refugee youths (Ajduković & Ajduković, 1993, 1998; Kuterovac, Dyregrov, & Stuvland, 1994; Papageorgiou et al., 2000) and yielding special series covering this topic in various scientific journals such as the *Journal of Clinical Psychology*, among others (Rosner, 2003). For the European Union, the data basis is considered too incomplete so as to present an overall historical trend in terms of migration statistics (van Mol & Valk, 2016), but at least with regard to Germany, since the mid-2000s, the number of asylum seekers had declined sharply in the interim (Bundesamt für Migration und Flüchtlinge (BAMF), 2015). During this period, research on the mental health of young refugees emerged in Europe, mainly in the Scandinavian countries and the Netherlands (Bean, Derluyn, Eurelings-Bontekoe, Broekaert, & Spinhoven, 2007; Oppedal & Idsoe, 2012). Finally, in the context of what became known as the European refugee crisis from 2015 to 2017, which saw more than 1.3 million initial asylum applications in Germany alone (of which roughly 500,000 were from minors; BAMF, 2015, 2016, 2017) and when the number of displaced people worldwide reached an interim record high of 60 million (United Nations High Commissioner for Refugees, 2017), there was renewed research interest in the psychological needs of this population.

At that time, only a few research studies from Germany were available on this topic (Möhrle, Dölitzsch, Fegert, & Keller, 2016). In most cases, these were also lacking methodological rigor, as they

solely used non-established or non-specific symptom measures (Rücker, Büttner, Lambertz, Karpinski, & Petermann, 2017) or employed retrospective record analyses alone (Walg, Fink, Großmeier, Temprano, & Hapfelmeier, 2017). Also, some of the first studies that specifically addressed adolescents who migrated to Germany in the wake of the European refugee crisis were still limited. For example, one survey in an initial reception center included only a small sample of accompanied refugee children (Soykoek, Mall, Nehring, Henningsen, & Aberl, 2017), while another survey included only unaccompanied minors in youth welfare facilities (Sierau, Schneider, Nesterko, Klitzing, & Glaesmer, 2018). For this reason, our research group initiated a first research project among young refugees in Germany in 2017 to compare both accompanied and unaccompanied minors with established measures (Müller, Büter, Rosner, & Unterhitzberger, 2019). At the same time, this project represented the starting point for the further research questions of this dissertation.

More specifically, this thesis will first provide an outline of findings in the context of the mental health of asylum-seeking children and adolescents¹ resettled to Western countries² and can thus be thought of as a compendium for the current state of research in this field. In particular, results on risk and protective factors will be presented—including a description of a refugee-specific pathogenesis model derived from literature—, data on the levels of psychological distress will be summarized, findings with respect to follow-up trajectories will be reported, and special considerations regarding the screening and diagnostic procedures in this group and regarding the work with interpreters will be discussed. Where appropriate, I have undertaken exploratory, non-systematic umbrella reviews for each of these areas, tabulating existing results from systematic reviews and meta-analyses for each area. This is followed by a presentation of the specific research questions posed in the dissertation, each of which was addressed by the publication of a specific study. The synopsis of these publications is provided in the subsequent section. Finally, I discuss the implications of the studies conducted and give an outlook on existing treatment models for this population, which is followed by the description of future directions in minor refugee clinical research.

¹ Please note that I will be using different terms to describe the same population under investigation in this thesis. For the lack of a technical definition in the context of mental health research (regardless of existing legal definitions), the terms “asylum-seeking children and adolescents”, “refugee youth”, “young refugees”, “refugee youngsters”, and so on, are used interchangeably, referring to young people between approximately 12 and 20 years of age.

² Please note that this thesis focuses exclusively on asylum-seeking children and adolescents in Western countries. The interested reader is referred to Reed, Fazel, Jones, Panter-Brick, and Stein (2012) for an overview of findings regarding the mental health of refugee youth resettled in low-income and middle-income countries.

2.1 Risk and protective factors

In terms of variables affecting their mental health, refugee youth are located at an intersection. In most cases, there is not a singular, clearly defined stressor that determines their levels of psychological distress, but a multitude of factors that are interlinked with each other and that, in their entirety, have an impact on the mental health of young refugees. For a long time, clinical research in this regard was dominated by a focus on the war exposure model, which attributed levels of psychological distress primarily to traumatic and other adverse experiences in the country of origin and/or during flight (Miller & Rasmussen, 2017), assuming a dose-response relationship according to the simplified formula that more traumatic experiences lead to more mental distress (Ehnholt & Yule, 2006). Gradually, moreover, an awareness emerged that the experience of uprooting, of living in exile as such, and the associated loss of familiar social networks, usually more broadly defined by many authors as post-migration factors, also contribute substantially to possibly persisting symptoms of psychological distress in young refugees (Miller & Rasmussen, 2017). Although not without criticism regarding the cross-cultural applicability of the concept (Lustig et al., 2004), there are also developmental challenges that adolescents of this age face (Jugert & Titzmann, 2020), which can be particularly challenging for unaccompanied refugee youngsters who lack family support in the host country (Frounfelker et al., 2020). Miller and Rasco (2004) summarize these factors in their ecological framework regarding the mental health of refugee communities. Note that in this model traumatic experiences on the one hand directly affect the mental health of refugees, and on the other hand are indicated as a triggering factor for displacement, which in turn also affects their mental health via associated post-migration factors (e.g., loss of social networks, loss of social roles, unemployment, discrimination, etc.). In addition, the model integrates in its operationalization flight-independent influencing factors and differentiates mental health on an individual, family and community level. This seems to make sense especially in light of the fact that many adolescent refugees originate from more collectivistic, high-context cultures (Motti-Stefanidi & Masten, 2020).

There is no doubt that it is reasonable to consider the entire spectrum of both pre-flight traumatic experiences and post-migration influences on the levels of psychological distress experienced by young refugees. However, when looking at the empirical findings on risk and protective factors as a whole, the number of traumatic experiences was still found to be the most robust predictor for a higher symptom severity (see Table 1). In the umbrella review I conducted for this introduction, I summarized existing meta-analyses and systematic reviews ($n = 4$; Fazel, Reed, Panter-Brick, & Stein, 2012; Höhne, van der Meer, Kamp-Becker, & Christiansen, 2020; Jahangiri,

Tabatabaie, & Keykaleh, 2017; Mitra & Hodes, 2019) that specifically addressed the question of risk and protective factors regarding the mental health of adolescent refugees. In a total of 64 studies with 7665 individuals, beyond the number of traumatic experiences in their lifetime, female sex, being unaccompanied, and low-support living arrangements also emerged as the most common risk factors. The importance of these aspects is further underscored by the fact that over time, reviews have also emerged that have specifically addressed each factor exclusively, including accommodation type (O'Higgins, Ott, & Shea, 2018) and female gender (Mohwinkel, Nowak, Kasper, & Razum, 2018). On the protective factor side, the most frequently detected variables were high parental support and family cohesion, social support, and high-support living arrangements. In both cases, therefore, pre-flight traumatic experiences as well as post-migration factors were found to have a decisive impact on the mental health of refugee youths which is in accordance with the ecological framework described above.

In addition to these aforementioned factors, which have been found to be most influential in a variety of studies, there is a continuing debate regarding other risk and protective factors, including, among others, the influence of experiences of discrimination (Ellis, MacDonald, Lincoln, & Cabral, 2008), the asylum process (Heptinstall, Sethna, & Taylor, 2004; Jakobsen, Meyer DeMott, Wentzel-Larsen, & Heir, 2017), and the age of the youth. While in the first two cases, if any at all, the association found was negatively associated with mental health, the influence of age is further ambiguous. In some studies, older study participants showed higher levels of psychological distress and vice versa, and in a large number of studies, age was not associated with symptomatology at all, suggesting that there is no clear underlying age-related process that either increases or decreases mental health, but that the influence of age may be conflated across additional, individual constellations (Fazel et al., 2012). Furthermore, resources and coping strategies in the host country seem to play an important role in the adaptation and acculturation of young refugees (Oppedal & Idsoe, 2015; Sleijpen, Boeije, Kleber, & Mooren, 2016), but classification is still vague and the assessment modalities rather heterogeneous, which limits comparability across different studies.

Table 1. Overview of reviews ($n_1 = 4$) summarizing studies investigating non-treatment risk and protective factors ($n_2 = 64$) in asylum-seeking children and adolescents ($n_3 = 7665$).

Review	Populations	Most common risk factors (number of studies)	Most common protective factors (number of studies)	No. of original research studies (participants)	Σ cumulative studies (participants) ^a
Fazel et al. (2012)	Unaccompanied and accompanied	Exposure to premigration violence (13) Female sex (11) Unaccompanied (3)	High parental support and family cohesion (4) Self-reported support from friends (4) Self-reported positive school experience (3)	44 (5776)	44 (5776)
Jahangiri et al. (2017)	Unaccompanied and accompanied	Exposure to premigration violence ^b Female sex Unaccompanied	High parental support and family cohesion ^b Self-reported support from friends Self-reported positive school experience	22 (4861)	45 (5875)
Mitra & Hodes (2019)	Only unaccompanied	Lower support and more restricted living arrangements (6)	High-support living arrangements (6) Same ethnic background between youths and foster family (1)	9 (1851)	49 (6355)
Höhne et al. (2020)	Only unaccompanied	Stressful life events/trauma (15) Female sex (7) Low-support accommodation (6)	Social support (6) Contact with family members (6) High support living arrangements (5) Cultural competence (4)	27 (4351) ^c	64 (7665)

Note. Only reviews focussing on non-treatment risk and protective factors in a systematic and comprehensive manner were considered for this overview.

^a Here, all different studies and their participants are counted across the reviews. If several studies report on the same sample, participants are only counted once.

^b With one exception, the Jahangiri et al. (2017) review included only studies that had been previously included in the Fazel et al. (2012) review.

^c The number of participants here differs from the information provided in the review because the authors there counted multiple analyses/studies of the same sample multiple times.

2.2 Epidemiology

Although, as was alluded in the previous part, cross-study comparisons with different measures have their pitfalls, it can be stated that the levels of psychological distress of young refugees in Western host countries most likely exceed those of young people of the same age in the general population. For example, in representative surveys in Switzerland (Landolt, Schnyder, Maier, Schoenbucher, & Mohler-Kuo, 2013), the U.S. (Giaconia et al., 1995), and Germany (Perkonig, Kessler, & Wittchen, 2000), 56% (Switzerland), 43% (the U.S.), and 21% (Germany) of adolescents reported having had any traumatic experience in their lifetime with corresponding prevalence rates of post-traumatic stress disorder (PTSD) of 4.2%, 6.3%, and 1.3%, respectively. In contrast, in a survey of young refugees in Norway with clinical interviews, 96% of respondents reported having experienced any traumatic event in their lives with a corresponding PTSD rate of 30.6% (Jakobsen, Demott, & Heir, 2014). If one considers the central risk factor from the previous part—the total number of traumas experienced—it seems little surprising that young refugees in particular show increased levels of psychological distress. Moreover, the multitude of traumatic experiences in this group has been, by now, confirmed in numerous studies (Witt, Rassenhofer, Fegert, & Plener, 2015). As another example, in a study of adolescents in the Netherlands, young refugees reported more traumatic experiences in direct comparison to their native peers (Bean, Derluyn et al., 2007), and unaccompanied minors appear to be particularly affected.

Accordingly, one of the most robust recurring findings from a variety of surveys is that post-traumatic stress symptoms (PTSS) are the central mental health problem in the group of young refugees. In the umbrella review I conducted for this introduction, based on a total of 8 meta-analyses and reviews including 113 studies with 37,366 individuals (Bamford, Fletcher, & Leavey, 2021; Bronstein & Montgomery, 2011; El Baba & Colucci, 2017; Huemer et al., 2009; Kien et al., 2019; Reavell & Fazil, 2017; Werthern, Grigorakis, & Vizard, 2019; Witt et al., 2015), the rate of clinically significant PTSS as determined in screening studies ranged from 5-85%, with the bulk of the original studies ranging roughly between 30-50% (see Table 2). In our baseline study, the determined rate was shown to be 56.1% (Müller et al., 2019). Those reviews that separately reported values for findings from studies with rigorous clinical interviews reported PTSD prevalence rates of 19-36%. In addition to PTSS, anxiety and depression symptoms are key mental health problems in young refugees, reported separately by most reviews. Here, the rates of clinically significant symptoms for depression identified in the reviews ranged from 3-76% and for anxiety from 9-85%, with the majority of rates identified in the original studies ranging from 20-40% and 20-30%, respectively.

In addition, a smaller but nonetheless considerable body of research literature is devoted to identifying other possible mental health problems in young refugees: Bronstein and Montgomery (2013) demonstrated in their study that young Afghan refugees exhibit increased sleep onset latencies, and argue that asking about sleep problems may be a more culturally acceptable way to also screen for underlying symptoms such as PTSS. The extent of externalizing problems that include behavioral problems appears to be unclear: In one study in Italy, the group of young refugees showed significantly more externalizing symptoms than the Italian comparison group (Thommessen, Laghi, Cerrone, Baiocco, & Todd, 2013); in some other studies, externalizing symptoms seem to play a minor role (Derluyn & Broekaert, 2007; Oppedal & Idsoe, 2012; Witt et al., 2015). Ivert and Magnusson's (2019) review shows that the issue of substance abuse is rarely raised as a primary research question by the original studies included in the review; and, if nevertheless, it often does not appear to be a central problem. For example, none of the adolescents in a study of 41 African unaccompanied refugee minors conducted with clinical interviews scored for substance abuse or substance dependence (Huemer et al., 2011). Non-suicidal self-injury in young refugees has been little researched—in an initial pilot work in Belgium, the authors found a lifetime prevalence of 17.4%, which is broadly comparable to Western samples (Verroken, Schotte, Derluyn, & Baetens, 2018). With regard to suicidality, on the other hand, there are appreciably more studies available: Here, a recent systematic review has shown that young refugees are at significantly increased risk for suicidality compared to the general population, although it is not clear from current studies whether suicidal ideation occurs independently or is a sequela of PTSS and depression (Jin, Dolan, Cloutier, Bojdani, & DeLisi, 2021)

Table 2. Overview of reviews ($n_1 = 8$) summarizing studies investigating levels of PTSS, depression, and anxiety ($n_2 = 113$) in asylum-seeking children and adolescents ($n_3 = 37,366$).

Review	Populations	Symptoms	Screening: prevalence range (average)	Interview: prevalence range (average)	No. of original research studies (participants)	Σ cumulative studies (participants)^a
Huemer et al. (2009)	Only unaccompanied	PTSS Depression	19-73% 23-39%	– –	22 (2629)	22 (2629)
Bronstein & Montgomery (2011)	Unaccompanied and accompanied	PTSS Depression	19-54% (36%) 3-30% (18%)	– –	22 (3003)	31 (4021)
Witt et al. (2015)	Only unaccompanied	PTSS Depression Anxiety Externalizing symptoms	17-71% 12-44% 18-38% 23-72%	20-30% 9-15% 3-4% 2-5%	26 (3410) ^b	50 (5801)
Reavell & Fazil (2016)	Unaccompanied and accompanied	PTSS Depression	5-60% 25-50%	– –	42 (5465)	69 (7581)
El Baba & Colucci (2018)	Only unaccompanied	PTSS Depression Anxiety	37-67% 14-51% 17-38%	20-30% 4-15% 2-4%	15 (1792)	70 (7587)

Table 2. (continuation)

Kien et al. (2019)	Unaccompanied and accompanied	PTSS	IQR 26-63% (35%)	IQR 19-36%	47 (24,786) ^c	94 (26,600)
		Depression	IQR 10-33% (21%)	IQR 3-9%		
		Anxiety	IQR 9-32% (15%)	–		
		Suicidal ideation	IQR 1-9% (5%)	IQR 9-10%		
		Emotional and behavior problems	IQR 20-35% (25%)	–		
von Werthern et al. (2019)	Only unaccompanied	PTSS	17-85%	20-30%	31 (9064) ^d	99 (32,516)
		Depression	13-76%	9-15%		
		Anxiety	11-85%	3-4%		
Bamford et al. (2021)	Only unaccompanied	PTSS	22-65%	5%	14 (4897)	113 (37,366)
		Depression	40-43%	3%		
		Anxiety	38%	–		

Note. Only reviews focussing exclusively on children and adolescents were considered for this overview. Reviews that partly included studies on adult asylum-seekers were excluded. IQR = Interquartile range, PTSS = Posttraumatic stress symptoms.

^a Here, all different studies and their participants are counted across the reviews. If several studies report on the same sample, participants are only counted once.

^b The number of participants here differs from the information provided in the review because the authors there counted multiple studies/analyses of the same sample multiple times.

^c Here, 15,264 participants from a register-based census study were included.

^d Here, 5686 participants from a register-based census study were included.

2.3 Course of symptoms after resettlement

The focus on inquiring into the psychopathology of young refugees in Western countries was, early on, accompanied by the question of possible symptom changes over the first years after resettlement. In principle, three broad directions seem plausible: On the one hand, an improvement of symptoms due to the elimination of flight-specific stressors, on the other hand, a worsening of symptoms due to the loss of important resources such as family support in the host country (cf. Part 2.1). A third conceivable path describes a level that remains constant on average with large inter-individual differences, each of which is accompanied by quite different mechanisms. Although rather sporadically, some research groups addressed this question early on: Initial and surprisingly already very long follow-ups showed improvement of symptoms over time (Kinzie, Sack, Angell, Clarke, & Ben, 1989; Krupinski & Burrows, 1986; Sack et al., 1993; Sack, Him, & Dickason, 1999). However, due to their use of non-validated instruments, some of these studies were still limited and they also covered rather long follow-up periods during which psychological adaptation or spontaneous remission might become more likely. In contrast, more recent studies that were prospective in method and focused on shorter time periods for this purpose, such as the first two to three years after arrival in the host country, tended to find that psychological distress remained stable over time (Bean, Eurelings-Bontekoe, & Spinhoven, 2007; Jakobsen et al., 2017; Jensen, Skårdalsmo, & Fjermestad, 2014).

To the author's knowledge, only one systematic review exists that compiled follow-up studies on the mental health of young refugees (Tam, Houlihan, & Melendez-Torres, 2017). This review focused only on PTSS and excluded studies that did not specifically capture PTSS but did include other disorders. In the narrative review for this introduction, I, therefore, listed the studies from this review along with additional follow-up studies that either captured other symptoms or were published after the Tam et al. (2017) meta-analysis appeared (see Table 3). In total, this summary is, thus, based on 19 primary studies from 1985 to 2021 involving 1993 individuals. The majority of studies followed their participants between 1 and 3 years after the original baseline survey, and, overall, a similar trend emerges in the review as described above: The longer the follow-up periods, the more likely the follow-up studies were to show symptom improvements. For example, studies that followed up their subjects for 5 (Jensen, Skar, Andersson, & Birkeland, 2019), 6 (Sack et al., 1993), 6-7 (Hjern & Angel, 2000), 8-9 (Montgomery, 2008, 2010), and 12 years (Sack et al., 1999) each showed significant alleviation of some or all symptoms over time; in contrast, with the exception of the early Krupinski and Burrows (1986) study, all studies with shorter follow-up periods showed stable symptom courses. It is worth mentioning that large inter-individual differences in trajectories were observed in several of these

studies (Jensen et al., 2014; Montgomery, 2010) which ultimately raises the question of predictors of symptom improvement, stability, or worsening. In the Tam et al. (2017) meta-analysis, factors that were most frequently associated with higher symptom levels at follow-up were shown to be comorbid disorders, exposure to premigration violence, and older age.

While the relative prevalence of PTSD in the group of young refugees clearly exceeds that in the general population (cf. Part 2.2), the findings on the stability of symptoms in the group comparison could possibly be more similar. In a meta-analysis on the natural course of PTSD within the first year post-trauma, the authors showed that within the first 6 months there was still a successive decrease in prevalence—but not thereafter (Hiller et al., 2016). In a 3.5-year follow-up study with adolescents and young adults in Germany, however, the prevalence of subthreshold and complete PTSD was approximately reduced by half (Perkonigg et al., 2005). It is important to note that while a total of 19 follow-up studies from 13 independent cohorts exist on mental health trajectories in young refugees—in 2017, when the baseline survey of our research group began (Müller et al., 2019), follow-up studies did not exist from Germany in general, nor did follow-up observations of the group of young people who arrived in Europe during the 2015-17 refugee crisis exist in particular. As this period was unprecedented in its scale of influx and the associated demands on authorities in terms of coordination, care, supply, and accommodation were at times overburdening (Roth & Maduz, 2017), it is questionable whether the psychological needs of this group could be addressed to a similar extent as before.

Table 3. Overview of follow-up studies examining mental health changes ($N_1 = 19$) in asylum-seeking children and adolescents ($N_2 = 1993$) including those in the Tam et al. (2017) meta-analysis ($n = 10$, only PTSD), further studies between 1985-2017 focussing on symptoms beyond PTSD ($n = 7$), and studies that have been published since publication of the review in 2017 ($n = 2$).

No.	Study	Population ^a	Follow-up period	Measures ^b	Symptoms	Results	No. of participants	Σ cumulative participants
1	Krupinski & Burrows (1986)	Young Indochinese refugees in Australia (age 5-19)	2 years	Paper-pencil questionnaires, interviews by psychiatrists	Psychiatric morbidity	Substantial decline in psychiatric morbidity over time	653	653
2	Kinzie et al. (1989) ^c	Young Cambodian refugees in the US (mean age 20)	3 years	Diagnostic Interview Schedule for DSM-III-R, BDI, IES	PTSS Depression	At baseline: 50%, at follow-up: 48% At baseline: 50%, at follow-up: 41%	30	683
3	Sack et al. (1993) ^c	Young Cambodian refugees in the US (mean age 23)	6 years	K-SADS, DICA, BDI, IES	PTSS Depression	At baseline: 50%, at follow-up: 38% At baseline: 50%, at follow-up: 6%	31	684
4	Sack et al. (1999) ^c	Young Cambodian refugees in the US (mean age 29)	12 years	K-SADS, DICA	PTSS Depression	At baseline: 50%, at follow-up: 35% At baseline: 50%, at follow-up: 14%	31	684
5	Almqvist & Brandell-Forsberg (1997) ^d	Iran refugee children in Sweden (age 6-10)	2.5 years	Parental interview Child assessment (observation, structured tasks, questions)	PTSS	At baseline: 21%, at follow-up: 18%	39	723

Table 3. (continuation)

6	Almqvist & Broberg (1999) ^d	Iranian refugee children in Sweden (age 6-10)	2.5 years	Parental interview Child assessment (observation, structured tasks, questions)	PTSS	At baseline: 21%, at follow-up: 18%	39	723
7	Becker et al. (1999)	Bosnian adolescent refugees in the US (age 13-19)	1 year	CTEI, PSS	PTSS	At baseline: 3 out of 10, at follow-up 1 out of 10	10	733
8	Hjern & Angel (2000)	Predominantly Chilean refugee youths in Sweden (age 8-20)	6-7 years	SCICA (children) CSS (parents) CBQ (teachers)	Overall mental health status	At baseline: 47%, at follow-up: 22%	49	782
9	Rousseau et al. (2003)	Cambodian minor refugees in Canada (mean age at baseline 13.6)	4 years	Trauma checklist, YSR	Internalizing symptoms Externalizing symptoms	Decline in girls, increase in boys No change over time	57	839
10	Bean et al. (2007) ^e	Unaccompanied refugee adolescents in the Netherlands (age 10-21)	1 year	SLE, RATS, HSCL-37A, CBCL	PTSS Internalizing symptoms Externalizing symptoms	No change over time No change over time Increase over time	582	1421
11	Smid et al. (2011) ^e	Unaccompanied refugee adolescents in the Netherlands (age 10-21)	1 year	SLE, RATS	PTSS	At baseline: 40%, at follow-up: 41%	554	1421

Table 3. (continuation)

12	Montgomery (2008) ^f	Young refugees from the Middle East in Denmark (age 11-23)	8-9 years	Trauma checklist, YSR, YASR (different measures between assessments)	Internalizing symptoms Externalizing symptoms	Decline from about 75% to 25% clinically significant levels of psychological distress	131	1543
13	Montgomery (2010) ^f	Young refugees from the Middle East in Denmark (age 11-23)	8-9 years	Trauma checklist, YSR, YASR (different measures between assessments)	Internalizing symptoms Externalizing symptoms	Decline from about 75% to 25% clinically significant levels of psychological distress	131	1543
14	Jensen et al. (2014) ^g	Young refugees in Norway (age 13-20)	2 years	SLE, HSCL-37A, CPSS	Traumatic experiences Internalizing symptoms PTSS	Significant increase over time No change over time No change over time	75	1618
15	Jensen et al. (2019) ^g	Young refugees in Norway (mean age 20)	5 years	SLE, HSCL-37A, CPSS	PTSS Depression Anxiety	At baseline: 63%, at follow-up: 42% At baseline: 21%, at follow-up: 15% At baseline: 33%, at follow-up: 24%	47	1618
16	Vervliet et al. (2014)	Minor refugees in Belgium (age 14-17)	1.5 years	SLE, RATS, HSCL-37A	PTSS Depression Anxiety	At baseline: 48%, at follow-up: 53% At baseline: 33%, at follow-up: 35% At baseline: 28%, at follow-up: 36%	77	1695

Table 3. (continuation)

17	Keles et al. (2016) ^h	Young unaccompanied refugees in Norway (mean age at baseline 19)	2-3 years	Trauma checklist, CES-D	Depression	Healthy: 41.9%, resilient: 16.4%, clinical: 24.5%, vulnerable: 17.1%	229	1924
18	Keles et al. (2017) ^h	Young unaccompanied refugees in Norway (mean age at baseline 19)	2-3 years	Trauma checklist, CES-D	Depression	Healthy: 41.9%, resilient: 16.4%, clinical: 24.5%, vulnerable: 17.1%	229	1924
19	Jakobsen et al. (2017)	Young unaccompanied refugees in Norway (age at baseline 14-20)	2.5 years	HSCL-37A, HTQ	Psychological distress PTSS	At baseline: 21% no change over time At baseline: 59%, no change over time	69	1993

Note. One study from the Tam et al. (2017) meta-analysis was not included in this overview because it reported on internally displaced children.

BDI = Beck Depression Inventory, CBCL = Child Behavior Checklist, CBQ = Children's Behaviour Questionnaire, CES-D = Center for Epidemiologic Stress Depression Scale for Adolescents, CPSS = Child PTSD Symptom Scale, CSS = Child Symptom Scale, CTEI = Communal Traumatic Experiences Inventory, DICA = Diagnostic Interview for Children and Adolescents, HSCL-37A = Hopkins Symptom Checklist 37 for Adolescents, HTQ = Harvard Trauma Questionnaire, IES = Impact of Event Scale, K-SADS = Kiddie-Schedule for Affective Disorders and Schizophrenia, PSS = PTSD Symptom Scale, RATS = Reactions of Adolescents to Traumatic Stress, SCICA = Achenbach's Semi-Structured Clinical Interview for Children and Adolescents, SLE = Stressful Life Events, YASR = Young Adult Self Report, YSR = Youth Self Report, PTSS = Posttraumatic stress symptoms.

^a If not stated otherwise, age of participants refers to time of follow-up.

^b Only the symptom measures used in the respective study are listed, further measures are not listed.

^{c, g} Same samples, different follow-up periods.

^{d, e, f, h} Same sample and follow-up period, in part different analyses.

2.4 Special considerations in screening and diagnostics

Given the high vulnerability of young refugees and the fact that resources in primary care settings are often low, many authors recommend a brief screening as a first step in assessing need for potential treatment (Horlings & Hein, 2018). For this purpose, instruments must be validated for culturally diverse samples. Over time, several measures have emerged that are preferentially used by different authors. In the umbrella review for this introduction, a total of 3 reviews with 9 primary studies and 1945 individuals are sampled that summarize validated screening instruments for the group of young refugees (Gadeberg & Norredam, 2016; Horlings & Hein, 2018; Rassenhofer, Fegert, Plener, & Witt, 2016). Among these, the following validated instruments emerge most frequently: Stressful Life Events (trauma checklist; Bean, Derluyn, Eurelings-Bontekoe, Broekaert, & Spinhoven, 2006), Reactions of Adolescents to Traumatic Stress (PTSS; Bean et al., 2006), the Hopkins Symptom Checklist 37 for Adolescents (internalizing and externalizing symptoms, Bean, Eurelings-Bontekoe, Derluyn, & Spinhoven, 2004), and the Child Behavior Checklist (internalizing and externalizing symptoms, Achenbach, 1991). In addition, the Children and Adolescent Trauma Screen (CATS; Sachser et al., 2017), which has by now been used in a number of studies with young refugees (Pfeiffer et al., 2019; Unterhitzberger, Wintersohl, Lang, König, & Rosner, 2019), has become established for the assessment of PTSS in recent years.

Although validated screening measures are at hand that are used in the target group, the general transcultural transferability of constructs of mental disorders remains an area of ongoing debate—and with it the question of the transcultural validity of measures that are developed mostly in the West (Bhui, Mohamud, Warfa, Craig, & Stansfeld, 2003; Frounfelker et al., 2020; Paalman, Terwee, Jansma, & Jansen, 2013; Prince, 2008; Wells, Wells, & Lawsin, 2015; Werthern et al., 2019). In addition, as described, many people migrating to Western countries come from rather collectivist cultures where indirect communication is more prevalent than in most Western countries (Motti-Stefanidi & Masten, 2020), which in turn could increase phenomena such as social desirability in response behavior. Furthermore, and not at all surprisingly, newly arriving young refugees often still have low language skills, which could evoke communicative misunderstandings, and they, unlike adolescents socialized in the West, might be generally less familiar with psychological test formats (Ehnholt & Yule, 2006). Taken together, these aspects pose a major challenge for valid screening of symptoms in young refugees. Referring to this, some authors recommend additionally assessing easily understandable and culturally less contentious domains such as sleep problems and general mood as another indicator of psychopathology (Bronstein & Montgomery, 2013; Horlings & Hein, 2018). In

this context, a possible association of symptom severity assessed by screening measures and levels of lower-threshold parameters (i.e., sleep parameters and mood) assessed in subsequent surveys could also be considered as predictive validity of the symptom measures in use for the specific population of young refugees.

Approaches such as Ecological Momentary Assessment (EMA) are particularly well suited for assessing temporally volatile variables like sleep patterns and mood (Ebner-Priemer & Trull, 2009). Unlike traditional psychological questionnaire settings in which subjects are asked to provide retrospective information about a past time period, EMAs using new technologies (e.g., smartphones) attempt to minimize known psychological biases such as hindsight or recall bias (Ebner-Priemer & Trull, 2009). However, to the author's knowledge, smartphone-based EMA has not yet been used in the young refugee group, which raises the question of whether the EMA approach is feasible in this population. Previous meta-analytic findings indicate that children and adolescents in EMA studies, for example, may have lower compliance than adults (Morren, van Dulmen, Ouwerkerk, & Bensing, 2009; Wen, Schneider, Stone, & Spruijt-Metz, 2017)—in addition, there are the general challenges with young refugees described above. On the other hand, refugee communities in particular are often very familiar with smartphones as they constitute an important tool during migration (Mohr, Schueller, Araya, Ricardo, Gureje, Oye, & Montague, 2014). For this reason, the EMA approach for assessing variable, low-threshold indicators of psychological distress, such as sleep parameters and mood, could be a promising pathway.

Table 4. Overview of reviews ($n_1 = 3$) summarizing studies investigating validated screening measures ($n_2 = 9$) in asylum-seeking children and adolescents ($n_3 = 1945$).

Review	Populations	Symptoms	Measures	No. of original research studies (participants)	Σ cumulative studies (participants) ^a
Rassenhofer et al. (2016)	Unaccompanied refugee youths in the Netherlands (age 8-20)	Trauma history PTSS Internalizing symptoms Externalizing symptoms	SLE (self) RATS (self) HSCL-37A (self), CBCL (proxy), TRF (proxy) HSCL-37A (self), CBCL (proxy), TRF (proxy)	4 (920) ^b	4 (920)
Gadeberg et al. (2017)	Refugee youths in the Netherlands (4 studies with the same sample, age 8-20), the US (3 studies, age 7-25), Sweden (age 6-18), and Croatia (age 6-15)	Trauma history PTSS Internalizing symptoms Externalizing symptoms	SLE (self) RATS (self), IES (self), CPSS-I (self), PTSS-C (interview), UCLA (interview) HSCL-37A (self), YSR (self), CBCL (proxy), TRF (proxy) HSCL-37A (self), YSR (self), CBCL (proxy), TRF (proxy)	9 (1945)	9 (1945)
Horlings & Hein (2018)	Refugee youths in the Netherlands (4 studies with the same sample, age 8-20), the US (3 studies, age 7-25), Sweden (age 6-18), and Croatia (age 6-15)	Trauma history PTSS Internalizing symptoms Externalizing symptoms	SLE (self) RATS (self), IES (self), CPSS-I (self), PTSS-C (interview), UCLA (interview) HSCL-37A (self), YSR (self), CBCL (proxy), TRF (proxy) HSCL-37A (self), YSR (self), CBCL (proxy), TRF (proxy)	9 (1945)	9 (1945)

Note. Only reviews focussing exclusively on children and adolescents were considered for this overview. Reviews that only partly included studies on children and adolescents were excluded. CBCL = Child Behavior Checklist, CPSS-I = Child Posttraumatic Stress Disorder Symptom Scale, HSCL-37A = Hopkins Symptom Checklist 37 for Adolescents, IES = Impact of Event Scale, PTSS-C = Posttraumatic Stress Symptoms in Children, RATS = Reactions of Adolescents to Traumatic Stress, SLE = Stressful Life Events, TRF = Teacher Report Form, UCLA = UCLA PTSD Index for DSM-IV, YSR = Youth Self Report, PTSS = Posttraumatic stress symptoms.

^a Here, all different studies and their participants are counted across the reviews. If several studies report on the same sample, participants are only counted once.

^b Here, all 4 studies draw from the same sample.

2.5 Special considerations for working with interpreters

As described in the previous part, language difficulties can pose challenges to clinicians in both screening and treatment settings. International guidelines recommend the use of language mediators for these situations (National Institute for Health and Care Excellence, 2018). The little available evidence to date on treatment effectiveness involving interpreters presents a mixed picture: While the first post-hoc analyses found no differences in effectiveness between the groups with and without interpreters (Ardenne, Ruaro, Cestari, Fakhoury, & Priebe, 2007; Brune, Eiroá-Orosa, Fischer-Ortman, Delijaj, & Haasen, 2011), a more recent analysis shows that the interpreter-assisted group was inferior (Sander, Laugesen, Skammeritz, Mortensen, & Carlsson, 2019). It should be noted that the first two studies employed interpreters with considerable professional experience in the psychosocial field and who were offered high-support context variables like supervision—in contrast, even before the Sander et al. (2019) analysis, authors had pointed out that employing untrained lay interpreters might adversely affect therapy outcomes (Hunt & Swartz, 2017). This is a crucial point, as certified or well-trained interpreters are often not available in real-life care settings for many languages of interest in the context of flight and migration (Hanft-Robert, Römer, Morgenroth, Redlich, & Metzner, 2018).

While the data base regarding the impact of interpreter inclusion on treatment effectiveness is already sparse, even fewer quantitative results exist for the impact on screening and diagnostic outcomes (Cecchet & Calabrese, 2011; Searight & Armrock, 2013). Most lines of argument and recommendations for working with interpreters in mental health services are based on qualitative interviews with stakeholders (mostly mental health professionals and interpreters), case reports from therapists working in the field, and position papers (e.g., Cecchet & Calabrese, 2011; Gartley & Due, 2017; Tribe & Morrissey, 2004)—which is further illustrated by the umbrella review I conducted for this introduction that is based on a total of 8 reviews and 87 original studies (see Table 5). There, most authors emphasize that the involvement of (lay) interpreters could influence a number of diagnostic and therapeutic processes. First and foremost, role diffusion is mentioned as a potential challenge by several authors: On the one hand, in relation to the understanding of tasks and roles of therapist and interpreter (Morina, Maier, & Schmid Mast, 2010), for example, when a professional attitude is lacking on the interpreter's side or when therapists feel reluctant to work with interpreters or lack cultural competence (Paone & Malott, 2008; Trejo-Phillips, 2012); but also between interpreter and the young patients, for example, when the parties involved come from cultures where communication with children and adolescents is more directive (Rousseau, Measham, & Moro, 2011). Furthermore, because interpreters and patients share the same language, patients may turn to the interpreter rather than the

therapist as a primary confidant which might cause conflicts of loyalty (Miller, Martell, Pazdirek, Caruth, & Lopez, 2005; Morina et al., 2010). Moreover, if interpreters originate from the same country or region as the patient, they might have made similar adverse experiences, which could lead to reliving the trauma addressed in the given situation (Miller et al., 2005)—all of these issues are mechanisms that could also influence therapy and diagnostic outcomes. In addition, other potential influencing variables exist: Interpreters might omit cultural taboos in the translation process out of avoidance behavior (Rousseau et al., 2011), but these could be crucial for therapeutic or diagnostic outcomes. Lack of expertise on the part of lay interpreters could result in an inaccurate translation of specialized medical or clinical psychological information (Paone & Malott, 2008). And even before therapy, with respect to the selection of interpreters, sources of error arise, for example, when patient and interpreter speak the same language on paper, but de facto have very different dialects and exhibit difficulties communicating themselves during treatment (Kletečka-Pulker, Parrag, Droždek, & Wenzel, 2019).

Overall, it can be stated that there are a number of conceivable mechanisms that could alter both therapeutic and diagnostic processes and thus their outcome. However, as far as the author is aware, there is very limited quantitative data available to either substantiate or rebut these observations.

Table 5. Overview of reviews ($n_1 = 8$) summarizing studies ($n_2 = 87$) investigating involvement of interpreters in (mental) health care settings.

Review	Populations	Type of Studies	Setting	Emerging themes and challenges	Recommendations	No. of original studies (cumulative)
Paone & Malott (2008)	Interpreters and counselors	Qualitative and quantitative	Mental health counseling	Counselor's fear regarding working with interpreters, interpreter competency, linguistic complexity, linguistic alterations, role exchange, professional knowledge and understanding, contextual knowledge	Pre-session briefing Post-session debriefing	8 (8)
Bauer & Alegría (2010)	Interpreters and psychiatric professionals	Qualitative and quantitative	Psychiatric care	Compromising psychiatric diagnoses, patient-provider interaction	More research in the field as many results stem from findings from 1970-1990	26 (31)
Trejo-Phillips (2012) ^a	Interpreters and therapists	Qualitative and quantitative	Psychotherapy for torture survivors	Role diffusion, vicarious trauma, missing cultural competency on therapists' part	–	–
Searight & Armrock (2013)	Interpreters and mental health professionals	Qualitative and quantitative	Mental health settings	Legal requirements, interpreter accuracy, diagnostic issues, the interpreter's role, ethical issues,	More research in the field, above all: diagnostic accuracy, interpreter's impact on therapeutic rapport, impact of training	35 ^b (59)

Table 5. (continuation)

Robertson (2014)	Interpreters and mental health professionals	Qualitative and quantitative	Mental health settings	Effectiveness of therapy, role of the interpreter, therapeutic alliance, therapists' experiences of interpreter roles, empathy	Developing training for therapists and interpreters	19 (72)
Farooq et al. (2015)	Interpreters and psychiatric professionals	Qualitative and quantitative	Old age psychiatry	Potential overdiagnosis of psychotic disorders when employing interpreters, lack of well-trained interpreters, role issues	More research in the field	4 (76)
Sander et al. (2017) ^c	Interpreters and mental health professionals	Qualitative and quantitative	Mental health settings	Effectiveness of therapy as a function of interpreter use (no differences detected)	Need for training	14 (81)
Yick & Daines (2019)	Interpreters and health professionals	Only qualitative	Health and mental health settings	Technicalities of interpreting (unfamiliar terms, cultural understanding, etc.), balancing objectivity versus support and identification with client, emotionally charged stories, workplace stress, integrating the past with existential growth	Debriefing, supervision, training, coping strategies	6 (87)

Note. Only reviews focussing mainly on mental health care settings and the involvement of interpreters were included in this overview. This is why reviews that focused on (primary) health care settings in general (e.g., Brisset et al., 2013; Crosby et al., 2013; Flores, 2005; Sleptsova et al., 2014), on service utilization (e.g., Ohtani et al., 2015), or on collaborative care (e.g., Garcia et al., 2017) were excluded.

^a No full version of this dissertation was available upon request to the author which is why information might be incomplete.

^b In this review, the authors did not state which studies were included in their final selection of the review. Therefore, the reference list was screened for relevant titles.

^c This review was only available in Danish which is why it was only appraised cursory.

3. Description of the dissertation project

3.1 Relevance and derivation of the research questions

As outlined in the previous chapters, a growing body of research has emerged over the years from the initially sparse attention paid to the topic of young refugees' mental health in clinical psychological research. Findings on epidemiology, risk and protective factors, natural course of symptoms, and specifics in screening and diagnosis are becoming perceptibly more robust and accurate. For instance, the finding of elevated levels of psychological distress in asylum-seeking children and adolescents has been, by now, confirmed by a wide spectrum of studies. However, there are still areas that have received too little attention in previous research. This dissertation approaches some of these areas by specifically addressing three goals.

First, starting with the baseline survey in 2017, this dissertation aims to track the mental health of young refugees who arrived in Germany in the wake of the 2015-2017 refugee crisis over a 1-year follow-up period. As described, no longitudinal findings exist on this topic from Germany or for this particular cohort to date—and the situation of these youth could potentially differ from that of previous years. Moreover, large inter-individual differences in trajectories have been described in past research and this investigation aims to contribute to further nuancing the overall findings. Second, building on the follow-up assessment, an EMA study among refugee youths will be conducted for the first time in this group, thus investigating its implementability and potential merits for further research. As described, a variety of challenges exist for valid symptom screening in young refugees and EMA could be a low-threshold approach for this. Finally, the area of interpreter-assisted mental health services will be empirically explored. Since there is a wide array of challenges that might alter diagnostic and therapeutic processes in interpreter-assisted mental health settings, screening results in this field will be further investigated. As most findings on the involvement of interpreters in mental health services are based on qualitative interviews, this will be undertaken with quantitative post-hoc analyses of screening results that can be thought of as a starting point for further quantitative investigations.

3.2 Research questions of the dissertation project

Derived from the previously described objectives of the dissertation, the following questions arise.

- 1) How do levels of psychological distress in young refugees who arrived in Germany during the 2015-2017 refugee crisis change within one year? Which trajectories are identifiable and what are predictors for levels of psychological distress at follow-up? This question was investigated using a prospective cohort study (publication 1).
- 2) Is the Ecological Momentary Assessment (EMA) approach implementable in the young refugee group and what is the level of compliance with the protocol? Is there a relationship between questionnaire-assessed symptom levels and daily-reported low-threshold problems such as mood and sleep patterns? This question was investigated with an EMA pilot study among young refugees (publication 2).
- 3) Are the reliability and other psychometric parameters of the Child and Adolescent Trauma Screen (CATS) comparable in the groups with and without interpreters? This question was investigated using a post-hoc analysis of cross-sectional CATS screening data among young refugees (publication 3).

4. Synopsis of the publications

4.1 Executive summary of Publication 1: 1-year follow-up of the mental health and stress factors in asylum-seeking children and adolescents resettled in Germany

Müller, L. R. F., Gossmann, K., Hartmann, F., Büter, K. P., Rosner, R. & Unterhitzberger, J. (2019b). 1-year follow-up of the mental health and stress factors in asylum-seeking children and adolescents resettled in Germany. *BMC Public Health*, 19(908), doi:10.1186/s12889-019-7263-6

Background: Over the course of the 2015-17 refugee crisis, Germany advanced to Europe's largest host country for refugees, including a large number of (unaccompanied) refugee minors. Previous research has shown that young refugees experience a variety of traumatic experiences and are at substantial risk for developing mental disorders. The recent longitudinal studies on the course of symptoms regarding PTSS, depression, and anxiety suggest that the high symptom rates remain constant within the first years after resettlement. However, no findings from Germany exist yet.

Methods: We conducted a prospective cohort study with $N = 98$ young refugees at T1 and $N = 72$ adolescents at T2 (attrition rate: 26.5%). Baseline assessments took place in 2017 and follow-up assessments on average approximately one year later ($M = 11.8$ months, $SD = 0.58$). Participants were mostly male ($n = 65$, 90.3%) and unaccompanied ($n = 47$, 65.3%) and were half from Afghanistan ($n = 36$, 50%). They were on average 17 years old ($M = 17.32$, $SD = 1.93$) and had lived in Germany for about 3 years ($M = 2.87$, $SD = 0.74$) at follow-up. We screened for experienced trauma, PTSS, depression, anxiety, and externalizing symptoms as well as post-migration factors both at baseline and follow-up.

Results: At follow-up, 9.7% of the adolescents showed clinically significant scores for externalizing behavior, 16.7% for anxiety, 16.7% for depression, and 37.5% for PTSS. With the exception of externalizing behavior, there was a significant improvement in symptom severity with respect to all symptom measures between assessments. However, large inter-individual differences emerged with respect to symptom courses and mental health trajectories. Participants with unremarkable symptom courses (no symptoms at T1 and T2) ranged from 31.9% (PTSS) to 62.5% (anxiety), those with adapted symptom courses (symptoms at T1 and no symptoms at T2) ranged from 20.8% (anxiety) to 30.6% (PTSS), those with reacting symptom courses (no symptoms at T1 and symptoms at T2) ranged from 5.6% (anxiety) to 6.9% (depression), and those with persisting symptom courses (symptoms both at T1

and T2) ranged from 9.7% (depression) to 26.4% (PTSS). Baseline symptom severity and asylum status were shown to be significant predictors of greater symptom severity at T2 in hierarchical multiple regression analysis.

Discussion: Contrary to previous findings on symptom courses in refugee minors, symptom severity ameliorated between assessments in our sample. Decisions about the adolescents' asylum process appear to play an important role with respect to their levels of psychological distress. Since most of the adolescents were still living in high-support living arrangements at T2, the influence of accommodation type could not be analyzed, but the protective influence of high-support living arrangements is known from previous studies, which could additionally explain the improvement of symptoms in this sample. Despite general alleviation of symptoms, more than one third of the sample still showed clinically significant rates of PTSS at T2, which is why dissemination and implementation of appropriate treatments is crucial. Limitations of the study include the small sample size and the convenient nature of the sample.

4.2 Executive summary of Publication 2: A pilot study on ecological momentary assessment in asylum-seeking children and adolescents resettled to Germany

Müller, L. R. F., Gossmann, K., Schmid, R. F., Rosner, R. & Unterhitzberger, J. (2021a). A pilot study on ecological momentary assessment in asylum-seeking children and adolescents resettled to Germany: Investigating compliance, post-migration factors, and the relation between daily mood, sleep patterns, and mental health. *PLOS One*, 16(2), <https://doi.org/10.1371/journal.pone.0246069>

Background: Young refugees in Western countries show high levels of psychological distress. However, most findings stem from investigations with retrospective questionnaires and the transcultural transferability of symptom measures is still debated. For example, we do not know whether these symptom measures manage, in terms of predictive validity, to reflect negative consequences in everyday life at a lower threshold and less culturally contestable level, e.g., in terms of mood and sleep parameters. Ecological Momentary Assessment (EMA) is a promising approach for this purpose, but it has not yet been used in the young refugee group, which is why implementability of and compliance with the protocol are unclear.

Methods: Following a retrospective questionnaire assessment, we conducted an EMA study with $N = 40$ adolescent refugees over a period of 2 weeks with 3 measurement points per day. The questionnaires screened for PTSS, anxiety, and depression; in the subsequent EMA, participants rated

daily mood, sleep parameters, and post-migration factors on a daily basis. Building on a total of $n = 680$ measurements, data were analyzed using multilevel modelling.

Results: Of 42 possible test time points over the study runtime, adolescents responded to a mean of $M = 17$ prompts ($SD = 9.85$), resulting in an overall compliance of 40.5%. Evening prompts were completed with the highest compliance (48.8%). In multilevel models, higher PTSS scores as well as higher anxiety scores were significantly associated with higher levels of low mood in daily life. Higher PTSS scores were also associated with lower sleep duration, and higher anxiety scores were associated with higher sleep duration. Depression symptoms were not associated with any of the parameters assessed in the EMA.

Discussion: As the first EMA study with adolescent refugees, the approach showed promising results, although overall compliance was rather low as compared to studies with similar age groups. The association found between questionnaire-assessed symptom scores and outcomes in daily mood and sleep parameters suggest that the symptom measures in use might also have transcultural diagnostic value as they succeeded in reflecting consequences of higher symptom levels in everyday life. The findings underscore the need for therapeutic services for severely traumatized young refugees. Limitations of the study include the lack of a comparison group and the convenient nature of the sample.

4.3 Executive summary of Publication 3: Screening for posttraumatic stress symptoms in young refugees. Comparison of questionnaire data with and without involvement of an interpreter

Müller, L. R. F., Unterhitzberger, J., Wintersohl, S., Rosner, R. & König, J. (2021b). Screening for posttraumatic stress symptoms in young refugees: Comparison of questionnaire data with and without involvement of an interpreter. *International Journal of Environmental Research and Public Health*, 18(6803), <https://doi.org/10.3390/ijerph18136803>

Background: The unprecedented number of young refugees with multiple traumatization in Western countries calls for brief and valid screenings to provide appropriate treatments to those individuals in need. However, in the field of refugees and migration, where groups of people are culturally and linguistically diverse, symptom measures are not available in all languages needed. Therefore, (lay) interpreters are often used in the practice of research, diagnostics and therapy. However, there are

hardly any quantitative data available so far that shed light on the influence of interpreters on therapeutic and diagnostic processes in the field of mental health services.

Methods: We report on a post-hoc analysis of the Child and Adolescent Trauma Screen (CATS), whose psychometric properties were examined as a function of interpreter involvement in a sample of $N = 145$ young refugees. Screenings were conducted over the course of two studies, half with and half without interpreters. Analyses included the calculation of Cronbach's alpha and item-scale correlations for the total and subscales of the CATS in both groups as well as the calculation of a confirmatory factor analysis in the total sample.

Results: The CATS total scale showed good internal consistency with Cronbach's $\alpha = 0.84$. Internal consistencies of the subscales were, partially, in the non-acceptable range and did not differ statistically between the groups with and without interpreters, although descriptively the interpreter group tended to show higher internal consistencies in all subscales. Five items in the total sample (5 in the group without interpreters and 3 in the group with interpreters) had item-scale correlations ≤ 0.30 . After the exclusion of items with low item-scale correlations, the results of the confirmatory factor analysis were acceptable.

Discussion: The reliability of the CATS total scale was lower in our sample of culturally diverse young refugees than in its original validation, but still good. Differences in psychometric scores between the interpreter and no-interpreter groups were small and tended to favor the interpreter group. The common practice of using lay interpreters in screening situations does not appear to have a disadvantageous effect, at least in terms of measurement reliability. Limitations of the study include the post-hoc design and the fact that study participants could not be randomly assigned to the different groups.

5. Discussion and conclusions

5.1 General discussion of study findings

This dissertation in general and the publications presented addressed the mental health of young refugees in Germany. Specifically, building on a baseline survey with adolescents who migrated to Europe in the wake of the 2015-17 refugee crisis (Müller et al., 2019), three main research questions were explored through three subsequent studies.

The first research question (publication 1) aimed to elicit symptom trajectories within one year of the original baseline survey. Thus, to the author's knowledge, it was the first longitudinal survey with young refugees in Germany and the first to focus on adolescents who migrated during the refugee crisis. Contrary to previous comparable studies from other European countries (e.g., Jakobsen et al., 2017; Jensen et al., 2014), the psychological distress of our sample decreased significantly with regard to most of the recorded symptoms (PTSS, depression, and anxiety). Significant predictors of greater symptom severity at follow-up were symptom severity at baseline and decisions on adolescents' asylum applications. In this regard, those adolescents who had not yet received a decision or had received a negative decision on their asylum application at follow-up exhibited the most severe symptoms and differed significantly from adolescents who had received a positive decision between assessments on most symptom outcomes recorded (PTSS, depression, anxiety). This once again illustrates the severe effects of the asylum process that have been previously reported in the literature (Heptinstall et al., 2004; Jakobsen et al., 2017). Several lines of reasoning can be opened to the question of explaining the mitigating symptom trajectories in our sample: On the one hand, methodological artifacts and time effects such as regression to the mean (Zhang & Tomblin, 2003) do, of course, exist, but can never be completely avoided in this kind of research designs. On the substantive level, it can be assumed that the relatively large proportion of adolescents with positive asylum decisions (51 of 72 adolescents, 25 of whom had positive decisions between assessments) may have contributed to the improvement in symptoms in the overall sample. In addition, the high-support accommodation arrangements in which most youths were still living at follow-up (45 of 72 youths in semi- or full-care units of youth welfare services; the remainder mostly with family members), may have played their part in the improvement of symptoms. Because the variance related to low-support living arrangements (e.g., centers for adults) was too small, i.e., no youths were transferred to such settings between assessments, this influential factor could not be adequately tested statistically. However, given previous research findings in which housing conditions have emerged as one of the most crucial risk or protective factors (cf. Part 2.1;

Höhne et al., 2020; Mitra & Hodes, 2019; O'Higgins et al., 2018), an influence on symptom improvement seems likely. Although the overall levels of mental distress declined within a year, two things must be noted: First, a substantial proportion of adolescents (e.g., more than one third with regard to PTSS) still had clinically significant symptoms at the time of follow-up, even though most of the adolescents had been living in a safe environment, had been living in Germany for almost 3 years, and most of them had been granted asylum. This points to the fact that PTSS are mental health conditions that do, without treatment, remain stable in a considerable proportion of youths which is in accordance with a recent 5-year follow-up study in Norway where depression, but not PTSS rates, had declined at follow-up (Jensen et al., 2019). Second, there were large inter-individual symptom trajectories with clusters of “unremarkable”, “adapted”, “reacting”, and “persisting”. Again, this finding is consistent with now some studies that identified large variability in trajectories among youth (Jensen et al., 2014; Montgomery, 2010)—which is why an individual case-by-case view, where the tendency of worsening symptoms is also possible, is critical. Taken together, the results of this study fall out of pattern compared to the bulk of the studies from the Introduction's review (cf. Part 2.3, Table 3). There, with the exception of the early Krupinski & Burrows (1986) study, symptom mitigation was reported only after a follow-up period of at least 5 years. However, the contextual factors described above (large proportion of positive asylum decisions, high-support living arrangements) may have differed from those of most comparable studies, which may partly explain the divergent findings in this publication.

The second research question (publication 2) aimed at piloting the EMA approach in the group of young refugees. To the author's knowledge, there are isolated studies that have tested EMA-like procedures such as daily diaries with young refugees (Holmes et al., 2017). However, at the time of this study, no smartphone-based EMA studies existed with young refugees, which offer a wider scope of possibilities through the use of new technologies (Ebner-Priemer & Trull, 2009). Accordingly, a main goal of the study was to determine the extent to which the procedure could be implemented in the target group in principle, and for this purpose, compliance with the EMA protocol was examined as a determining factor for its feasibility. It can be said that the identified compliance rate (40.5%) was considerably lower compared to that found in meta-analyses of EMA studies with children and adolescents (54.6% to 96.2%, Wen et al., 2017). Possible substantive reasons for this finding may be that the refugee adolescents were possibly not as familiar with psychological testing procedures in general as peers socialized in the West (Ehnholt & Yule, 2006; Paalman et al., 2013)—in an EMA study with adult refugees, the compliance rate of 55%, for example, was also rather low (Koch, Liedl, Takano, & Ehring, 2020). In addition, at the more procedural level, it can be said that compliance rate

in our sample might not be similar compared to other EMA studies with children and adolescents because, analytically, they have unequal starting conditions. For example, in existing studies, authors often exclude individuals with low compliance from the analysis—sometimes down to a response rate of < 50%—which, of course, has a beneficial effect on overall compliance rate (Heron, Everhart, McHale, & Smyth, 2017). In our sample, however, we excluded only a total of 4 adolescents with compliance rates < 5% (less than 3 completed prompts over the study runtime), which accordingly adversely affected the overall compliance rate. Considering both explanations, it can be said that the EMA approach might still be a promising means for assessing low-threshold symptoms or even symptom measures in daily life, but future implementations of the EMA approach might consider alterations like audio-assisted assessment tools (Morina et al., 2017) or including participants' caregivers to monitor compliance to the study protocol. In addition, a second research question of the EMA study was to determine the relationship between symptom scores recorded in the questionnaires and low-threshold daily EMA parameters such as mood and sleep. With the exception of depression, all symptom outcomes (i.e., PTSS and anxiety) were associated with higher levels of poor mood as well as with some of the recorded sleep parameters (less sleep duration and higher sleep onset latency) in the subsequent EMA. This association may well seem intuitively expected, as this problem is a common phenomenon in PTSS and anxiety disorders (American Psychiatric Association, 2013). However, there is still an ongoing debate about the extent to which disorder categories in general and diagnostic instruments in particular have transcultural validity (Frounfelker et al., 2020; Paalman et al., 2013; Wells et al., 2015). Against this background, the elicited association can also be interpreted in terms of evidence for the predictive or transcultural validity of the symptom measures used: Adolescents who reported higher levels of distress in the questionnaires were also shown to being influenced by it in daily real-life settings and based on culturally less contentious phenomena such as bad mood and sleeping problems (Bronstein & Montgomery, 2013).

The third research question (publication 3) addressed the psychometric evaluation of the CATS in a pooled sample of underage refugees from two studies, the baseline study of this dissertation (Müller et al., 2019) and a pilot study (Unterhitzberger et al., 2019) on trauma-focused cognitive behavioral therapy (TF-CBT; Cohen, Mannarino, & Deblinger, 2006). As described in the introduction of this thesis (cf. Part 2.5), rather few quantitative findings exist on the influence of interpreters on therapeutic and diagnostic processes in mental health settings. In our analysis, the groups with and without interpreters did not differ significantly from each other with regard to examined psychometric parameters (internal consistency, mean symptom scores, item-scale correlations). The internal consistency found in the total sample was good and results of the confirmatory factor analysis

performed were acceptable after exclusion of items with poor item characteristics, although in both cases lower than in the original validation of the CATS (Sachser et al., 2017). However, because our sample was a culturally diverse sample with participants from over 10 different countries, the deviation from the original study, which examined national samples, may not be too surprising. Although there were no statistical differences between the groups with and without interpreters—as a tendency, e.g., with respect to the reliability of all subscales of the CATS, the interpreter group showed consistently better scores. Nevertheless, even in the group with interpreters, the internal consistencies of some subscales were outside the acceptable range (especially avoidance and hyperarousal). This may be due to several reasons: Analytically, scales with only two items are not ideal (Kline, 2005); content-wise, of course, the questionnaires may have captured culturally inappropriate concepts or—despite the employment of interpreters—language difficulties may have occurred. Should the latter reason be decisive, it could be useful for the reliable recording of the subscales to resort to questionnaire versions prepared in advance and translated by professional interpreters, since the translation could be more elaborate and thus more accurate (Bhui et al., 2003).

5.2 Implications

Some clinical and policy implications can be derived from the integration of the studies conducted. The scientific implications regarding further research gaps are discussed in a separate chapter (cf. Part 5.4). First of all, it can be stated that the findings regarding the high psychological distress of young refugees have gained further evidence through the studies conducted. Not only do a considerable proportion of young refugees in relatively well-established living conditions still show considerable levels of psychological distress (publication 1), this is also detectable in the young people's everyday lives in the form of poorer mood and less sleep (publication 2). At the same time, there is a large number of transitions and individual symptom trajectories (publication 1) for which indicators have been found (e.g., asylum procedures), but which could not be conclusively clarified (e.g., influence of youth welfare services).

Against this context, it seems useful to start by looking at the possible roles of youth welfare services in the young people's adaptation process. Youth welfare caregivers, at least in Germany, are usually the primary point of reference for young refugees in terms of issues concerning care, life organization and accommodation, especially in the first few years after arrival (Tangermann & Hoffmeyer-Zlotnik, 2018). Although the influence of youth welfare services compared to low-support

living arrangements could not be analyzed further in publication 1, the protective influence of high-support housing conditions is known from other studies (O'Higgins et al., 2018). As a policy matter, therefore, it seems prudent to ensure that youth have access to high-support youth welfare services and living arrangements whenever possible, since basal needs are being met there and a fairly relevant proportion of the youths are, in terms of mental health, already experiencing benefits from it. However, given the high variability of symptom trajectories (publication 1), where late-onset symptomatology is also possible, repeated screening and monitoring of symptomatology seems indicated to identify possible transition points in the adolescents' lives in a timely and targeted manner (Smid, Lensvelt-Mulders, Gerty, Knipscheer, Gersons, & Kleber, 2011). A conceivable alternative is that specially trained caregivers in youth welfare could take on this role in order to subsequently also provide support in initiating therapy which often poses a major challenge for asylum-seeking youths, given that they might be overrepresented in inpatient psychiatric care (Ramel, Täljemark, Lindgren, & Johansson, 2015) but underrepresented in psychotherapy services (Horlings & Hein, 2018). In this context, it can be stated that brief and professionally translated screening measures in the languages of origin, where the translation process is well elaborate, are the gold standard, ensuring cultural sensitivity of the measure and eliminating potential linguistic pitfalls (Bhui et al., 2003). However, if such translated versions are not available, the common practice of employing lay interpreters seems at least not to be disadvantageous (publication 3). Also, methods such as the EMA approach could be a valuable tool for youth care workers to assess needs, as asking for culturally non-controversial problem areas could generate initial indications of which youth should be further assessed for needs in more detail (publication 2). The EMA approach also seems promising in light of the fact that symptoms may be overlooked by caregivers in the normal course of care due to the adolescents' otherwise good adaptation (Mollica, Poole, Son, Murray, & Tor, 1997; Sack et al., 1993)

In addition to initiating treatment, caregivers can also act as a link to therapy in the form of being involved as an active agent, such as in TF-CBT (Cohen et al., 2006). In terms of effective treatment methods, several procedures have emerged as promising approaches in recent years (see Table 6). In the umbrella review I prepared for this dissertation, there are 7 reviews and meta-analyses with a total number of 60 studies (of which 23 controlled trials) and 4270 individuals. This shows the wide range of treatment approaches that have been examined, ranging from school and community-based interventions to multimodal interventions to mental health counseling to systemic interventions and cognitive behavioral therapy. However, it must be said that only three of the reviews systematically report effect sizes (Eberle-Sejari, Nocon, & Rosner, 2015; Nocon, Eberle-Sejari, Unterhitzenberger, & Rosner, 2017; Tyrer & Fazel, 2014), with values as high as .31 (school and community-based

interventions, Tyrer & Fazel, 2014) and .88 (Nocon et al., 2017) in terms of comparisons to the control group. In, by far, the most comprehensive analysis (Nocon et al., 2017), only 2 of 11 studies with comparison groups showed significant results (Ehnholt, Smith, & Yule, 2005; Tol et al., 2012)—the latter of which was not realized in a Western host country but in a war-affected region in Sri Lanka (Tol et al., 2012). More recent analyses (Demazure, Gaultier, & Pinsault, 2018; Hettich, Seidel, & Stuhmann, 2020; Mitra & Hodes, 2019) included mainly case studies in this regard, in places, making a rigorous appraisal of treatment effectiveness difficult. Therefore, it must be stated that the number of studies on therapy programs that have proven to be effective is still rather thin, despite the seven reviews that have emerged in the meantime. Nevertheless, promising therapy and prevention programs exist, which have been evaluated in recent studies, some of which are not yet included in the reviews. Among these, KIDNET (Ruf et al., 2010) and Mein Weg (“My way”, Pfeiffer, Sachser, Rohlmann, & Goldbeck, 2018) have the most robust evidence base, having demonstrated efficacy in rigorous randomized-controlled trials. TF-CBT (Cohen et al., 2006) has also shown promising results in an initial pilot study (Unterhitzenberger et al., 2019) and is overall one of the best evaluated therapies for children and adolescents with trauma sequelae (Cohen, Deblinger, & Mannarino, 2018). Procedurally, it can be said that treatment should be, if possible, embedded in stepped-care approaches, which are recommended especially for settings with low resources (Bajbouj et al., 2018; Horlings & Hein, 2018). In this way, they enable clinicians and caregivers to identify those at risk and ensure tailored treatment for the population under investigation.

Table 6. Overview of reviews ($N_1 = 7$) summarizing studies investigating mental health interventions ($N_2 = 60$, of which controlled trials, $n_1 = 23$) for asylum-seeking children and adolescents ($N_3 = 4270$).

Review	Populations	Treatment types	Treatments (for mental disorders)	Results	No. of studies included (of which controlled trials, participants)	Σ cumulative studies (of which controlled trials, participants) ^a
Tyrer & Fazel (2014)	Unaccompanied and accompanied	School and community-based interventions	No restriction	Cohen's d between .31 (vs. control) and .93 (pre vs. post, for 7 studies)	21 (12, 1694) ^b	21 (12, 1694)
Eberle-Sejari et al. (2015)	Unaccompanied and accompanied	Psychotherapy and psychosocial interventions	PTSD	Cohen's d (pre vs. post) between .04 and 2.58 (for 10 studies)	10 (6, 640)	24 (14, 1871)
Sullivan & Simonson (2015)	Unaccompanied and accompanied	School-based interventions	No restriction	No quantitative analyses conducted, partial improvements of symptoms reported in 11 out of 13 studies	13 (6, 871)	28 (15, 2363)
Nocon et al. (2017)	Unaccompanied and accompanied (including internally displaced minors)	Psychosocial interventions	PTSD, depression, anxiety, grief, general distress	SMC (vs. control) between -.02 and .88 (for 11 studies), only 2 of which were significant (.37 and .88, both CBT) SMC (pre vs. post) between .29 and 1.94, combined pre-post SMCs not interpretable due to high heterogeneity	23 (16, 2064)	37 (23, 3697)

Table 6. (continuation)

Demazure et al. (2018)	Only unaccompanied	TF-CBT, systemic interventions, multimodal interventions, transcultural interventions	No restriction	No quantitative analyses conducted (mostly case reports), partial improvements of symptoms reported in 10 out of 17 studies	17 (1, 65)	53 (23, 3747)
Mitra & Hodes (2019)	Only unaccompanied	TF-CBT, CBT, mental health counselling	PTSD	No quantitative analyses conducted (mostly case reports), improvements of symptoms reported in 3 out of 4 studies	4 (0, 311)	54 (23, 4051)
Hettich et al. (2020)	Newly arrived adolescent refugees (unaccompanied and accompanied)	Psychosocial interventions within the first year after resettlement	No restriction	No quantitative analyses conducted (mostly case reports), partial improvements of symptoms reported in 7 out of 7 studies	7 (0, 220)	60 (23, 4270)

Note. Reviews that only partly included studies in children and adolescents were excluded (e. g., Turrini et al 2018), and so were reviews focussing exclusively on interventions employed in refugee camps or low and middle-income countries (see Jordans et al. 2009 for information in this matter) and practitioner reviews and reviews conducted in an unsystematic manner (e. g., Ehntholt & Yule, 2006; Fazel & Betancourt, 2017, Fazel, 2018, Horlings & Hein, 2018; Frounfelker et al., 2020). CBT = Cognitive behavioral therapy, PTSD = Posttraumatic stress disorder, SMC = Standardized mean changes, SMD = Standardized mean differences, TF-CBT = Trauma-focused cognitive behavioral therapy.

^a Here, all different studies and their participants are counted across the reviews. If several studies report on the same sample, participants are only counted once.

^b Here, 5 controlled trials were conducted in refugee camps.

5.3 Strengths and limitations

The studies conducted have several strengths and limitations. In addition to the findings illustrated in the previous chapters that can help to refine the overall evidence base in the mental health refugee context, it can be noted first of all that the respective studies primarily have novelty value: The studies each aimed to identify research gaps from the review of the current study situation at the time of study initiation and to close these gaps to some extent. For example, at that time there were no longitudinal studies with underage refugees in Germany and those young refugees who migrated to Germany in the course of the 2015-17 refugee crisis, there were no EMA studies with young refugees, and the quantitative study situation regarding interpreter use was (and still is) very scarce. An objective of the studies was to address these black spots and to give starting points for further research. If nothing else, this thesis has thereby attempted to contribute to the broader picture that continues to emerge in the context of minor refugee mental health research—from establishing a compendium of the current state of research on various subfields of the topic in the introduction to addressing the specific research questions in the form of three publications that have been taken up in the later part of this thesis.

In addition, limitations can of course be identified on two different levels. On the one hand, on the micro-level of the individual sub-studies: Here, a central point is that the samples of all publications consisted of convenience samples, which, as is well known, can promote all kinds of biases (Pruchno et al., 2008). This is mainly due to the fact that all studies were outreach projects that did not have access to the overall register of refugee youth in Germany, rendering random sampling difficult. In addition, the samples in all publications were rather small, which partly prevented more in-depth analyses (e.g., confirmatory factor analysis for both subgroups in publication 3, influence of low-support living arrangements in publication 1). Also, some basic design-theoretical considerations could, partly, not be adhered to, such as the inclusion of an appropriate control group (e.g., native peers in publication 2, a third comparison group using professionally translated questionnaire versions in publication 3) or randomization to study conditions (publication 3). To some extent, this is due to the nature of the subject matter (publication 3)—linguistic competence, for instance, is difficult or impossible to manipulate experimentally—or to the pilot character of the study conducted where preliminary work was simply lacking and where investigating feasibility of and compliance with the study protocol was the major focus of the study (publication 2). In addition, on the macro-level of the overall thesis, there is the limitation that the studies conducted could naturally only address a small part of all existing research gaps and open questions in the field of clinical research with young

refugees. The elicitation of individual research questions usually opens up a whole series of further puzzles and it is up to future research to pursue these. The following section (cf. Part 5.4) describes in more detail how these limitations might be addressed in further research.

5.4 Future directions

Since the first more specific research on the mental health of children and adolescents with refugee experience in the 1980s, the scale and research base in this area has expanded significantly. Nevertheless, there are still areas where further research and related processes to be initiated can be identified—these result directly from the studies conducted on the one hand and from reviewing the existing literature in the entire field of the mental health of refugee minors on the other.

First, it can be stated that the vast majority of epidemiological studies, regardless of whether they are screening or interview studies, are composed of convenient samples. These are known to promote selection biases that could distort the results in various conceivable directions (Pruchno et al., 2008). One of the most comprehensive analyses with a representative random sample in this field has been done almost 15 years ago (Bean, Derluyn et al., 2007), other, more recent studies come about only sporadically and not in the same quality, because they are either register-based cohort studies (Norredam, Nellums, Nielsen, Byberg, & Petersen, 2018) or the screening instruments used do not have the same elaboration as those in older studies (Solberg et al., 2020). Therefore, further, large-scale studies are desirable, preferably in an institutionalized setting to warrant representativeness and random sample selection. Ideally, such projects incorporate longitudinal surveys in their design to further illuminate the large inter-individual variance in adolescents' symptom trajectories that has now been described in some studies (Jensen et al., 2014; Montgomery, 2010, publication 1) and to locate predictors of individual symptom trajectories. This may ultimately help to improve both primary and specific therapeutic care for young refugees in the host country.

Following on from this, secondly, it can be stated that further research is needed on the effective treatment of young refugees. On the one hand, of a more structural nature: treatments that have been shown to be effective in recent years should be compiled in a new meta-analysis, similar to that of Nocon et al. (2017). Although more recent reviews also exist in this area, some of these lack exhaustive identification and rigorous appraisal of the most well-designed original studies as well as a quantitative assessment of a pooled effect size across therapies. On the other hand, the gap between science and practice should be narrowed by specifically planning dissemination and implementation

studies that can examine and, if necessary, facilitate the transition of promising therapy approaches into standard care. Such projects are currently realized in the form of stepped-care approaches (Rosner et al., 2020), which provide an efficient and tailored form of treatment and are thus particularly useful for areas where resources are limited. Lastly, more treatment modalities should be further investigated to broaden the spectrum of effective therapies at hand for this vulnerable population.

Thirdly, further EMA studies with adolescent refugees might also be useful in this context. It was shown that higher symptom scores recorded in the questionnaire predicted worse mood and less sleep in the adolescents' everyday life, which can be understood not least as a component of the transcultural validation of symptom measures. Complementary to this, it would be useful to illuminate the reverse direction of effect—that is, whether and to what extent low-threshold parameters such as mood and sleep recorded in the EMA can also predict a subsequent assessment of higher psychological symptoms. Also, in light of the rather low compliance with the EMA protocol in our study, embedding the approach in the youth service context could be helpful as primary caregivers could assist in completing the EMA prompts. In this regard, future EMA studies with young refugees should consider incorporating conclusive interviews with the youth in order to shed light on the potential pitfalls and barriers to EMA implementation, as well as modifications such as audio-assisted assessment tools to reliably ensure a good understanding of the questions. In addition, the EMA approach in particular, which is well-suited for capturing temporally volatile variables, may also be valuable to further explore post-migration factors in the lives of youth that are known to influence the mental health of young refugees (cf. Part 2.1). Given that, in this area, the classification and assessment measures are often still very heterogeneous, it would be desirable to develop a uniform test battery for the assessment of post-migration factors including resources and coping strategies that is validated for the target group, which would, in turn, facilitate comparability across studies.

Finally, it can be said that further research seems to be necessary in the field of interpreter-assisted diagnostics and therapy. On the one hand, in the form of evaluated trainings for language mediators, which aim at sensitizing (lay) interpreters for important aspects of therapy, imparting knowledge and generally preparing them for cooperation in therapy. By now, quite a number of authors have pointed out this gap (Cecchet & Calabrese, 2011; Hunt & Swartz, 2017; Searight & Armrock, 2013)—and a corresponding evaluation is currently in preparation in connection with a larger dissemination project (Rosner et al., 2020). Second, also in relation to further evaluating the extent to which the involvement of interpreters influences diagnostic and therapeutic processes: Our conducted post-hoc analysis is only a modest quantitative starting point for this, which should be complemented by further work including, among others, the comparison of the

interpreter-assisted screening modalities with a gold standard clinical interview. Especially in the field of interpreter-assisted mental health services, common research design principles such as randomization and control conditions are difficult to implement, since factors such as language competence, etc., can hardly be manipulated experimentally. Here, creative solutions have to be found and the whole spectrum of possibilities has to be exploited: For example, very early analyses from the 1970s on this topic already relied on experimental manipulations with audio recordings to make the influence of the quality of interpreting on diagnostic results quantifiable (Marcos, 1979; Price, 1975). Considering that more than 40 years have passed since then and that technical developments offer far more possibilities, a rediscovery and further development of these early research efforts, among other methods, could be a promising pathway.

References

(References for the umbrella reviews are listed separately at the end of this list)

- Achenbach, T. M. (1991). *Manual for the child behavioral checklist/4-18 and 1991 profile*. Burlington, USA: University of Vermont Department of Psychiatry.
- Ajduković, M., & Ajduković, D. (1993). Psychological well-being of refugee children. *Child Abuse & Neglect*, 17, 843–854.
- Ajduković, M., & Ajduković, D. (1998). Impact of displacement on the psychological well-being of refugee children. *International Review of Psychiatry*, 10, 186–195.
- American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders [DSM-5]* (5th ed.). Washington D. C.: American Psychiatric Association.
- Ardenne, P. d', Ruaro, L., Cestari, L., Fakhoury, W., & Priebe, S. (2007). Does Interpreter-Mediated CBT with Traumatized Refugee People Work? A Comparison of Patient Outcomes in East London. *Behavioural and Cognitive Psychotherapy*, 35(3), 293–301. <https://doi.org/10.1017/S1352465807003645>
- Bajbouj, M., Alabdullah, J., Ahmad, S., Schidem, S., Zellmann, H., Schneider, F., & Heuser, I. (2018). Psychosoziale Versorgung von Flüchtlingen in Deutschland: Erkenntnisse aus der Not- und Entwicklungshilfe [Psychosocial care for refugees in Germany: lessons learned from emergency and developmental care] [Psychosocial care of refugees in Germany : Insights from the emergency relief and development aid]. *Der Nervenarzt*, 89(1), 1–7. <https://doi.org/10.1007/s00115-017-0326-y>
- Bamford, J., Fletcher, M., & Leavey, G. (2021). Mental Health Outcomes of Unaccompanied Refugee Minors: A Rapid Review of Recent Research. *Current Psychiatry Reports*, 23(8), 46. <https://doi.org/10.1007/s11920-021-01262-8>
- Bean, T., Derluyn, I., Eurelings-Bontekoe, E., Broekaert, E., & Spinhoven, P. (2006). Validation of the multiple language versions of the Reactions of Adolescents to Traumatic Stress questionnaire. *Journal of Traumatic Stress*, 19(2), 241–255. <https://doi.org/10.1002/jts.20093>
- Bean, T., Eurelings-Bontekoe, E., Derluyn, I., & Spinhoven, P. (2004). *HSCL-37A User's Manual*. Oegstgeest: Centrum 45.
- Bean, T. M., Derluyn, I., Eurelings-Bontekoe, E., Broekaert, E., & Spinhoven, P. (2007). Comparing psychological distress, traumatic stress reactions, and experiences of unaccompanied refugee minors with experiences of adolescents accompanied by parents. *The Journal of Nervous and Mental Disease*, 195(4), 288–297. <https://doi.org/10.1097/01.nmd.0000243751.49499.93>
- Bean, T. M., Eurelings-Bontekoe, E., & Spinhoven, P. (2007). Course and predictors of mental health of unaccompanied refugee minors in the Netherlands: One year follow-up. *Social Science & Medicine*, 64(6), 1204–1215. <https://doi.org/10.1016/j.socscimed.2006.11.010>
- Bhui, K., Mohamud, S., Warfa, N., Craig, T. J., & Stansfeld, S. A. (2003). Cultural adaptation of mental health measures: improving the quality of clinical practice and research. *British Journal of Psychiatry*, 183, 184–186.

- Bronstein, I., & Montgomery, P. (2011). Psychological distress in refugee children: A systematic review. *Clinical Child and Family Psychology Review*, 14(1), 44–56. <https://doi.org/10.1007/s10567-010-0081-0>
- Bronstein, I., & Montgomery, P. (2013). Sleeping patterns of Afghan unaccompanied asylum-seeking adolescents: A large observational study. *PloS One*, 8(2), e56156. <https://doi.org/10.1371/journal.pone.0056156>
- Brune, M., Eiroá-Orosa, F. J., Fischer-Ortman, J., Delijaj, B., & Haasen, C. (2011). Intermediated communication by interpreters in psychotherapy with traumatized refugees. *International Journal of Culture and Mental Health*, 4(2), 144–151. <https://doi.org/10.1080/17542863.2010.537821>
- Cecchet, S. J., & Calabrese, D. (2011). Interpreter-Mediated Therapy for Refugees: A Need for Awareness and Training. *Graduate Student Journal of Psychology*, 13, 12–16.
- Cohen, J. A., Mannarino, A. P., & Deblinger, E. (2006). *Treating trauma and traumatic grief in children and adolescents*. New York: Guilford Press.
- Cohen, J. A., Deblinger, E., & Mannarino, A. P. (2018). Trauma-focused cognitive behavioral therapy for children and families. *Psychotherapy Research : Journal of the Society for Psychotherapy Research*, 28(1), 47–57. <https://doi.org/10.1080/10503307.2016.1208375>
- Demazure, G., Gaultier, S., & Pinsault, N. (2018). Dealing with difference: A scoping review of psychotherapeutic interventions with unaccompanied refugee minors. *European Child & Adolescent Psychiatry*, 27(4), 447–466. <https://doi.org/10.1007/s00787-017-1083-y>
- Derluyn, I., & Broekaert, E. (2007). Different perspectives on emotional and behavioural problems in unaccompanied refugee children and adolescents. *Ethnicity & Health*, 12(2), 141–162. <https://doi.org/10.1080/13557850601002296>
- Eberle-Sejari, R., Nocon, A., & Rosner, R. (2015). Zur Wirksamkeit von psychotherapeutischen Interventionen bei jungen Flüchtlingen und Binnenvertriebenen mit posttraumatischen Symptomen. *Kindheit Und Entwicklung*, 24(3), 156–169. <https://doi.org/10.1026/0942-5403/a000171>
- Ebner-Priemer, U. W., & Trull, T. J. (2009). Ambulatory Assessment. An Innovative and Promising Approach for Clinical Psychology. *European Psychologist*, 14(2), 109–119. <https://doi.org/10.1027/1016-9040.14.2.109>
- Ehnholt, K. A., Smith, P. A., & Yule, W. (2005). School-based Cognitive-Behavioural Therapy Group Intervention for Refugee Children who have Experienced War-related Trauma. *Clinical Child Psychology and Psychiatry*, 10(2), 235–250. <https://doi.org/10.1177/1359104505051214>
- Ehnholt, K. A., & Yule, W. (2006). Practitioner review: Assessment and treatment of refugee children and adolescents who have experienced war-related trauma. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 47(12), 1197–1210. <https://doi.org/10.1111/j.1469-7610.2006.01638.x>
- Eisenbruch, M. (1988). The Mental Health of Refugee Children and Their Cultural Development. *International Migration Review*, 22(2), 282–300.

- El Baba, R., & Colucci, E. (2017). Post-traumatic stress disorders, depression, and anxiety in unaccompanied refugee minors exposed to war-related trauma: a systematic review. *International Journal of Culture and Mental Health*, 11(2), 194–207. <https://doi.org/10.1080/17542863.2017.1355929>
- Ellis, B. H., MacDonald, H. Z., Lincoln, A. K., & Cabral, H. J. (2008). Mental health of Somali adolescent refugees: The role of trauma, stress, and perceived discrimination. *Journal of Consulting and Clinical Psychology*, 76(2), 184–193. <https://doi.org/10.1037/0022-006X.76.2.184>
- Fazel, M., Reed, R. V., Panter-Brick, C., & Stein, A. (2012). Mental health of displaced and refugee children resettled in high-income countries: Risk and protective factors. *The Lancet*, 379(9812), 266–282. [https://doi.org/10.1016/S0140-6736\(11\)60051-2](https://doi.org/10.1016/S0140-6736(11)60051-2)
- Federal Office for Migration and Refugees (2015). Aktuelle Zahlen zu Asyl. Ausgabe Dezember 2015. Retrieved from https://www.bamf.de/SiteGlobals/Forms/Suche/Expertensuche_Flyout_Formular.html?templateQueryString=2Aktuelle+Zahlen+zu+Asyl2&sortOrder=dateOfIssue_dt+desc&pageLocale=de
- Federal Office for Migration and Refugees (2016). Aktuelle Zahlen zu Asyl. Ausgabe Dezember 2016. Retrieved from https://www.bamf.de/SiteGlobals/Forms/Suche/Expertensuche_Flyout_Formular.html?templateQueryString=2Aktuelle+Zahlen+zu+Asyl2&sortOrder=dateOfIssue_dt+desc&pageLocale=de
- Federal Office for Migration and Refugees (2017). Aktuelle Zahlen zu Asyl. Ausgabe: Dezember 2017. Retrieved from https://www.bamf.de/SharedDocs/Anlagen/DE/Statistik/AsylinZahlen/aktuelle-zahlen-zu-asyl-dezember-2017.pdf?__blob=publicationFile&v=6
- Freud, A., & Burlingham, D. T. (1943). *War and Children*. London: Medical War Books.
- Frounfelker, R. L., Miconi, D., Farrar, J., Brooks, M. A., Rousseau, C., & Betancourt, T. S. (2020). Mental Health of Refugee Children and Youth: Epidemiology, Interventions, and Future Directions. *Annual Review of Public Health*, 41, 159–176. <https://doi.org/10.1146/annurev-publhealth-040119-094230>
- Gadeberg, A. K., & Norredam, M. (2016). Urgent need for validated trauma and mental health screening tools for refugee children and youth. *European Child & Adolescent Psychiatry*, 25(8), 929–931. <https://doi.org/10.1007/s00787-016-0837-2>
- Gartley, T., & Due, C. (2017). The Interpreter Is Not an Invisible Being: A Thematic Analysis of the Impact of Interpreters in Mental Health Service Provision with Refugee Clients. *Australian Psychologist*, 52(1), 31–40. <https://doi.org/10.1111/ap.12181>
- Giaconia, R. M., Reinherz, H. Z., Silverman, A. B., Pakiz, B., Frost, A. K., & Cohen, E. (1995). Traumas and Posttraumatic Stress Disorder in a Community Population of Older Adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry*, 34(10), 1369–1380.
- Hanft-Robert, S., Römer, M., Morgenroth, O., Redlich, A., & Metzner, F. (2018). Handlungsempfehlungen für die dolmetschergestützte Psychotherapie mit Flüchtlingen und Asylbewerbern: Ergebnisse qualitativer Interviews mit Psychotherapeuten und Dolmetschern zu Chancen und Herausforderungen in der Triade. [Recommendations for action in interpreter-assisted psychotherapy with refugees and asylum seekers: results of qualitative interviews with psychotherapists and interpreters on opportunities and challenges in the triad.]. *Verhaltenstherapie*, 28(2), 73–81. <https://doi.org/10.1159/000480667>

- Harding, R. K., & Looney, J. G. (1977). Problems of Southeast Asian Children in a Refugee Camp. *American Journal of Psychiatry*, 134(4), 407–411.
- Hepinstall, E., Sethna, V., & Taylor, E. (2004). Ptsd and depression in refugee children: Associations with pre-migration trauma and post-migration stress. *European Child & Adolescent Psychiatry*, 13(6), 373–380. <https://doi.org/10.1007/s00787-004-0422-y>
- Heron, K. E., Everhart, R. S., McHale, S. M., & Smyth, J. M. (2017). Using Mobile-Technology-Based Ecological Momentary Assessment (EMA) Methods With Youth: A Systematic Review and Recommendations. *Journal of Pediatric Psychology*, 42(10), 1087–1107. <https://doi.org/10.1093/jpepsy/jsx078>
- Hettich, N., Seidel, F. A., & Stuhmann, L. Y. (2020). Psychosocial Interventions for Newly Arrived Adolescent Refugees: A Systematic Review. *Adolescent Research Review*, 5(2), 99–114. <https://doi.org/10.1007/s40894-020-00134-1>
- Hiller, R. M., Meiser-Stedman, R., Fearon, P., Lobo, S., McKinnon, A., Fraser, A., & Halligan, S. L. (2016). Research Review: Changes in the prevalence and symptom severity of child post-traumatic stress disorder in the year following trauma - a meta-analytic study. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 57(8), 884–898. <https://doi.org/10.1111/jcpp.12566>
- Hjern, A., & Angel, B. (2000). Organized violence and mental health of refugee children in exile: a six-year follow-up. *Acta Paediatrica*, 89, 722–727.
- Höhne, E., van der Meer, A. S., Kamp-Becker, I., & Christiansen, H. (2020). A systematic review of risk and protective factors of mental health in unaccompanied minor refugees. *European Child & Adolescent Psychiatry*. Advance online publication. <https://doi.org/10.1007/s00787-020-01678-2>
- Holmes, E. A., Ghaderi, A., Eriksson, E., Lauri, K. O., Kukacka, O. M., Mamish, M., . . . Visser, R. M. (2017). 'I Can't Concentrate': A Feasibility Study with Young Refugees in Sweden on Developing Science-Driven Interventions for Intrusive Memories Related to Trauma. *Behavioural and Cognitive Psychotherapy*, 45(2), 97–109. <https://doi.org/10.1017/S135246581600062X>
- Horlings, A., & Hein, I. (2018). Psychiatric screening and interventions for minor refugees in Europe: An overview of approaches and tools. *European Journal of Pediatrics*, 177(2), 163–169. <https://doi.org/10.1007/s00431-017-3027-4>
- Huemer, J., Karnik, N. S., Voelkl-Kernstock, S., Granditsch, E., Dervic, K., Friedrich, M. H., & Steiner, H. (2009). Mental health issues in unaccompanied refugee minors. *Child and Adolescent Psychiatry and Mental Health*, 3(1), 13. <https://doi.org/10.1186/1753-2000-3-13>
- Huemer, J., Karnik, N., Voelkl-Kernstock, S., Granditsch, E., Plattner, B., Friedrich, M., & Steiner, H. (2011). Psychopathology in African unaccompanied refugee minors in Austria. *Child Psychiatry and Human Development*, 42(3), 307–319. <https://doi.org/10.1007/s10578-011-0219-4>
- Hunt, X., & Swartz, L. (2017). Psychotherapy with a language interpreter: considerations and cautions for practice. *South African Journal of Psychology*, 47(1), 97–109. <https://doi.org/10.1177/0081246316650840>
- Ivert, A.-K., & Magnusson, M.-M. (2019). Drug use and criminality among unaccompanied refugee minors: a review of the literature. *International Journal of Migration, Health and Social Care*, 16(1), 93–107. <https://doi.org/10.1108/IJMHSC-05-2019-0050>

- Jahangiri, K., Tabatabaie, S., & Keykaleh, M. S. (2017). Mental Health Challenges in Immigrant and Refugee Children and Adolescents: A Systematic Review. *Emergencies and Disasters Quarterly*, 3(1), 3–10.
- Jakobsen, M., Demott, M. A. M., & Heir, T. (2014). Prevalence of Psychiatric Disorders Among Unaccompanied Asylum-Seeking Adolescents in Norway. *Clinical Practice & Epidemiology in Mental Health*, 10, 53–58.
- Jakobsen, M., Meyer DeMott, M. A., Wentzel-Larsen, T., & Heir, T. (2017). The impact of the asylum process on mental health: A longitudinal study of unaccompanied refugee minors in Norway. *BMJ Open*, 7(6), e015157. <https://doi.org/10.1136/bmjopen-2016-015157>
- Jensen, T. K., Skar, A.-M. S., Andersson, E. S., & Birkeland, M. S. (2019). Long-term mental health in unaccompanied refugee minors: Pre- and post-flight predictors. *European Child & Adolescent Psychiatry*, 28(12), 1671–1682. <https://doi.org/10.1007/s00787-019-01340-6>
- Jensen, T. K., Skårdalsmo, E. M. B., & Fjermestad, K. W. (2014). Development of mental health problems - a follow-up study of unaccompanied refugee minors. *Child and Adolescent Psychiatry and Mental Health*, 8, 29. <https://doi.org/10.1186/1753-2000-8-29>
- Jin, S. S., Dolan, T. M., Cloutier, A. A., Bojdani, E., & DeLisi, L. (2021). Systematic review of depression and suicidality in child and adolescent (CAP) refugees, 302. Retrieved from <https://doi.org/10.1016/j.psychres.2021.114025>
- Jugert, P., & Titzmann, P. F. (2020). Developmental Tasks and Immigrant Adolescent's Adaption. In D. Güngör & D. Strohmeier (Eds.), *Contextualizing Immigrant and Refugee Resilience: Cultural and Acculturation Perspectives* (pp. 33–50). Cham: Springer.
- Kien, C., Sommer, I., Faustmann, A., Gibson, L., Schneider, M., Krczal, E., . . . Gartlehner, G. (2019). Prevalence of mental disorders in young refugees and asylum seekers in European Countries: A systematic review. *European Child & Adolescent Psychiatry*, 28(10), 1295–1310. <https://doi.org/10.1007/s00787-018-1215-z>
- Kinzie, J. D., Sack, W., Angell, R., Clarke, G., & Ben, R. (1989). A Three-Year Follow-up of Cambodian Young People Traumatized as Children. *Journal of the American Academy of Child and Adolescent Psychiatry*, 28(4), 501–504.
- Kletečka-Pulker, M., Parrag, S., Droždek, B., & Wenzel, T. (2019). Language Barriers and the Role of Interpreters: A Challenge in the Work with Migrants and Refugees. In T. Wenzel & B. Droždek (Eds.), *An Uncertain Safety: Integrative Health Care for 21st Century Refugees* (pp. 345–361). Basel: Springer.
- Kline, R. B. (2005). *Principles and Practice of Structural Equation Modeling*. New York: Guilford Publications.
- Koch, T., Liedl, A., Takano, K., & Ehring, T. (2020). Daily Worry in Trauma-Exposed Afghan Refugees: Relationship with Affect and Sleep in a Study Using Ecological Momentary Assessment. *Cognitive Therapy and Research*, 16(6), 1247. <https://doi.org/10.1007/s10608-020-10091-7>
- Krupinski, J., & Burrows, G. (1986). *The Price of Freedom. Young Indochinese Refugees in Australia*. Sydney: Pergamon.
- Kuterovac, G., Dyregrov, A., & Stuvland, R. (1994). Children in war: A silent majority under stress. *British Journal of Medical Psychology*, 67, 363–375.

- Landolt, M. A., Schnyder, U., Maier, T., Schoenbucher, V., & Mohler-Kuo, M. (2013). Trauma exposure and posttraumatic stress disorder in adolescents: A national survey in Switzerland. *Journal of Traumatic Stress, 26*(2), 209–216. <https://doi.org/10.1002/jts.21794>
- Lustig, S. L., Kia-Keating, M., Knight, W. G., Geltman, P., Ellis, B. H., Kinzie, J. D., . . . Saxe, G. N. (2004). Review of Child and Adolescent Refugee Mental Health. *Journal of the American Academy of Child and Adolescent Psychiatry, 43*(1), 24–36.
- Marcos, L. R. (1979). Effects of interpreters on the evaluation of psychopathology in non-English-speaking patients. *The American Journal of Psychiatry, 136*(2), 171–174.
- Miller, K. E., & Rasmussen, A. (2017). The mental health of civilians displaced by armed conflict: An ecological model of refugee distress. *Epidemiology and Psychiatric Sciences, 26*(2), 129–138. <https://doi.org/10.1017/S2045796016000172>
- Miller, K. E., Martell, Z. L., Pazdirek, L., Caruth, M., & Lopez, D. (2005). The role of interpreters in psychotherapy with refugees: An exploratory study. *The American Journal of Orthopsychiatry, 75*(1), 27–39. <https://doi.org/10.1037/0002-9432.75.1.27>
- Miller, K. E., & Rasco, L. M. (2004). An ecological framework for addressing the mental health needs of refugee communities. In K. E. Miller & L. M. Rasco (Eds.), *The Mental Health of Refugees: Ecological Approaches To Healing and Adaptation* (pp. 1–64). London: Lawrence Erlbaum Associates.
- Mitra, R., & Hodes, M. (2019). Prevention of psychological distress and promotion of resilience amongst unaccompanied refugee minors in resettlement countries. *Child: Care, Health and Development, 45*(2), 198–215. <https://doi.org/10.1111/cch.12640>
- Mohr, D. C., Schueller, S. M., Araya, Ricardo, Gureje, Oye, & Montague, E. (2014). Mental health technologies and the needs of cultural groups. *The Lancet Psychiatry, 1*(5), 368–376. [https://doi.org/10.1016/S2215-0366\(14\)70329-3](https://doi.org/10.1016/S2215-0366(14)70329-3)
- Möhrle, B., Dölitzsch, C., Fegert, J. M., & Keller, F. (2016). Verhaltensauffälligkeiten und Lebensqualität bei männlichen unbegleiteten minderjährigen Flüchtlingen in Jugendhilfe einrichtungen in Deutschland: [Emotional and Behavioral Problems and Quality of Life in Unaccompanied Adolescent Male Refugees Residing in Institutional Care]. *Kindheit Und Entwicklung, 25*, 204–215.
- Mohwinkel, L.-M., Nowak, A. C., Kasper, A., & Razum, O. (2018). Gender differences in the mental health of unaccompanied refugee minors in Europe: A systematic review. *BMJ Open, 8*(7), e022389. <https://doi.org/10.1136/bmjopen-2018-022389>
- Mollica, R. F., Poole, C., Son, L., Murray, C. C., & Tor, S. (1997). Effects of war trauma on Cambodian refugee adolescents' functional health and mental health status. *Journal of the American Academy of Child and Adolescent Psychiatry, 36*(8), 1098–1106.
- Montgomery, E. (2008). Long-term effects of organized violence on young Middle Eastern refugees' mental health. *Social Science & Medicine, 67*(10), 1596–1603.
- Montgomery, E. (2010). Trauma and resilience in young refugees: A 9-year follow-up study. *Development and Psychopathology, 22*(2), 477–489. <https://doi.org/10.1017/S0954579410000180>

- Morina, N., Maier, T., & Schmid Mast, M. (2010). Lost in Translation? - Psychotherapie unter Einsatz von Dolmetschern [Lost in translation? Psychotherapy using interpreters.]. *Psychotherapie, Psychosomatik, Medizinische Psychologie*, *60*, 104–110. <https://doi.org/10.5167/UZH-45872>
- Morina, N., Ewers, S. M., Passardi, S., Schnyder, U., Knaevelsrud, C., Müller, J., . . . Schick, M. (2017). Mental health assessments in refugees and asylum seekers: Evaluation of a tablet-assisted screening software. *Conflict and Health*, *11*, 18. <https://doi.org/10.1186/s13031-017-0120-2>
- Morren, M., van Dulmen, S., Ouwerkerk, J., & Bensing, J. (2009). Compliance with momentary pain measurement using electronic diaries: A systematic review. *European Journal of Pain*, *13*(4), 354–365. <https://doi.org/10.1016/j.ejpain.2008.05.010>
- Motti-Stefanidi, F., & Masten, A. S. (2020). Immigrant Youth Resilience: Integrating Developmental and Cultural Perspectives. In D. Güngör & D. Strohmeier (Eds.), *Contextualizing Immigrant and Refugee Resilience: Cultural and Acculturation Perspectives* (pp. 11–32). Cham: Springer.
- Müller, L. R. F., Büter, K. P., Rosner, R., & Unterhitzenberger, J. (2019). Mental health and associated stress factors in accompanied and unaccompanied refugee minors resettled in Germany: A cross-sectional study. *Child and Adolescent Psychiatry and Mental Health*, *13*(1), 288. <https://doi.org/10.1186/s13034-019-0268-1>
- National Institute for Health and Care Excellence (2018). Post-traumatic stress disorder. NICE guidelines. Retrieved from <https://www.nice.org.uk/guidance/ng116/chapter/Recommendations#management-of-ptsd-in-children-young-people-and-adults>
- Nocon, A., Eberle-Sejari, R., Unterhitzenberger, J., & Rosner, R. (2017). The effectiveness of psychosocial interventions in war-traumatized refugee and internally displaced minors: Systematic review and meta-analysis. *European Journal of Psychotraumatology*, *8*(sup2), 1388709. <https://doi.org/10.1080/20008198.2017.1388709>
- Norredam, M., Nellums, L., Nielsen, R. S., Byberg, S., & Petersen, J. H. (2018). Incidence of psychiatric disorders among accompanied and unaccompanied asylum-seeking children in Denmark: A nation-wide register-based cohort study. *European Child & Adolescent Psychiatry*, *27*(4), 439–446. <https://doi.org/10.1007/s00787-018-1122-3>
- O'Higgins, A., Ott, E. M., & Shea, M. W. (2018). What is the Impact of Placement Type on Educational and Health Outcomes of Unaccompanied Refugee Minors? A Systematic Review of the Evidence. *Clinical Child and Family Psychology Review*, *21*(3), 354–365. <https://doi.org/10.1007/s10567-018-0256-7>
- Oppedal, B., & Idsoe, T. (2012). Conduct problems and depression among Unaccompanied Refugees: The association with pre-migration trauma and acculturation. *Anales De Psicología*, *28*(3). <https://doi.org/10.6018/analesps.28.3.155981>
- Oppedal, B., & Idsoe, T. (2015). The role of social support in the acculturation and mental health of unaccompanied minor asylum seekers. *Scandinavian Journal of Psychology*, *56*(2), 203–211. <https://doi.org/10.1111/sjop.12194>

- Paalman, C. H., Terwee, C. B., Jansma, E. P., & Jansen, L. M. C. (2013). Instruments measuring externalizing mental health problems in immigrant ethnic minority youths: A systematic review of measurement properties. *PloS One*, 8(5), e63109. <https://doi.org/10.1371/journal.pone.0063109>
- Paone, T. R., & Malott, K. M. (2008). Using Interpreters in Mental Health Counseling: A Literature Review and Recommendations. *Journal of Multicultural Counseling and Development*, 36, 130–142.
- Papageorgiou, V., Frangou-Guranovic, A., Iordanidou, R., Yule, W., Smith, P., & Vostanis, P. (2000). War trauma and psychopathology in Bosnian refugee children. *European Child & Adolescent Psychiatry*, 9, 84–90.
- Perkonig, A., Kessler, R. C., & Wittchen, H.-U. (2000). Traumatic events and post-traumatic stress disorder in the community: prevalence, risk factors and comorbidity. *Acta Psychiatrica Scandinavica*, 101, 46–59.
- Perkonig, A., Pfister, H., Stein, M. B., Höfler, M., Lieb, R., Maercker, A., & Wittchen, H.-U. (2005). Longitudinal Course of Posttraumatic Stress Disorder and Posttraumatic Stress Disorder Symptoms in a Community Sample of Adolescents and Young Adults. *American Journal of Psychiatry*, 162(7), 1320–1327.
- Pfeiffer, E., Sachser, C., Rohlmann, F., & Goldbeck, L. (2018). Effectiveness of a trauma-focused group intervention for young refugees: A randomized controlled trial. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 59(11), 1171–1179. <https://doi.org/10.1111/jcpp.12908>
- Pfeiffer, E., Sukale, T., Müller, L. R. F., Plener, P. L., Rosner, R., Fegert, J. M., . . . Unterhitzberger, J. (2019). The symptom representation of posttraumatic stress disorder in a sample of unaccompanied and accompanied refugee minors in Germany: A network analysis. *European Journal of Psychotraumatology*, 10(1), 1675990. <https://doi.org/10.1080/20008198.2019.1675990>
- Price, J. (1975). Foreign Language Interpreting in Psychiatric Practice. *Australian & New Zealand Journal of Psychiatry*, 9(4), 263–267.
- Prince, M. (2008). Measurement validity in cross-cultural comparative research. *Epidemiologia E Psichiatria Sociale*, 17(3), 211–220. <https://doi.org/10.1017/s1121189x00001305>
- Pruchno, R. A., Brill, J. E., Shands, Yonne, Gordon, Judith, Wilson Genderson, M., Rose, M., & Cartwright, F. (2008). Convenience Samples and Caregiving Research: How Generalizable Are the Findings? *The Gerontologist*, 48(6), 820–827.
- Ramel, B., Täljemark, J., Lindgren, A., & Johansson, B. A. (2015). Overrepresentation of unaccompanied refugee minors in inpatient psychiatric care. *SpringerPlus*, 4, 131. <https://doi.org/10.1186/s40064-015-0902-1>
- Rassenhofer, M., Fegert, J. M., Plener, P. L., & Witt, A. (2016). Validierte Verfahren zur psychologischen Diagnostik unbegleiteter minderjähriger Flüchtlinge - eine systematische Übersicht / Validated Instruments for the Psychological Assessment of Unaccompanied Refugee Minors – a Systematic Review. *Praxis Der Kinderpsychologie Und Kinderpsychiatrie*, 65, 97–112.
- Reavell, J., & Fazil, Q. (2017). The epidemiology of PTSD and depression in refugee minors who have resettled in developed countries. *Journal of Mental Health (Abingdon, England)*, 26(1), 74–83. <https://doi.org/10.1080/09638237.2016.1222065>

- Reed, R. V., Fazel, M., Jones, L., Panter-Brick, C., & Stein, A. (2012). Mental health of displaced and refugee children resettled in low-income and middle-income countries: risk and protective factors. *The Lancet*, 379(9812), 250–265. [https://doi.org/10.1016/S0140-6736\(11\)60050-0](https://doi.org/10.1016/S0140-6736(11)60050-0)
- Rosenblatt, R. (1983). *Children of War*. Garden City, NY: Anchor Press/Doubleday.
- Rosner, R. (2003). Introduction: Psychosocial consequences of the war in the region of former Yugoslavia. *Journal of Clinical Psychology*, 59(1), 1–8. <https://doi.org/10.1002/jclp.10113>
- Rosner, R., Sachser, C., Hornfeck, F., Kilian, R., Kindler, H., Muche, R., . . . Pfeiffer, E. (2020). Improving mental health care for unaccompanied young refugees through a stepped-care approach versus usual care+: Study protocol of a cluster randomized controlled hybrid effectiveness implementation trial. *Trials*, 21(1), 1–13. <https://doi.org/10.1186/s13063-020-04922-x>
- Roth, F., & Maduz, L. (2017). Lehren aus der Flüchtlingskrise 2015/2016: Ergebnisse des D-A-CH Expertenworkshops. [Lessons learned from the 2015–16 migrant crisis: results from the D-A-CH expert workshop from 27 to 28 October 2016 in Zurich]. Retrieved from <https://doi.org/10.3929/ethz-b-000170580>
- Rousseau, C., Measham, T., & Moro, M.-R. (2011). Working with Interpreters in Child Mental Health. *Child and Adolescent Mental Health*, 16(1), 55–59. <https://doi.org/10.1111/j.1475-3588.2010.00589.x>
- Rücker, S., Büttner, P., Lambertz, B., Karpinski, N., & Petermann, F. (2017). Resilient oder Risikogruppe? Psychische Belastungen bei unbegleiteten minderjährigen Ausländern (umA) in Deutschland [Resilient or Risk Group? Psychological Burden at Unaccompanied Refugee Minors (URM) in Germany]. *Praxis der Kinderpsychologie und Kinderpsychiatrie*, 66(4), 242–258. <https://doi.org/10.13109/prkk.2017.66.4.242>
- Ruf, M., Schauer, M., Neuner, F., Catani, C., Schauer, E., & Elbert, T. (2010). Narrative exposure therapy for 7- to 16-year-olds: A randomized controlled trial with traumatized refugee children. *Journal of Traumatic Stress*, 23(4), 437–445. <https://doi.org/10.1002/jts.20548>
- Sachser, C., Berliner, L., Holt, T., Jensen, T. K., Jungbluth, N., Risch, E., . . . Goldbeck, L. (2017). International development and psychometric properties of the Child and Adolescent Trauma Screen (CATS). *Journal of Affective Disorders*, 210(1), 189–195.
- Sack, W., Clarke, G., Him, C., Dickason, D., Goff, B., Lanham, K., & Kinzie, J. D. (1993). A 6-Year Follow-up Study of Cambodian Refugee Adolescents Traumatized as Children. *Journal of the American Academy of Child and Adolescent Psychiatry*, 32(2), 431–437.
- Sack, W., Him, C., & Dickason, D. (1999). Twelve-Year Follow-up Study of Khmer Youths Who Suffered Massive War Trauma as Children. *Journal of the American Academy of Child and Adolescent Psychiatry*, 38(9), 1173–1179.
- Sander, R., Laugesen, H., Skammeritz, S., Mortensen, E. L., & Carlsson, J. (2019). Interpreter-mediated psychotherapy with trauma-affected refugees - A retrospective cohort study. *Psychiatry Research*, 271, 684–692. <https://doi.org/10.1016/j.psychres.2018.12.058>
- Searight, H. R., & Armrock, J. A. (2013). Foreign language interpreters in mental health: a literature review and research agenda. *North American Journal of Psychology*, 15(1), 17–38.
- Sierau, S., Schneider, E., Nesterko, Y., Klitzing, K. von, & Glaesmer, H. (2018). Mental Health Problems of Unaccompanied Young Refugees in Youth Welfare Institutions [Mental Health

- Problems of Unaccompanied Young Refugees in Youth Welfare Institutions]. *Psychiatrische Praxis*. Advance online publication. <https://doi.org/10.1055/a-0756-7970>
- Sleijpen, M., Boeije, H. R., Kleber, R. J., & Mooren, T. (2016). Between power and powerlessness: A meta-ethnography of sources of resilience in young refugees. *Ethnicity & Health, 21*(2), 158–180. <https://doi.org/10.1080/13557858.2015.1044946>
- Smid, G., Lensvelt-Mulders, Gerty J L M, Knipscheer, J. W., Gersons, B. P. R., & Kleber, R. J. (2011). Late-onset PTSD in unaccompanied refugee minors: Exploring the predictive utility depression and anxiety symptoms. *Journal of Clinical Child & Adolescent Psychology, 40*(5), 742–755.
- Solberg, Ø., Nissen, A., Vaez, M., Cauley, P., Eriksson, A.-K., & Saboonchi, F. (2020). Children at risk: A nation-wide, cross-sectional study examining post-traumatic stress symptoms in refugee minors from Syria, Iraq and Afghanistan resettled in Sweden between 2014 and 2018. *Conflict and Health, 14*, 67. <https://doi.org/10.1186/s13031-020-00311-y>
- Soykoek, S., Mall, V., Nehring, I., Henningsen, P., & Aberl, S. (2017). Post-traumatic stress disorder in Syrian children of a German refugee camp. *The Lancet, 389*(10072), 903–904. [https://doi.org/10.1016/S0140-6736\(17\)30595-0](https://doi.org/10.1016/S0140-6736(17)30595-0)
- Tam, S. Y., Houlihan, S., & Melendez-Torres, G. J. (2017). A Systematic Review of Longitudinal Risk and Protective Factors and Correlates for Posttraumatic Stress and Its Natural History in Forcibly Displaced Children. *Trauma, Violence & Abuse, 18*(4), 377–395. <https://doi.org/10.1177/1524838015622437>
- Tangermann, J., & Hoffmeyer-Zlotnik, P. (2018). Unbegleitete Minderjährige in Deutschland [Unaccompanied minors in Germany]: Herausforderungen und Maßnahmen nach der Klärung des aufenthaltsrechtlichen Status [Challenges and measures after clarification of the legal residence status]. Retrieved from https://www.bamf.de/SharedDocs/Anlagen/DE/EMN/Studien/wp80-unbegleitete-minderjaehrige.pdf?__blob=publicationFile&v=18
- Thommessen, S., Laghi, F., Cerrone, C., Baiocco, R., & Todd, B. (2013). Internalizing and externalizing symptoms among unaccompanied refugee and Italian adolescents. *Children and Youth Services Review, 35*(1), 7–10.
- Tol, W. A., Komproe, I. H., Jordans, M. J. D., Vallipuram, A., Sipsma, H., Sivayokan, S., . . . Jong, J. T. de (2012). Outcomes and moderators of a preventive school-based mental health intervention for children affected by war in Sri Lanka: a cluster randomized trial. *World Psychiatry, 11*, 114–122.
- Trejo-Phillips, P. (2012). *Interpreters in a psychotherapeutic triad interpreting for torture survivors: An integrative literature review through a cultural competence lens* (Dissertation). Wright Institute Graduate School of Psychology, Berkeley, California.
- Tribe, R., & Morrissey, J. (2004). Good practice issues in working with interpreters in mental health. *Intervention, 2*(2), 129–142.
- Tyrer, R. A., & Fazel, M. (2014). School and community-based interventions for refugee and asylum seeking children: A systematic review. *PLoS One, 9*(2), e89359. <https://doi.org/10.1371/journal.pone.0089359>
- United Nations High Commissioner for Refugees (2017). Figures at a Glance. Retrieved from <http://www.unhcr.org/figures-at-a-glance.html>

- Unterhitzberger, J., Wintersohl, S., Lang, M., König, J., & Rosner, R. (2019). Providing manualized individual trauma-focused CBT to unaccompanied refugee minors with uncertain residence status: A pilot study. *Child and Adolescent Psychiatry and Mental Health*, 13, 22. <https://doi.org/10.1186/s13034-019-0282-3>
- Van Mol, C., & Valk, H. de (2016). Migration and Immigrants in Europe: A Historical and Demographic Perspective. In B. Garcés-Mascareñas & R. Penninx (Eds.), *Integration Processes and Policies in Europe* (pp. 31–55). Basel: Springer.
- Verroken, S., Schotte, C., Derluyn, I., & Baetens, I. (2018). Starting from scratch: Prevalence, methods, and functions of non-suicidal self-injury among refugee minors in Belgium. *Child and Adolescent Psychiatry and Mental Health*, 12(51). <https://doi.org/10.1186/s13034-018-0260-1>
- Walg, M., Fink, E., Großmeier, M., Temprano, M., & Hapfelmeier, G. (2017). Häufigkeit psychischer Störungen bei unbegleiteten minderjährigen Flüchtlingen in Deutschland [The proportion of unaccompanied refugee minors suffering from psychiatric disorders in Germany]. *Zeitschrift für Kinder- und Jugendpsychiatrie und Psychotherapie*, 45(1), 58–68. <https://doi.org/10.1024/1422-4917/a000459>
- Wells, R., Wells, D., & Lawsin, C. (2015). Understanding Psychological Responses to Trauma among Refugees: the Importance of Measurement Validity in Cross-cultural Settings. *Journal and Proceedings of the Royal Society of New South Wales*, 148(455 & 456), 60–69.
- Wen, C. K. F., Schneider, S., Stone, A. A., & Spruijt-Metz, D. (2017). Compliance With Mobile Ecological Momentary Assessment Protocols in Children and Adolescents: A Systematic Review and Meta-Analysis. *Journal of Medical Internet Research*, 19(4), e132. <https://doi.org/10.2196/jmir.6641>
- Werthern, M. von, Grigorakis, G., & Vizard, E. (2019). The mental health and wellbeing of Unaccompanied Refugee Minors (URMs). *Child Abuse & Neglect*, 98, 104146. <https://doi.org/10.1016/j.chiabu.2019.104146>
- Witt, A., Rassenhofer, M., Fegert, J. M., & Plener, P. L. (2015). Hilfebedarf und Hilfsangebote in der Versorgung von unbegleiteten minderjährigen Flüchtlingen. *Kindheit Und Entwicklung*, 24(4), 209–224. <https://doi.org/10.1026/0942-5403/a000177>
- Zhang, X., & Tomblin, J. B. (2003). Explaining and Controlling Regression to the Mean in Longitudinal Research Designs. *Journal of Speech, Language, and Hearing Research*, 46, 1340–1351.

Part 2.1 Umbrella review: Risk and protective factors

- Fazel, M., Reed, R. V., Panter-Brick, C., & Stein, A. (2012). Mental health of displaced and refugee children resettled in high-income countries: Risk and protective factors. *The Lancet*, 379(9812), 266–282. [https://doi.org/10.1016/S0140-6736\(11\)60051-2](https://doi.org/10.1016/S0140-6736(11)60051-2)
- Höhne, E., van der Meer, A. S., Kamp-Becker, I., & Christiansen, H. (2020). A systematic review of risk and protective factors of mental health in unaccompanied minor refugees. *European Child & Adolescent Psychiatry. Advance online publication*. <https://doi.org/10.1007/s00787-020-01678-2>
- Jahangiri, K., Tabatabaie, S., & Keykaleh, M. S. (2017). Mental Health Challenges in Immigrant and Refugee Children and Adolescents: A Systematic Review. *Emergencies and Disasters Quarterly*, 3(1), 3–10.

Mitra, R., & Hodes, M. (2019). Prevention of psychological distress and promotion of resilience amongst unaccompanied refugee minors in resettlement countries. *Child: Care, Health and Development*, 45(2), 198–215. <https://doi.org/10.1111/cch.12640>

Part 2.2 Umbrella review: Epidemiology

Bamford, J., Fletcher, M., & Leavey, G. (2021). Mental Health Outcomes of Unaccompanied Refugee Minors: A Rapid Review of Recent Research. *Current Psychiatry Reports*, 23(8), 46. <https://doi.org/10.1007/s11920-021-01262-8>

Bronstein, I., & Montgomery, P. (2011). Psychological distress in refugee children: A systematic review. *Clinical Child and Family Psychology Review*, 14(1), 44–56. <https://doi.org/10.1007/s10567-010-0081-0>

El Baba, R., & Colucci, E. (2017). Post-traumatic stress disorders, depression, and anxiety in unaccompanied refugee minors exposed to war-related trauma: a systematic review. *International Journal of Culture and Mental Health*, 11(2), 194–207. <https://doi.org/10.1080/17542863.2017.1355929>

Huemer, J., Karnik, N. S., Voelkl-Kernstock, S., Granditsch, E., Dervic, K., Friedrich, M. H., & Steiner, H. (2009). Mental health issues in unaccompanied refugee minors. *Child and Adolescent Psychiatry and Mental Health*, 3(1), 13. <https://doi.org/10.1186/1753-2000-3-13>

Kien, C., Sommer, I., Faustmann, A., Gibson, L., Schneider, M., Krczal, E., . . . Gartlehner, G. (2019). Prevalence of mental disorders in young refugees and asylum seekers in European Countries: A systematic review. *European Child & Adolescent Psychiatry*, 28(10), 1295–1310. <https://doi.org/10.1007/s00787-018-1215-z>

Reavell, J., & Fazil, Q. (2017). The epidemiology of PTSD and depression in refugee minors who have resettled in developed countries. *Journal of Mental Health*, 26(1), 74–83. <https://doi.org/10.1080/09638237.2016.1222065>

Werthern, M. von, Grigorakis, G., & Vizard, E. (2019). The mental health and wellbeing of Unaccompanied Refugee Minors (URMs). *Child Abuse & Neglect*, 98, 104146. <https://doi.org/10.1016/j.chiabu.2019.104146>

Witt, A., Rassenhofer, M., Fegert, J. M., & Plener, P. L. (2015). Hilfebedarf und Hilfsangebote in der Versorgung von unbegleiteten minderjährigen Flüchtlingen. *Kindheit und Entwicklung*, 24(4), 209–224. <https://doi.org/10.1026/0942-5403/a000177>

Part 2.3 Review: Course of symptoms

Almqvist, K., & Brandell-Forsberg, M. (1997). Refugee children in Sweden: Post-traumatic stress disorder in Iranian preschool children exposed to organized violence. *Child Abuse & Neglect*, 21(4), 351–366.

Almqvist, K., & Broberg, A. G. (1999). Mental health and social adjustment in young refugee children 3 1/2 years after their arrival in Sweden. *Journal of the American Academy of Child and Adolescent Psychiatry*, 38(6), 723–730.

- Bean, T. M., Eurelings-Bontekoe, E., & Spinhoven, P. (2007). Course and predictors of mental health of unaccompanied refugee minors in the Netherlands: One year follow-up. *Social Science & Medicine*, 64(6), 1204–1215. <https://doi.org/10.1016/j.socscimed.2006.11.010>
- Becker, D. F., Weine, S. M., Vojvoda, D., & McGlashan, T. H. (1999). Case Series: PTSD Symptoms in Adolescent Survivors of “Ethnic Cleansing.” Results From a 1-Year Follow-up Study. *Journal of the American Academy of Child and Adolescent Psychiatry*, 38(6), 775–781.
- Hjern, A., & Angel, B. (2000). Organized violence and mental health of refugee children in exile: a six-year follow-up. *Acta Paediatrica*, 89, 722–727.
- Jakobsen, M., Meyer DeMott, M. A., Wentzel-Larsen, T., & Heir, T. (2017). The impact of the asylum process on mental health: A longitudinal study of unaccompanied refugee minors in Norway. *BMJ Open*, 7(6), e015157. <https://doi.org/10.1136/bmjopen-2016-015157>
- Jensen, T. K., Skar, A.-M. S., Andersson, E. S., & Birkeland, M. S. (2019). Long-term mental health in unaccompanied refugee minors: Pre- and post-flight predictors. *European Child & Adolescent Psychiatry*, 28(12), 1671–1682. <https://doi.org/10.1007/s00787-019-01340-6>
- Jensen, T. K., Skårdalsmo, E. M. B., & Fjermestad, K. W. (2014). Development of mental health problems - a follow-up study of unaccompanied refugee minors. *Child and Adolescent Psychiatry and Mental Health*, 8, 29. <https://doi.org/10.1186/1753-2000-8-29>
- Keles, S., Friborg, O., Idsøe, T., Sirin, S., & Oppedal, B. (2016). Resilience and acculturation among unaccompanied refugee minors. *International Journal of Behavioral Development*, 42(1), 52–63. <https://doi.org/10.1177/0165025416658136>
- Keles, S., Idsøe, T., Friborg, O., Sirin, S., & Oppedal, B. (2017). The Longitudinal Relation between Daily Hassles and Depressive Symptoms among Unaccompanied Refugees in Norway. *Journal of Abnormal Child Psychology*, 45(7), 1413–1427. <https://doi.org/10.1007/s10802-016-0251-8>
- Kinzie, J. D., Sack, W., Angell, R., Clarke, G., & Ben, R. (1989). A Three-Year Follow-up of Cambodian Young People Traumatized as Children. *Journal of the American Academy of Child and Adolescent Psychiatry*, 28(4), 501–504.
- Krupinski, J., & Burrows, G. (1986). *The Price of Freedom. Young Indochinese Refugees in Australia*. Sydney: Pergamon.
- Montgomery, E. (2008). Long-term effects of organized violence on young Middle Eastern refugees' mental health. *Social Science & Medicine*, 67(10), 1596–1603.
- Montgomery, E. (2010). Trauma and resilience in young refugees: A 9-year follow-up study. *Development and Psychopathology*, 22(2), 477–489. <https://doi.org/10.1017/S0954579410000180>
- Rousseau, C., Drapeau, A., & Rahimi, S. (2003). The complexity of trauma response: A 4-year follow-up of adolescent Cambodian refugees. *Child Abuse & Neglect*, 27(11), 1277–1290. <https://doi.org/10.1016/j.chiabu.2003.07.001>
- Sack, W., Clarke, G., Him, C., Dickason, D., Goff, B., Lanham, K., & Kinzie, J. D. (1993). A 6-Year Follow-up Study of Cambodian Refugee Adolescents Traumatized as Children. *Journal of the American Academy of Child and Adolescent Psychiatry*, 32(2), 431–437.

- Sack, W., Him, C., & Dickason, D. (1999). Twelve-Year Follow-up Study of Khmer Youths Who Suffered Massive War Trauma as Children. *Journal of the American Academy of Child and Adolescent Psychiatry*, 38(9), 1173–1179.
- Smid, G., Lensvelt-Mulders, Gerty J L M, Knipscheer, J. W., Gersons, B. P. R., & Kleber, R. J. (2011). Late-onset PTSD in unaccompanied refugee minors: Exploring the predictive utility depression and anxiety symptoms. *Journal of Clinical Child & Adolescent Psychology*, 40(5), 742–755.
- Vervliet, M., Lammertyn, J., Broekaert, E., & Derluyn, I. (2014). Longitudinal follow-up of the mental health of unaccompanied refugee minors. *European Child & Adolescent Psychiatry*, 23(5), 337–346. <https://doi.org/10.1007/s00787-013-0463-1>

Part 2.4 Umbrella review: Special considerations in screening and diagnostics

- Gadeberg, A. K., Montgomery, E., Frederiksen, H. W., & Norredam, M. (2017). Assessing trauma and mental health in refugee children and youth: A systematic review of validated screening and measurement tools. *European Journal of Public Health*, 27(3), 439–446. <https://doi.org/10.1093/eurpub/ckx034>
- Horlings, A., & Hein, I. (2018). Psychiatric screening and interventions for minor refugees in Europe: An overview of approaches and tools. *European Journal of Pediatrics*, 177(2), 163–169. <https://doi.org/10.1007/s00431-017-3027-4>
- Rassenhofer, M., Fegert, J. M., Plener, P. L., & Witt, A. (2016). Validierte Verfahren zur psychologischen Diagnostik unbegleiteter minderjähriger Flüchtlinge - eine systematische Übersicht / Validated Instruments for the Psychological Assessment of Unaccompanied Refugee Minors – a Systematic Review. *Praxis Der Kinderpsychologie und Kinderpsychiatrie*, 65, 97–112.

Part 2.5 Umbrella review: Special considerations in working with interpreters

- Bauer, A., & Alegría, M. (2010). Impact of Patient Language Proficiency and Interpreter Service Use on the Quality of Psychiatric Care: A Systematic Review. *Psychiatric Services*, 61(8). <https://doi.org/10.1176/appi.ps.61.8.765>
- Farooq, S., Kingston, P., & Regan, J. (2015). Working through interpreters in old age psychiatry: a literature review. *Mental Health Review Journal*, 20(1), 36–47. <https://doi.org/10.1108/MHRJ-12-2013-0040>
- Paone, T. R., & Malott, K. M. (2008). Using Interpreters in Mental Health Counseling: A Literature Review and Recommendations. *Journal of Multicultural Counseling and Development*, 36, 130–142.
- Robertson, J. A. (2014). *Therapists' and Interpreters' Perceptions of the Relationships When Working with Refugee Clients* (Dissertation). Antioch University, New England.
- Sander, R., Nørregaard, T. M., & Carlsson, J. (2017). Effekt af brug af tolk i psykoterapi [Effect of using an interpreter in psychotherapy]. *Ugeskr Læger*, 179, 2–5.
- Searight, H. R., & Armrock, J. A. (2013). Foreign language interpreters in mental health: a literature review and research agenda. *North American Journal of Psychology*, 15(1), 17–38.

Trejo-Phillips, P. (2012). *Interpreters in a psychotherapeutic triad interpreting for torture survivors: An integrative literature review through a cultural competence lens* (Dissertation). Wright Institute Graduate School of Psychology, Berkeley, California.

Yick, A. G., & Daines, A. M. (2019). Data in–data out? A metasynthesis of interpreter’s experiences in health and mental health. *Qualitative Social Work*, 18(1), 98–115.

<https://doi.org/10.1177/1473325017707027>

Part 5. Umbrella review: Therapy

Demazure, G., Gaultier, S., & Pinsault, N. (2018). Dealing with difference: A scoping review of psychotherapeutic interventions with unaccompanied refugee minors. *European Child & Adolescent Psychiatry*, 27(4), 447–466. <https://doi.org/10.1007/s00787-017-1083-y>

Eberle-Sejari, R., Nocon, A., & Rosner, R. (2015). Zur Wirksamkeit von psychotherapeutischen Interventionen bei jungen Flüchtlingen und Binnenvertriebenen mit posttraumatischen Symptomen. *Kindheit Und Entwicklung*, 24(3), 156–169. <https://doi.org/10.1026/0942-5403/a000171>

Hettich, N., Seidel, F. A., & Stuhmann, L. Y. (2020). Psychosocial Interventions for Newly Arrived Adolescent Refugees: A Systematic Review. *Adolescent Research Review*, 5(2), 99–114.

<https://doi.org/10.1007/s40894-020-00134-1>

Mitra, R., & Hodes, M. (2019). Prevention of psychological distress and promotion of resilience amongst unaccompanied refugee minors in resettlement countries. *Child: Care, Health and Development*, 45(2), 198–215. <https://doi.org/10.1111/cch.12640>

Nocon, A., Eberle-Sejari, R., Unterhitzberger, J., & Rosner, R. (2017). The effectiveness of psychosocial interventions in war-traumatized refugee and internally displaced minors: Systematic review and meta-analysis. *European Journal of Psychotraumatology*, 8(sup2), 1388709.

<https://doi.org/10.1080/20008198.2017.1388709>

Sullivan, A. L., & Simonson, G. R. (2016). A Systematic Review of School-Based Social-Emotional Interventions for Refugee and War-Traumatized Youth. *Review of Educational Research*, 86(2), 503–530. <https://doi.org/10.3102/0034654315609419>

Tyrer, R. A., & Fazel, M. (2014). School and community-based interventions for refugee and asylum seeking children: A systematic review. *PloS One*, 9(2), e89359.

<https://doi.org/10.1371/journal.pone.0089359>



PART B.
THE PUBLISHED PAPERS

Publication 1. 1-year follow-up study of the mental health of refugee minors


Exact title	1-year follow-up of the mental health and stress factors in asylum-seeking children and adolescents resettled in Germany
Authors	Lauritz Rudolf Floribert Müller Katharina Gossmann Franziska Hartmann Karl Philipp Büter Rita Rosner Johanna Unterhitzberger
Affiliation	Catholic University Eichstätt-Ingolstadt
My contribution	I co-designed the study and performed the baseline survey on which this 1-year follow-up was based. I furthermore coordinated the data collection and the study procedure. I also conducted some of the data collection. In addition, I executed the data preparation and analysis, drafted the manuscript, and initiated and finalized the publication process.
Journal	BMC Public Health
Submitted	April 17, 2019
Feedback of the reviewers	June 9, 2019
Resubmitted	June 18, 2019
Accepted	June 30, 2019
Published	July 8, 2019

RESEARCH ARTICLE

Open Access



1-year follow-up of the mental health and stress factors in asylum-seeking children and adolescents resettled in Germany

Lauritz Rudolf Floribert Müller* , Katharina Gossmann, Franziska Hartmann, Karl Phillip Büter, Rita Rosner and Johanna Unterhitzberger

Abstract

Background: Asylum-seeking children and adolescents (ASCs) who have resettled in Western countries show elevated rates of psychological distress, including Posttraumatic Stress Symptoms (PTSS), depression, and anxiety. Most longitudinal data suggest a relatively stable course of symptoms during the first years in exile. However, no longitudinal examination of the mental health of ASCs, who resettled in Europe in the wake of the 2015–17 European migrant crisis, has been conducted so far.

Methods: A prospective cohort study looked at 98 ASCs who resettled in southern Germany throughout 2015–17. They mainly came from Afghanistan, Syria, Eritrea, and Iraq. Baseline assessments were undertaken 22 months, on average, after resettlement, and follow-up assessments 1 year thereafter. Seventy-two ASCs could be secured for the follow-up. The measures included self-report questionnaires screening for PTSS, depression, anxiety, externalizing behavior, and post-migration factors that were administered in an interview-like setting. Results were analyzed using hierarchical multiple regression analysis.

Results: Participating ASCs reported on average eight potentially traumatic experiences and high levels of psychological distress at baseline that had significantly declined at follow-up. At follow-up, rates of clinically significant symptoms ranged from 9.7% (externalizing behavior) to 37.5% (PTSS). There was considerable individual variation in symptom change resulting in multiple mental health trajectories. ASCs whose asylum applications had been rejected presented significantly more symptoms than ASCs whose asylum applications had been accepted between assessments. Baseline psychopathology and asylum status predicted follow-up symptom severity.

Conclusions: In contrast to earlier studies, the symptom severity in this sample of ASCs in Germany ameliorated between assessments. Decisions on the asylum applications of ASCs are thought to contribute to the course of symptoms. Since levels of psychological distress were still high, dissemination and implementation of appropriate treatments for ASCs is crucial.

Keywords: Asylum-seeking, Children and adolescents, Unaccompanied, Mental health, Trauma, Longitudinal, Post-traumatic stress disorder, Resettlement, Minor refugees

* Correspondence: lauritz.mueller@ku.de

Department of Psychology, Catholic University of Eichstätt-Ingolstadt, Ostenstraße 25, 85072 Eichstätt, Germany



Background

A constantly increasing number of people worldwide are fleeing their homes on account of ongoing international armed conflicts, political oppression or persecution, and environmental changes [1, 2]. While most refugees resettle in their home or in neighboring countries [3] there has also been a substantial increase in asylum applications throughout Europe in recent years, peaking in 2015 when roughly 1.26 million people were registered as first-time asylum applicants [4]. It is estimated that half of the refugees and asylum-seekers worldwide [3] and nearly a third in Europe [4] are minors, hereinafter referred to as asylum-seeking children and adolescents (ASCs).

There is a growing body of research dedicated to the investigation of the mental health of ASCs who have resettled in Western countries. So far, research on the psychological distress levels of ASCs has clearly identified an elevated psychopathology. Posttraumatic stress symptoms (PTSS) following the frequent experience of potentially traumatic events are the most common mental health problem [5]. In addition, ASCs present additional serious mental health problems including depression, anxiety, and externalizing behavior [6–8]. While numerous studies support the findings of increased levels of psychological distress among ASCs on a cross-sectional level [5, 9], very few longitudinal investigations have been conducted so far. In essence, two inverse courses of the mental health status of ASCs within the process of post-resettlement seem feasible. Whilst symptom levels may improve thanks to the absence of migration-related adversities (e.g. war atrocities, deprivation) and the experience of safety in the host country, it could also be argued that post-migration stressors may contribute to perpetuating or even worsening the mental health status of ASCs. In addition, PTSS have mainly been shown to be mental health problems with a risk of chronification [10]. Hence, they may not simply diminish once the migration-related adversities disappear.

So far, the scarce number of longitudinal studies have yielded mixed results. Most studies that examine ASCs during their first years in exile [11–15] report no or little decline in symptoms over time, thereby supporting the latter courses of symptoms. In contrast, some studies that tracked their participants over the course of six [16] to eight and nine [17] years after resettlement, revealed some to considerable mitigation of PTSS and depression. However, for the first study [16], levels of psychological distress were shown to be chronic in nature later on [18] with rates of clinically significant PTSS of 35% 12 years after the ASCs first arrived in the host country. Moreover, in both cases, the rates of clinically relevant symptoms, including PTSS and depression, exceeded the levels of psychological problems in community samples reported elsewhere [19, 20]. Overall, this illustrates the stable nature of increased levels of psychological

symptoms in ASCs in terms of a variety of mental health problems.

Nevertheless, several studies have pointed out the substantial variation in symptom levels in longitudinal studies which results in the various mental health trajectories reported in these studies [13, 17, 21, 22]. For instance, in a two-year follow-up study on unaccompanied ASCs in Norway, 40.4% of those with clinically significant PTSS at baseline decreased to below cut-off at follow-up, yet, at the same time, 47.8% of those with no clinically significant PTSS at baseline increased to above cut-off at follow-up [13]. Late-onset posttraumatic stress disorder (PTSD) has also been described by Smid and colleagues [23] where 18% developed clinically significant PTSS after a preceding period of unremarkable symptoms. Montgomery [17] attempted to categorize the course of symptoms among ASCs. This resulted in four distinct trajectories: (a) unproblematic at both assessments (hereinafter referred to as *unremarkable*), (b) problematic at first assessment only (hereinafter referred to as *adapted*), (c) problematic at follow-up only (hereinafter referred to as *reacting*), (d) problematic at both assessments (hereinafter referred to as *persisting*).

On a cross-sectional level, exposure to pre-migration violence and trauma, female sex, and being unaccompanied have repeatedly been found to be the major risk factors for poorer mental health status in ASCs [24]. Moreover, further factors related to the post-migration period (hereinafter referred to as *post-migration factors*) have been shown to be associated with symptom levels in ASCs but they have very rarely been investigated in longitudinal studies [21]. Consequently, taking post-migration factors into account might contribute to a better understanding of the course of symptoms in ASCs after resettlement.

To the authors' knowledge, this is the first longitudinal study on the mental health of ASCs to be conducted in Germany and the first ever to draw on a sample of ASCs who resettled in Europe in the wake of what is known as the 2015–17 migrant crisis. During that time, Germany became Europe's largest host country for asylum-seekers, including ASCs [4]. Cross-sectional research efforts indicated high levels of psychological distress in this subgroup [25, 26]. Moreover, in line with previous studies, our cross-sectional assessment of ASCs in southern Germany showed elevated levels of PTSS (56.1%), depression (33.7%), and anxiety (38.8%) [27]. In this study, we aimed to examine the longitudinal course of mental health symptoms 12 months after the initial investigation. Specifically, in line with earlier research, we (1) hypothesized that symptom levels would remain unchanged over time. We furthermore aimed to (2) examine trajectories of symptom courses, and to (3) identify in an exploratory manner individual (e.g. age), trauma-related and clinical (e.g. number

of traumatic experiences), and post-migration (e.g. approval/refusal of asylum) factors that might predict the symptom levels of ASCs at follow-up.

Methods

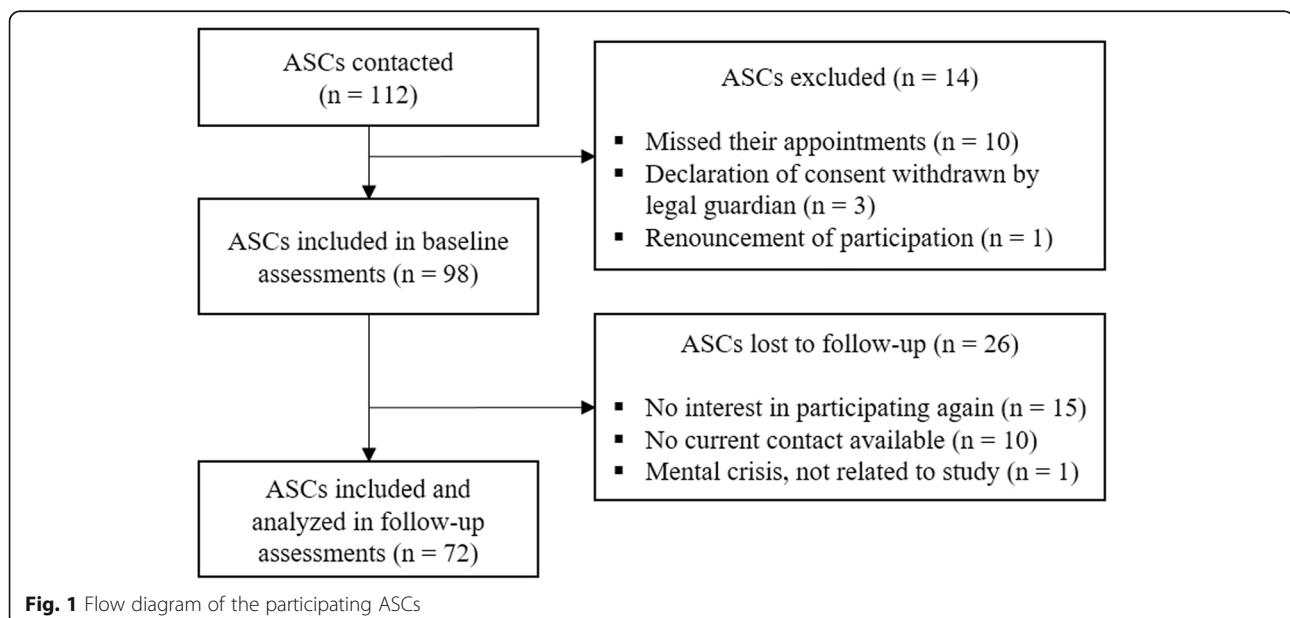
We used the STROBE statement [28] as a guideline for reporting cohort studies when drafting the manuscript of this study.

Procedure

This study is a prospective cohort study on the mental health and stress factors of ASCs, carried out between 2017 and 2018. In 2017, we contacted ASC facilities, refugee reception centers, and volunteers working in the field throughout Bavaria, Germany in order to promote this study among their clients. The original inclusion criteria were: an asylum-seeking minor residing in Germany for at least 3 months and written informed consent from both participants and their legal guardians. Power analysis was undertaken at baseline originally using G*Power [29] in order to identify differences between accompanied and unaccompanied ASCs, and with a moderate effect size of Cohen's $d = .5$, a significance level of $\alpha = .05$, a test power of $1 - \beta = .8$, and an allocation ratio of 1 to 2, resulting in a required sample size of $N = 114$. We had therefore recruited $N = 112$ ASCs for baseline assessments, 14 of whom dropped out before completing the assessments. This resulted in an original sample of $N = 98$ ASCs at baseline (T1) [27]. We calculated no additional power analysis prior to the follow-up, but rather contacted all youths who had given their consent to be contacted again in 2018 and arranged appointments with those who wished to participate in the

follow-up assessments (T2) which took place on average 12 months ($M = 11.8$, $SD = .58$) after baseline. Altogether, $N = 72$ ASCs were available for assessment at follow-up (73.5% of the original sample). Of those lost to follow-up assessment, 15 did not want to participate again, 10 could not be contacted or located anymore, and one adolescent did not want to participate due to an urgent mental crisis that was not related to participation in the study. Figure 1 gives the participant flow.

All participants, as well as their parents or legal guardians, had given their informed consent prior to study participation at baseline but were asked to do so again at follow-up. After contacting and setting up appointments, all measures were administered in an interview-like face-to-face setting in a private room in the adolescents' residences. All interviewers were bachelor-level psychologists and were in their master's program by the time of the respective assessments. They had been trained and were being supervised by experienced and licensed clinicians in the context of trauma and refugees (JU, RR) at all times. If the participants did not have sufficient language proficiency, interpreters were on hand but were not needed. The interviews began by clarifying the study aims, informing the participants about the obligation of the professionals involved to uphold confidentiality, and stressing the voluntary nature of participation. All participants were given information about psychosocial services in the vicinity. The researchers provided immediate psychological support in the event of any distress caused by the assessment among the participants. However, no emergencies occurred during the study. Participants were given a 20-euro voucher as an incentive.



The study was approved by the university's ethics board in December 2016 (ethics approval number: 2016/23).

Participants

Seventy-two ASCs were analyzed at follow-up. The majority were boys ($n = 65$, 90.3%), of Islamic faith ($n = 59$, 84.3%), unaccompanied ($n = 47$, 65.28%), and attending school in Germany ($n = 64$, 88.9%). Half of the participants came from Afghanistan ($n = 36$, 50%), further major countries of origin were Eritrea ($n = 9$, 12.5%), Syria ($n = 8$, 11.1%), and Iraq ($n = 7$, 9.7%). Most participants were living in either semi-care ($n = 27$, 37.5%) or full-care units of the Child and Youth Welfare System ($n = 18$, 25%), in an apartment with some family member ($n = 18$, 25%), or in an apartment on their own ($n = 8$, 11.1%). The asylum applications of most participants had been accepted ($n = 51$, 71.8%), 25 of which had been accepted between baseline and follow-up assessment (34.7%). Another 16 participants' applications had been declined (22.5%), and another five applications were pending (6.9%). The mean age was 17 ($M = 17.32$, $SD = 1.93$) and participants had been living in Germany for almost 3 years ($M = 2.87$, $SD = 0.74$). Thirteen participants (18.1%) had undergone some sort of psychosocial intervention since their resettlement in Germany but did not differ from those with no history of treatment in terms of psychopathology. See Additional file 1: Table S1 for more information on participants' sociodemographic characteristics.

ASCs who had completed the baseline assessment but had dropped out by follow-up did not differ from participants included in the follow-up with regard to socio-demographic data and mental health outcomes.

Measures

The same measures were used at baseline and at follow-up. The socio-demographic background was queried via the self-report. Besides common demographic data, we also asked about any changes in placement, asylum status, or psychosocial treatment that might have occurred between baseline and follow-up. Moreover, the following measures were administered in the German versions.

The *Child and Adolescent Trauma Screen* (CATS; [30]) consists of two parts. First, participants were shown a list of 15 potentially traumatic events and were asked to indicate which of them they had ever experienced (CATS trauma list). We added another four items related to the experience of flight and resettlement (deprivation for several days, dangerous journey (e.g. on a crowded boat), imprisonment and abduction, and the committing of acts of violence (voluntarily or involuntarily)). Second, respondents rated the frequency of PTSS over the course of the previous 2 weeks (CATS symptom scale) on a four-point Likert scale. The CATS symptom scale ranges from 0 to 60, and its authors have

suggested a cut-off value of 21 as an indicator of clinically significant levels of PTSS. Lastly, respondents rated the impairment caused by PTSS over the course of the previous 2 weeks by means of five dichotomous items. The CATS is based on DSM-5 criteria [31]. It has shown good psychometric properties [30] and has been used among ASC populations [32]. In this study, the inter-item reliability of the CATS symptom scale was good (20 items; $\alpha = .83$).

The *Hopkins Symptom Checklist-37 for Adolescents* (HSCL-37A; [33]) is a self-report questionnaire that screens for internalizing symptoms such as anxiety and depression, and externalizing behavior. Respondents rated the frequency of symptoms over the course of the previous month on a 4-point Likert scale. The subscales are composed as follows: total score (range 37–148, cut-off 63), depression (range 15–60, cut-off 33), anxiety (range 10–40, cut-off 20), and externalizing cluster (range 12–48, cut-off 19). The depression scale and the anxiety scale add up to the internalizing cluster (range 25–100, cut-off 54). The HSCL-37A has been widely used among diverse populations and shows good psychometric properties [33]. In this study, inter-item reliability for the constituent scales was as follows: total score (37 items, $\alpha = .89$), depression (15 items, $\alpha = .86$), anxiety (10 items, $\alpha = .78$), externalizing cluster (12 items, $\alpha = .54$), and internalizing cluster (25 items, $\alpha = .90$).

The *Everyday Resources and Stressors Scale* (ERSS, Müller & Bütter, unpublished scale) is a 20-item self-report questionnaire designed to screen for the following post-migration factors: experience of discrimination, social support within the family, social support in the host country, language proficiency, and everyday resources (all ranging from 1 to 4). One subscale has been derived from the Everyday Discrimination Scale [34]. The other subscales were composed by the construction of items concerning relevant post-migration factors identified through consensual literature research [24, 35]. The ERSS is yet to be validated but it was successfully used at baseline with α ranging from .71 to .77 [27]. In this study, the inter-item reliability of discrimination (4 items, $\alpha = .45$) and the social support in the host country (5 items, $\alpha = .33$) subscales were psychometrically unsatisfactory and were, therefore, excluded from the analysis. The inter-item reliability of the other scales was as follows: social support within the family (3 items, $\alpha = .81$), language proficiency (3 items, $\alpha = .74$), and everyday resources (5 items, $\alpha = .68$).

Statistical analyses

Data were analyzed using SPSS statistics, version 25. As regards missing data, only nine single item values were missing (0.2%) across all participants and mental health outcome measures. The most conservative values were

subsequently interpolated into these missing values. First, descriptive statistics were run to analyze the study sample with regard to socio-demographic data. Comparisons between groups (e.g. non-participants and participants) were conducted using χ^2 -statistics and independent *t*-tests. Second, Pearson's correlations were carried out between all continuous variables at both time points. Third, paired-sample *t*-tests were used to examine differences in numbers of traumatic experiences and mental health outcomes between baseline and follow-up. Cohen's *d* was calculated in order to indicate the magnitude of effects. In addition, the Reliable Change Index (RCI) was used to compute the critical difference. Fourth, a set of ANOVAs with Bonferroni-Holm post-hoc testing was conducted with 'change in asylum status between time points' as the fixed factor and mental health outcomes as the dependent variables. The subgroups were categorized as follows: asylum application pending or rejected at T2, asylum application accepted both at T1 and T2, and asylum application accepted between assessments. Finally, hierarchical multiple regression analysis was conducted in order to investigate predictors of mental health outcomes at follow-up (CATS symptom scale, HSCL-37A measures). Baseline variables that were significantly correlated with follow-up mental health outcomes were entered in a stepwise manner in the subsequent regression analysis with follow-up mental health outcomes as the dependent variables. We used residualized change score modelling as a standard approach to control for initial symptom levels (i.e., follow-up values with baseline values taken into account). The predictor variables that were entered in the regression analysis included socio-demographic data (e.g. age), numbers of traumatic experiences, mental health outcomes, and ERSS scales, all at baseline, as well as change in asylum status as described above. Baseline mental health outcome measures that were shown to be multicollinear to at

least one further predictor variable were excluded from the analysis (according to $VIF \geq 3$).

Results

Course of symptoms

Table 1 gives the numbers of traumatic experiences and all mental health outcomes at baseline and follow-up. At follow-up, the levels of clinically significant symptoms (i.e., number of participants above cut-off values) ranged from 9.7% (HSCL-37A externalizing cluster) to 37.5% (CATS symptom scale). There was a major change in symptom severity for all mental health outcome measures except for the externalizing cluster, $t(71) = .35$, $p = .73$. All symptom reductions within 1 year were found to be highly significant (on a significance level of $p < .001$) and of moderate effect size (range: depression, $d = .41$ to PTSS, $d = .52$). The numbers of traumatic experiences did not change from baseline to follow-up, $t(71) = .67$, $p = .51$, with an average of eight ($M = 8.32$, $SD = 2.92$) reported potentially traumatic experiences at follow-up. Symptom levels at baseline and follow-up were significantly correlated, and these correlations were moderate (range: PTSS, $r = .41$ to HSCL-37A total score, $r = .60$). Altogether, except for the HSCL-37A total score and externalizing cluster, the number of participants with clinically significant symptoms (i.e., above cut-off values) had declined significantly at follow-up.

Mental health trajectories

From the descriptive angle, all mean symptom change scores showed considerable standard deviations, indicating a large variation in participants' mental health trajectories. Table 2 gives an overview of the trajectories of all mental health outcomes over the course of 1 year. Figure 2 illustrates these transitions for the CATS symptom scale. Similar numbers of participants either showed

Table 1 Mental health outcome measures at baseline and follow-up and their change scores between time points for 72 ASCs

	T1		T2		Change scores ^a M (SD)	<i>r</i> ^b	<i>t</i> (df)	χ^2 ^b (df)	<i>d</i>
	M (SD)	Subjects above cut-off <i>n</i> (%)	M (SD)	Subjects above cut-off <i>n</i> (%)					
CATS-TL	8.56 (2.96)		8.32 (2.92)		-.19 (2.97)	.48***	.67 (71)		.08
CATS-SS	22.17 (9.68)	41 (56.9)	17.29 (9.17)	27 (37.5)	-4.88 (10.26)	.41***	4.03*** (71)	5.46* [1]	.52
HSCL-Tot	63.83 (13.76)	23 (31.9)	58.33 (12.65)	13 (18.1)	-5.5 (11.93)	.60***	3.91*** (71)	3.70 (1)	.42
HSCL-Dep	30.1 (7.82)	28 (38.9)	26.96 (7.7)	12 (16.7)	-2.25 (4.79)	.49***	3.38*** (71)	8.86** [1]	.41
HSCL-Anx	18.57 (5.69)	23 (31.9)	16.32 (4.13)	12 (16.7)	-3.14 (7.88)	.56***	3.99*** (71)	4.57* [1]	.45
HSCL-Int	48.67 (12.61)	23 (31.9)	43.28 (11.17)	11 (15.3)	-5.39 (11.1)	.57***	4.12*** (71)	5.54* [1]	.45
HSCL-Ext	15.17 (2.68)	4 (5.6)	15.06 (2.91)	7 (9.7)	-.11 (2.68)	.54***	.35 (71)	.89 (1)	.04

^aNegative values represent improvement on the respective scale

^bbetween T1 and T2

CATS-TL CATS trauma list, CATS-SS CATS symptom scale, HSCL-Tot HSCL-37A total score, HSCL-Dep HSCL-37A depression scale, HSCL-Anx HSCL-37A anxiety scale, HSCL-Int HSCL-37A internalizing cluster, HSCL-Ext HSCL-37A externalizing cluster

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

Table 2 Trajectories of mental health outcome measures over the course of one year among 72 ASCs

	Unremarkable <i>n</i> (%)	Reacting <i>n</i> (%)	Adapted <i>n</i> (%)	Persisting <i>n</i> (%)	RCI	Subjects improving acc. RCI <i>n</i> (%)	Subjects worsening acc. RCI <i>n</i> (%)
CATS-SS	23 (31.9)	8 (11.1)	22 (30.6)	19 (26.4)	11.06	21 (29.2)	5 (6.9)
HSCL-Tot	45 (62.5)	4 (5.6)	14 (19.4)	9 (12.5)	13.21	16 (22.2)	4 (5.6)
HSCL-Dep	39 (54.2)	5 (6.9)	21 (29.2)	7 (9.7)	8.94	15 (20.8)	7 (9.7)
HSCL-Anx	45 (62.5)	4 (5.6)	15 (20.8)	8 (11.1)	6.5	14 (19.4)	1 (1.4)
HSCL-Int	46 (63.9)	3 (4.2)	15 (20.8)	8 (11.1)	11.59	17 (23.6)	5 (6.9)
HSCL-Ext	64 (88.9)	4 (5.6)	1 (1.4)	3 (4.2)	5.09	2 (2.8)	2 (2.8)

Unremarkable = no symptoms at T1 and T2; Reacting = no symptoms at T1, symptoms at T2; Adapted = symptoms at T1, no symptoms at T2; Persisting = symptoms at T1 and T2. RCI = critical difference according to reliable change index formula

unremarkable ($n = 23$, 31.9%) or adapted symptoms ($n = 22$, 30.6%) between assessments. Nineteen (26.4%) participants showed persisting clinically significant PTSS, and eight (11.1%) participants fell within the ‘reacting’ category. Similar trajectories emerged for the HSCL-37A. Most participants either showed unremarkable (range: depression, $n = 39$, 54.2% to externalizing cluster, $n = 64$, 88.9%) or adapted symptoms (range: externalizing cluster, $n = 1$, 1.4% to depression scale, $n = 21$, 29.2%). However, there were still large

proportions of participants with persisting (range: externalizing cluster, $n = 3$, 4.2% to total score, $n = 9$, 12.5%) and reacting symptoms (range: internalizing cluster, $n = 3$, 4.2% to depression, $n = 5$, 6.9%). Moreover, as can be seen in Table 2, RCIs indicated similar proportions of change in symptom levels, with reliable improvement ranging from 19.4% (HSCL-37A anxiety scale) to 29.2% (CATS symptom scale), and reliable worsening ranging from 1.4% (HSCL-37A anxiety scale) to 9.7% (HSCL-37A depression scale).

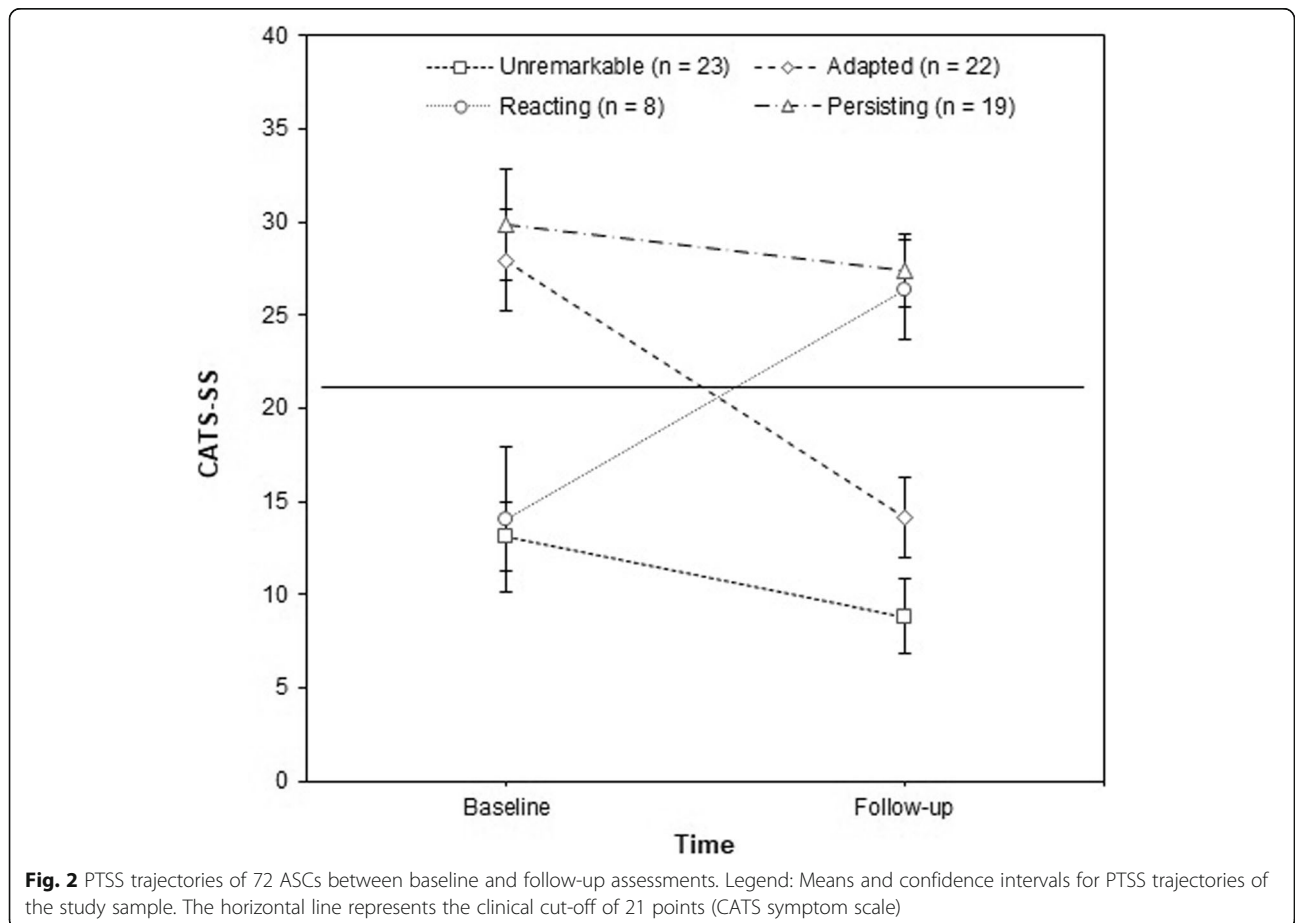


Fig. 2 PTSS trajectories of 72 ASCs between baseline and follow-up assessments. Legend: Means and confidence intervals for PTSS trajectories of the study sample. The horizontal line represents the clinical cut-off of 21 points (CATS symptom scale)

Group differences

Unaccompanied and accompanied ASCs did not differ significantly with respect to follow-up mental health outcomes and symptom change scores. However, there were significant main effects for change in asylum status with regard to all follow-up mental health outcome measures, except for the externalizing cluster, $F(2, 69) = .98$, $p = .26$. Bonferroni-Holm post-hoc testing revealed that participants whose applications were still pending or rejected at follow-up showed significantly more symptoms than participants whose asylum applications had been accepted between assessments. This association was found to be the largest in terms of the internalizing cluster, $t(44) = 3.54$, $p < .01$, and the magnitude of effects proved to be large (range: PTSS, $d = .79$ to internalizing cluster, $d = 1.05$). Table 3 gives the mean mental health outcomes for ASCs whose asylum applications had been accepted between assessments, ASCs whose applications had been accepted already at baseline, and ASCs whose applications were still pending or had been rejected at follow-up.

Predictors of follow-up symptom levels

Next, we investigated which factors contributed to follow-up symptom levels. Table 4 gives an overview of the results of the hierarchical regression analysis. As can be seen, baseline symptom scores were the most robust single predictors for all mental health outcomes at follow-up, except for the CATS symptom scale which was mainly predicted by HSCL-37A depression scores, $F(1, 69) = 15.62$, $p < .001$. They alone accounted for 20.7% (HSCL-37A depression scale) to 33% (HSCL-37A total score) of variance in the respective mental health outcomes at follow-up. In addition to baseline symptom

scores, change in asylum status was found to predict all mental health outcome measures, except for the externalizing cluster. It was the second most robust predictor and accounted for 4.7% (HSCL-37A total score) to 8.1% (HSCL-37A internalizing cluster) of variance in follow-up symptom severity. Besides that, the only further predictor variable that contributed to variance in follow-up symptom levels was 'time since resettlement'. It accounted for some 4% of HSCL-37A anxiety scores, $\Delta R^2_{adj} = .043$, $F(3, 67) = 6.05$, $p < .05$.

Discussion

This study investigated the course and predictors of the most common mental health outcomes among a cohort of 72 ASCs predominantly from Afghanistan, Syria, Eritrea, and Iraq who resettled in southern Germany in the wake of the 2015–17 European migrant crisis within their first years in exile. Hence, it is the first longitudinal study on the mental health of ASCs in Germany and the first ever on ASCs who resettled during this crisis. The study demonstrated that levels of psychological distress in ASCs were high, even almost 3 years after resettlement and with two thirds of the participants having been granted asylum. At the same time, it revealed a considerable change in symptom severity with respect to PTSS, depression, and anxiety between baseline (on average 22 months after resettlement) and follow-up (1 year after baseline assessment). Participants significantly improved on all but one mental health outcome (the externalizing cluster) that were covered in the study, and the magnitude of effects was moderate. Still, a substantial number of the participants showed elevated psychopathology, with rates of clinically significant symptoms ranging from 9.7% (externalizing behavior) to 37.5% (PTSS) at

Table 3 Mean comparisons of mental health outcome measures at T2 between ASCs in terms of asylum application status

	(1) Asylum application accepted between assessments, $n = 25$	(2) Asylum application accepted both at T1 and T2, $n = 26$	(3) Asylum application pending or rejected at T2, $n = 21$	ANOVA main effect asylum status $F(df)$	$t(df)^a$	d^a
	$M(SD)$	$M(SD)$	$M(SD)$			
CATS-SS	14.2 (9.68)	16.92 (9.35)	21.43 (8.52)	3.87* (2, 69)	2.87* (44)	.79
HSCL-Tot	54.32 (10.84)	57.85 (14.01)	63.71 (11.45)	3.4* (2, 69)	2.85* (44)	.84
HSCL-Dep	24.4 (5.8)	26.04 (8.33)	31.14 (7.48)	5.22*** (2, 69)	3.44** (44)	1.02
HSCL-Anx	14.72 (3.68)	16.31 (4.07)	18.24 (4.07)	4.55* (2, 69)	3.08* (44)	.91
HSCL-Int	39.12 (8.97)	42.35 (11.67)	49.38 (10.71)	5.6** (2, 69)	3.54** (44)	1.05
HSCL-Ext	15.2 (2.53)	15.5 (3.41)	14.33 (2.63)	.98 (2, 69)	-1.14 (44)	-.34

^aBetween (1) and (3)

CATS-SS CATS symptom scale, HSCL-Tot HSCL-37A total score, HSCL-Dep HSCL-37A depression scale, HSCL-Anx HSCL-37A anxiety scale, HSCL-Int HSCL-37A internalizing cluster, HSCL-Ext HSCL-37A externalizing cluster

* $p < .05$ (adjusted level of significance according to Bonferroni-Holm, $p < .0167$)

** $p < .01$ (adjusted level of significance according to Bonferroni-Holm, $p < .003$)

Table 4 Hierarchical linear regression analysis for variables predicting CATS and HSCL-37A measures at follow-up

Step	Included variable	B^a	$SE B^a$	Stand. β^a	F change	Overall F	Adj. R^2 change	Total adj. R^2
CATS-SS								
Step 1	HSCL-Dep (T1)	.47	.13	.40***	15.62***	15.62***	.173	.173
Step 2	Asylum status ^b	-3.02	1.19	-.27*	6.41*	11.63***	.06	.233
HSCL-Tot								
Step 1	HSCL-Total (T1)	.51	.09	.55***	30.34***	30.34***	.33	.33
Step 2	Asylum status	-3.6	1.48	-.23*	8.53*	21.95***	.047	.374
HSCL-Dep								
Step 1	HSCL-Dep (T1)	.43	.1	.43***	19.24***	19.24***	.207	.207
Step 2	Asylum status	-2.8	.96	-.30**	8.5**	14.91***	.077	.284
HSCL-Anx								
Step 1	HSCL-Anx (T1)	.36	.07	.50***	31.01***	31.01***	.3	.3
Step 2	Asylum status	-1.42	.47	-.28**	8.48**	21.43***	.069	.369
Step 3	Time since resettlement	-.11	.04	-.23*	6.05*	17.36***	.043	.412
HSCL-Int								
Step 1	HSCL-Int (T1)	.46	.08	.52***	31.05***	31.05***	.3	.3
Step 2	Asylum status	-4.12	1.3	-.3**	10**	22.55***	.081	.381
HSCL-Ext								
Step 1	HSCL-Ext (T1)	.58	.11	.54***	28.63***	28.63***	.283	.283

^afor the final model/step^basylum status interval-scaled: rejected or pending at T2, accepted both at T1 and T2, accepted between assessmentsCATS-SS CATS symptom scale, *HSCL-Tot* HSCL-37A total score, *HSCL-Dep* HSCL-37A depression scale, *HSCL-Anx* HSCL-37A anxiety scale, *HSCL-Int* HSCL-37A internalizing cluster, *HSCL-Ext* HSCL-37A externalizing cluster, *T1* baseline assessment* $p < .05$, ** $p < .01$, *** $p < .001$

follow-up, indicating a considerable need for professional support. The attrition rate from baseline to follow-up was 26.5% and was, therefore, comparable to the rates reported in studies with similar follow-up periods where attrition rates ranged from 19.4% [13] to 39.1% [12].

The results of this study are contrary to most longitudinal studies on the mental health of ASCs during the first years after resettlement that found little or no change in symptoms over time, indicating the stability and chronicity of symptoms [11–15]. Most studies that have reported an alleviation of symptoms either showed poor methodological quality (i.e., retrospective assessment of symptoms [36]), or had longer follow-up periods that tracked their participants over the course of up to 9 years [17]. Hence, this study seems to be the first prospective investigation using standardized measures to report on the improvement in the mental health status of ASCs during their first years in exile.

Given the somewhat unambiguous character of previous findings that suggest chronicity of symptoms in ASCs, the question arises as to which factors might account for the change in symptom severity in this sample of ASCs in Germany. Generally speaking, it is plausible to say that at least some symptom changes may have occurred on account of regression to the mean, a statistical

phenomenon commonly described in repeated measurements designs [37]. In this context, the change in the symptoms of ASCs may reflect natural variation (i.e., random error) in repeatedly measured values rather than any real change triggered by actual symptom alleviation. Regression to the mean seems to occur primarily following particularly extreme measurements when it is more likely that subsequent measurements of the same unit will yield less extreme results [37].

However, one can also presume that real change has occurred between baseline and follow-up assessments. First, participants whose asylum applications had been accepted between the two assessments showed significantly fewer severe symptoms at follow-up on all but one mental health outcome measure (the externalizing cluster) than participants with rejected applications, and the change in asylum status significantly predicted follow-up symptom severity. Given the relatively large number of participants who had their applications accepted at follow-up ($n = 51$, 71%) as opposed to a Norwegian study on ASCs where roughly half of the participants were rejected [12], it seems likely that this disparity explains the current improved course of symptoms compared to the Norwegian sample with stable courses. In this way, the current findings add to the existing evidence suggesting an adverse effect of negative

asylum decisions on the mental health of ASCs [12, 38]. It is, however, worth noting that the biggest differences in mental health outcomes were observed between those whose applications were accepted between assessments and those whose applications had been rejected at follow-up. Participants whose applications had already been accepted at baseline assessment still showed fewer severe symptoms than those with rejected applications, yet, these differences fell short of statistical significance. Hence, it might be that the positive decision on an asylum application constitutes a short-term protective factor that is superimposed by sustained psychopathology and further post-resettlement hardships that emerged at a later stage.

Apart from that, it also seems plausible that symptoms were mitigated by the absence of migration-related adversities and the experience of safety in the host country. By the time of follow-up assessments, most participants were resident in semi- or full-care units assisted by the Child and Youth Welfare System, and only few participants ($n = 8$, 11%) were living on their own. Given the detrimental effects of low-support living arrangements that have been demonstrated in different studies [12, 39], the mental health status of ASCs might have improved because of the support measures they were consistently receiving as opposed to, for instance, Jakobsen and colleagues' study where more than 25% of the study sample were subsequently placed in centers for adults without any specialized care [12]. Since only a small proportion of the current sample had received some form of psychosocial support—and as they did not differ from those with no history of treatment—we can, moreover, assume that symptom mitigation did not occur on account of treatment effects. Quite the contrary, our results demonstrate that ASCs rarely receive the mental health care they need.

Furthermore, in line with longitudinal data from the Netherlands [11], baseline symptom scores were found to be the most robust predictors of follow-up symptom severity. With respect to PTSS severity at follow-up, baseline depression scores turned out to be the major predictor, an association that has also been repeatedly reported in longitudinal studies [21]. Still, it is a remarkable association of symptoms given that it has been reported elsewhere that late-onset PTSD might be a secondary consequence of the worsening of depressive symptoms [23].

Besides baseline psychopathology and asylum status, only one further predictor of follow-up symptom levels could be derived. Time since resettlement accounted for some variance in follow-up anxiety scores which reflects the overall symptom improvement in this study over time. However, it still has to be borne in mind that time since resettlement merely accounted for small degrees of variance in anxiety scores, and further post-migration

factors did not contribute to variance in follow-up symptom scores. Quite the opposite, two scales of the ERSS were excluded from the analysis due to low internal consistency, arguably because the ERSS constitutes a new measure that is yet to be modified and validated. Therefore, post-migration factors were not found to be the major predictors of follow-up symptom severity. More standardized measures screening for post-migration factors in a concise manner are needed, and post-migration factors should be examined more rigorously in future research as they have rarely been taken into account in longitudinal investigations [21].

Despite the contrary finding on symptom mitigation, it is worth noting that this study fits in with a number of previous studies that reported considerable individual symptom variation throughout the study runtime regardless of the overall symptom course [13, 17, 22]. Symptom courses that appear to be stable at first sight then transpire to have multiple trajectories. For instance, in a Norwegian 2-year follow-up study there were equally substantial groups of participants who either decreased to below or increased to above cut-off at follow-up with regard to most mental health outcomes [13]. Similar trajectories have been described in this study, with the 'unremarkable'- and the 'adapted' groups being the most prevalent. Unfortunately, no statistical analyses could be conducted as to which factors predicted the constituent trajectories because of the small subsamples. So far, Montgomery [17] has documented that the number of pre-migration traumata differentiated the 'unremarkable' from the 'persisting' type, whereas the experience of stressful life events after resettlement differentiated 'adapted' ASCs from those with 'persisting' symptoms. This is largely in line with the Norwegian study where the increase in reported stressful life events predicted worsening of PTSS [13]. Furthermore, a Dutch study has found that late-onset PTSD (i.e., the 'reacting' type) was associated with older age, low levels of education, and numbers of pre-migration traumata, the latter of which were, however, fully mediated by depression and anxiety scores [23]. In summary, the factors associated with the mental health trajectories of ASCs have been detected sporadically but should be further examined in order to fully understand individual transitions. Moreover, more studies that include longer follow-up periods are necessary in order to inform clinicians about the natural history of symptoms. Both approaches could enable us to better monitor associated conditions in ASCs and derive implications for tailored mental health care.

Limitations

Certain limitations should be borne in mind when interpreting the results of this study. Even though the attrition rate from baseline to follow-up was rather low, one

major drawback of the study is the small sample size. A larger sample would have allowed for more nuanced statistical analyses regarding different subgroups of the current sample. Moreover, recruiting a random sample would have resulted in enhanced representativeness because distortions on the basis of selection bias could have been obviated. In addition, checklists instead of clinical interviews were used which means that the determined rates of psychological distress merely reflect an estimation of psychopathology. Even though these measures have been used broadly in research with ASCs and a good reliability has been documented consistently in these studies, it still deserves some consideration if cultural validity of these measures can be assumed for this particular population. Inquiring into the perceptions of ASCs with regard to the cultural appropriateness of the measures could therefore constitute a worthwhile addition to fathoming their overall validity. Other areas of psychological problems could not be covered nor were other potentially relevant factors such as hope and coping styles that could constitute important sources of resilience in ASCs. Furthermore, there were only two assessments, with the baseline taking place almost 2 years after the resettlement of the ASCs. Consequently, neither initial mental health transitions following the very early stages of resettlement nor long-term symptom changes could be examined. Finally, different interviewers administered the follow-up assessments and the baseline assessments. It is not, therefore, clear whether any sort of experimenter effect might have occurred. Given these limitations, the results of this study should be generalized with caution to ASCs as a whole but may function as a starting point for further long-term research.

Conclusions

We discussed several explanations for the significantly decreased psychological symptoms in our sample of ASCs after 1 year, including the impact of asylum status, the experience of safety and current living arrangements, and regression to the mean.

In conclusion, it is, on the one hand, somewhat promising to observe that a substantial number of the participating ASCs seems to show an improvement in symptoms, and that, even 3 years after resettlement, most ASCs were still living in specialized care units. On the other hand, the current findings do not belie the fact that, despite improvement, the levels of psychological distress among ASCs were still high and exceeded those reported in community samples [19, 20]. In addition, a shortage of mental health care was documented, underlining the need for a functional system for meeting the psychological needs of ASCs, both on a community and on an individual level. Psychosocial interventions should address the nexus between mental health problems on the one hand, and post-migration stressors and acculturative hardships on the

other. As rates of PTSS, depression, and anxiety were high and have been shown to be equally prevalent in the refugee population [8], interventions should encompass addressing not only PTSS, but also depression and anxiety. Even though it is, yet, a scarce number, there are several interventions being put forward, including prevention groups [32] and individual therapy [8, 40], that have proved to be promising approaches. They should be integrated into national health care systems, and preferably embedded in stepped-care and cross-sectoral models as suggested by Horlings & Hein [41] and Fazel & Betancourt [42] in order to address the wide array of stressors encountered by ASCs.

Additional file

Additional file 1: Table S1. Sociodemographic characteristics of the participating ASCs ($n = 72$) at follow-up. (DOCX 4408 kb)

Abbreviations

ASCs: Asylum-seeking children and adolescents; CATS: Child and Adolescent Trauma Screen; ERSS: Everyday Resources and Stressors Scale; HSCL-37A: Hopkins Symptom Checklist-37 for Adolescents; PTSD: Posttraumatic Stress Disorder; PTSS: Posttraumatic stress symptoms; RCI: Reliable Change Index; VIF: Variance inflation factor

Acknowledgements

The authors would like to thank all participants, caregivers, and interpreters involved in the study.

Authors' contributions

LRFM collected the baseline data, performed the statistical analysis, and drafted the manuscript. KG and FH collected the follow-up data and made contributions to the manuscript. KPB collected the baseline data and made contributions to the statistical analysis. RR and JU designed and coordinated the study. JU was involved in drafting and revising the manuscript. All authors read and approved the manuscript and the final version.

Funding

JH received a proFOR+ grant, a funding program of the Catholic University of Eichstätt-Ingolstadt, to cover costs emerging over the course of the study, including payments for interpreters, incentives for participants, travel expenses, and publication fees. The funding body has not been involved in any of the following tasks: design and conduct of the study, collection, analysis and interpretation of data, and drafting the manuscript.

Availability of data and materials

The datasets generated and analyzed during this study are not publicly available but are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

The study was approved by the ethics board of the Catholic University Eichstätt-Ingolstadt in December 2016 (ethics approval number: 2016/23). All participants and their legal guardians gave their written informed consent to participate in the study.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Received: 17 April 2019 Accepted: 30 June 2019

Published online: 08 July 2019

References

- Biermann F, Boas I. Preparing for a warmer world: towards a global governance system to protect climate refugees. *Glob Environ Polit*. 2010; 10(1):60–88.
- United Nations High Commissioner for Refugees. Asylum and Migration; 2017. Available from: URL: <https://www.unhcr.org/asylum-and-migration.html>.
- United Nations High Commissioner for Refugees. Figures at a Glance; 2017. Available from: URL: <http://www.unhcr.org/figures-at-a-glance.html>.
- eurostat. Asylum statistics; 2018. Available from: URL: https://ec.europa.eu/eurostat/statistics-explained/index.php/Asylum_statistics#Age_and_gender_of_first-time_applicants.
- Bronstein I, Montgomery P. Psychological distress in refugee children: a systematic review. *Clin Child Fam Psychol Rev*. 2011;14(1):44–56.
- Bean T, Derluyn I, Eurelings-Bontekoe E, Broekaert E, Spinoven P. Comparing psychological distress, traumatic stress reactions, and experiences of unaccompanied refugee minors with experiences of adolescents accompanied by parents. *J Nerv Ment Dis*. 2007;195(4):288–97.
- Thommessen S, Laghi F, Cerrone C, Baiocco R, Todd B. Internalizing and externalizing symptoms among unaccompanied refugee and Italian adolescents. *Child Youth Serv Rev*. 2013;35(1):7–10.
- Turrini G, Purgato M, Ballette F, Nosè M, Ostuzzi G, Barbui C. Common mental disorders in asylum seekers and refugees: umbrella review of prevalence and intervention studies. *Int J Ment Health Syst*. 2017;11:51.
- Huemer J, Karnik NS, Voelkl-Kernstock S, Granditsch E, Dervic K, Friedrich MH, et al. Mental health issues in unaccompanied refugee minors. *Child Adolesc Psychiatry Ment Health*. 2009;3(1):13.
- Perkonig A, Pfister H, Stein MB, Höfler M, Lieb R, Maercker A, Wittchen H-U. Longitudinal course of posttraumatic stress disorder and posttraumatic stress disorder symptoms in a community sample of adolescents and young adults. *Am J Psychiatry*. 2005;162(7):1320–7.
- Bean TM, Eurelings-Bontekoe E, Spinoven P. Course and predictors of mental health of unaccompanied refugee minors in the Netherlands: one year follow-up. *Soc Sci Med*. 2007;64(6):1204–15.
- Jakobsen M, Meyer DeMott MA, Wentzel-Larsen T, Heir T. The impact of the asylum process on mental health: a longitudinal study of unaccompanied refugee minors in Norway. *BMJ Open*. 2017;7(6):e015157.
- Jensen TK, Skårdalsmo EMB, Fjermestad KW. Development of mental health problems - a follow-up study of unaccompanied refugee minors. *Child Adolesc Psychiatry Ment Health*. 2014;8:29.
- Vervliet M, Lammertyn J, Broekaert E, Derluyn I. Longitudinal follow-up of the mental health of unaccompanied refugee minors. *Eur Child Adolesc Psychiatry*. 2014;23(5):337–46.
- Keles S, Ildsoe T, Friborg O, Sirin S, Oppedal B. The longitudinal relation between daily hassles and depressive symptoms among unaccompanied refugees in Norway. *J Abnorm Child Psychol*. 2017;45(7):1413–27.
- Sack WH, Clarke GN, Him C, Dickason D, Goff B, Lanham K, et al. A 6-year follow-up study of Cambodian refugee adolescents traumatized as children. *J Am Acad Child Adolesc Psychiatry*. 1993;32:431–7.
- Montgomery E. Trauma and resilience in young refugees: a 9-year follow-up study. *Dev Psychopathol*. 2010;22(2):477–89.
- Sack WH, Him C, Dickason D. Twelve-year follow-up study of Khmer youths who suffered massive war trauma as children. *J Am Acad Child Adolesc Psychiatry*. 1999;38:1173–9.
- Alisic E, Zalta AK, van Wesel F, Larsen SE, Hafstad GS, Hassanpour K, et al. Rates of post-traumatic stress disorder in trauma-exposed children and adolescents: meta-analysis. *Br J Psychiatry*. 2014;204:335–40.
- Costello EJ, Mustillo S, Erkanlin A, Keeler G, Angold A. Prevalence and development of psychiatric disorders in childhood and adolescence. *Arch Gen Psychiatry*. 2003;60:837–44.
- Tam SY, Houlihan S, Melendez-Torres GJ. A systematic review of longitudinal risk and protective factors and correlates for posttraumatic stress and its natural history in forcibly displaced children. *Trauma Violence Abuse*. 2017;18(4):377–95.
- Ahmad A, Mohamed HT, Ameen NM. A 26-month follow-up of posttraumatic stress symptoms in children after the mass-escape tragedy in Iraqi Kurdistan. *Nord J Psychiatry*. 1998;52:357–66.
- Smid G, Lensvelt-Mulders GJLM, Knipscheer JW, Gersons BPR, Kleber RJ. Late-onset PTSD in unaccompanied refugee minors: exploring the predictive utility depression and anxiety symptoms. *J Clin Child Adolesc Psychol*. 2011;40(5):742–55.
- Fazel M, Reed RV, Panter-Brick C, Stein A. Mental health of displaced and refugee children resettled in high-income countries: risk and protective factors. *Lancet*. 2012;379(9812):266–82.
- Soykoek S, Mall V, Nehring I, Henningsen P, Aberl S. Post-traumatic stress disorder in Syrian children of a German refugee camp. *Lancet*. 2017; 389(10072):903–4.
- Sierau S, Schneider E, Nesterko Y, von Klitzing K, Glaesmer H. Mental health problems of unaccompanied young refugees in youth welfare institutions. *Psychiatr Prax*. 2018;46(3):135–40.
- Müller LRF, Büter KP, Rosner R, Unterhitzberger J. Mental health and associated stress factors in accompanied and unaccompanied refugee minors resettled in Germany: a cross-sectional study. *Child Adolesc Psychiatry Ment Health*. 2019;13(1):288.
- von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The strengthening of reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. *Lancet*. 2007;370(9596):1453–7.
- Faul F, Erdfelder E, Lang A-G, Buchner A. G*power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav Res Methods*. 2007;39:175–91.
- Sachser C, Berliner L, Holt T, Jensen TK, Jungbluth N, Risch E, et al. International development and psychometric properties of the child and adolescent trauma screen (CATS). *J Affect Disord*. 2017;210(1):189–95.
- American Psychiatric Association. Diagnostic and statistical manual of mental disorders (DSM-5). Arlington: American Psychiatric Publishing; 2013.
- Pfeiffer E, Sachser C, Rohlmann F, Goldbeck L. Effectiveness of a trauma-focused group intervention for young refugees: a randomized controlled trial. *J Child Psychol Psychiatry*. 2018;59(11):1171–9.
- Bean TM, Eurelings-Bontekoe E, Derluyn I, Spinoven P. HSC-37A User's Manual. Available from: URL: <http://www.centrum45.nl>.
- Williams DR, Yu Y, Jackson JS, Anderson NB. Racial differences in physical and mental health: socioeconomic status, stress, and discrimination. *J Health Psychol*. 1997;2(3):335–51.
- Sleijpen M, Boeije HR, Kleber RJ, Mooren T. Between power and powerlessness: a meta-ethnography of sources of resilience in young refugees. *Ethn Health*. 2016;21(2):158–80.
- Hjern A, Angel B. Organized violence and mental health of refugee children in exile: a six-year follow-up. *Acta Paediatr*. 2000;89:722–7.
- Barnett AG, van der Pols JC, Dobson AJ. Regression to the mean: what it is and how to deal with it. *Int J Epidemiol*. 2005;34(1):215–20.
- Heptinstall E, Sethna V, Taylor E. PTSD and depression in refugee children: associations with pre-migration trauma and post-migration stress. *Eur Child Adolesc Psychiatry*. 2004;13(6):373–80.
- Hodes M, Jagdev D, Chandra N, Cunniff A. Risk and resilience for psychological distress amongst unaccompanied asylum seeking adolescents. *J Child Psychol Psychiatry*. 2008;49(7):723–32.
- Unterhitzberger J, Wintersohl S, Lang M, König J, Rosner R. Providing manualized individual trauma-focused CBT to unaccompanied refugee minors with uncertain residence status: a pilot study. *Child Adolesc Psychiatry Ment Health*. 2019;13:22.
- Horlings A, Hein I. Psychiatric screening and interventions for minor refugees in Europe: an overview of approaches and tools. *Eur J Pediatr*. 2018;177(2):163–9.
- Fazel M, Betancourt TS. Preventive mental health interventions for refugee children and adolescents in high-income settings. *Lancet Child Adolesc Health*. 2018;2(2):121–32.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Publication 2. Ecological Momentary Assessment (EMA) of daily mood and post-migration factors in young refugees

Exact title	A pilot study on ecological momentary assessment in asylum-seeking children and adolescents resettled to Germany: Investigating compliance, post-migration factors, and the relation between daily mood, sleep patterns, and mental health
Authors	Lauritz Rudolf Floribert Müller ¹ Katharina Gossmann ¹ Regina Franziska Schmid Rita Rosner Johanna Unterhitzberger ¹ joint first authors
Affiliation	Catholic University Eichstätt-Ingolstadt
My contribution	I initiated contact with the young participants through the baseline survey. I coordinated and supervised the study procedure and the data collection. I drafted the manuscript, and carried out the submission to the scientific journal. I implemented the reviewers' feedback and finalized the publication process.
Journal	PLOS One
Submitted	June 26, 2020
Feedback of the reviewers	September 10, 2020
Resubmitted	October 21, 2020
Accepted	January 18, 2021
Published	February 1, 2021

RESEARCH ARTICLE

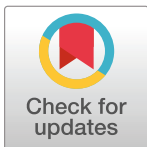
A pilot study on ecological momentary assessment in asylum-seeking children and adolescents resettled to Germany: Investigating compliance, post-migration factors, and the relation between daily mood, sleep patterns, and mental health

Lauritz Rudolf Floribert Müller^{†*}, Katharina Gossmann[‡], Regina F. Schmid, Rita Rosner, Johanna Unterhitzberger

Department of Psychology, Catholic University of Eichstätt-Ingolstadt, Eichstätt, Germany

† These authors are equal contributors and joint first authors

* lauritz.mueller@ku.de



OPEN ACCESS

Citation: Müller LRF, Gossmann K, Schmid RF, Rosner R, Unterhitzberger J (2021) A pilot study on ecological momentary assessment in asylum-seeking children and adolescents resettled to Germany: Investigating compliance, post-migration factors, and the relation between daily mood, sleep patterns, and mental health. PLoS ONE 16(2): e0246069. <https://doi.org/10.1371/journal.pone.0246069>

Editor: Ricarda Nater-Mewes, University of Vienna, AUSTRIA

Received: June 26, 2020

Accepted: January 12, 2021

Published: February 1, 2021

Copyright: © 2021 Müller et al. This is an open access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Data Availability Statement: The data cannot be made freely available to the public because it contains potentially identifiable and sensitive patient information, the unrestricted disclosure of which is not permitted by the consent forms approved by the Ethics Committee that gave their approval of this study. Requests can be sent to Prof. Dr. Marco Steinhauser, Chairman of the Ethics Committee of the Catholic University of

Abstract

Background

Asylum-seeking children and adolescents (ASCs) resettled to western countries show elevated levels of psychological distress. While research on the mental health of ASCs is increasing, less is known about their day-to-day living experiences such as their daily mood, sleep patterns, and post-migration factors. Moreover, no examination *in situ*, using smartphone-assisted ecological momentary assessment (EMA), has been conducted up to now among ASCs. Furthermore, we do not know if screening measures succeed in reflecting the daily mood of ASCs experienced in everyday life.

Methods

We undertook a smartphone-assisted EMA study over a two-week period with 3 measurements a day. Participants were $N = 40$ ASCs from 10 different countries who had resettled to Germany. They completed standardized questionnaires screening for history of trauma and clinical symptoms (post-traumatic stress symptoms, depression, and anxiety) that were carried out in interview-like settings, and they participated in the subsequent EMA where they rated mood, sleep parameters, and post-migration factors on a daily basis. Multilevel models of clinical symptoms, daily mood, and sleep parameters were computed based on a total of 680 measurements.

Results

The multiply traumatized and highly distressed participants reported different levels of discrimination, and various social activities and contacts in the EMA. The overall compliance rate was shown to be 40.5%. Higher PTSS and anxiety scores were associated with lower

Eichstätt-Ingolstadt, Ostenstraße 25, DE-85072 Eichstätt, marco.steinhauser@ku.de.

Funding: JU received a proFOR+ grant for the conduct of the study (ID 2316). proFOR+ is a funding program of the Catholic University of Eichstätt-Ingolstadt. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. <https://www.ku.de/forschung/forschungsfoerderung/profor> This work was supported by the German Research Foundation (DFG) within the funding programme Open Access Publishing.

Competing interests: The authors have declared that there are no competing interests.

Abbreviations: ASC, Asylum-seeking children and adolescents; CATS, Child and Adolescent Trauma Screen; EDS, Everyday Discrimination Scale; EMA, Ecological momentary assessment; ERSS, Everyday Resources and Stressors Scale; HSCL-37A, Hopkins Symptom Checklist-37 for Adolescents; ICC, Intraclass correlation; L1 (variable), Level 1 (variable); L2 (variable), Level 2 (variable); PTSD, Posttraumatic stress disorder; PTSS, Posttraumatic stress symptoms.

levels of daily mood and poorer outcomes of some sleep parameters. Depression scores were not associated with any of the variables assessed in the EMA.

Conclusions

Smartphone-assisted EMA among ASCs resettled to Germany proved to be implementable despite a rather low compliance rate. Not only do ASCs show high symptom levels, they are also affected by these symptoms in their daily lives. The results emphasize the need for concise screenings and psychological treatment for this high-risk population. Limitations include the convenient nature of the sample and the lack of a comparison group.

Introduction

Over the course of the years 2015 to 2017, at the peak of what became known as the European migrant crisis, almost 500,000 asylum-seeking children and adolescents (ASCs) under the age of 18 resettled to Germany [1–3]. Given the myriad of adversities that ASCs regularly experience in their home country and during different stages of flight [4,5], the screening of mental health problems of ASCs resettled to western countries has been a major focus of clinical research [6].

Whereas data on the rates of mental health problems of ASCs are appreciably increasing and becoming more accurate, less is known about the day-to-day experiences of ASCs with regard to domains such as post-migration factors, sleep patterns, and daily mood.

Moreover, most studies that focus on the everyday experiences of ASCs with regard to a variety of domains are of cross-sectional, more specifically retrospective, nature in the sense that participating ASCs were asked to rate their experiences over the course of a preceding time period (e.g. four weeks) at a given point in time (e.g. [7,8]). Naturally, this procedure is not specific to mental health research with ASCs but rather inherent to most non-experimental psychological research in and of itself [9]. However, this approach bears some considerations. In retrospective investigations, respondents might simply overlook past experiences, or these experiences might be conflated with current sensations and cognitions [10]. This can result in individuals recalling or rating their experiences differently from what they actually felt, thought, or perceived in a given situation, a phenomenon commonly known as recall or hindsight bias [11,12]. In fact, there is some evidence to suggest that memory inconsistencies among youths do appear regularly in psychological assessments, even with regard to severe experiences such as trauma [13]. For instance, in a 12-month follow-up study with ASCs in the Netherlands, 86.4% of the sample changed their response on at least one of the traumatic experiences assessed in the study [14]—which is largely in accordance with the proportion determined in studies with non-migration populations [15]. New technologies, like ecological momentary assessment (EMA), allow us to overcome some of these limitations. In EMAs, as opposed to conventional questionnaire assessments, participants respond *in situ* to the outcomes of interest using smartphones or comparable devices [16]. In doing so, respondents rate their present perceptions rather than evaluating what has happened in the past. In fact, studies that used the EMA approach have shown considerable discrepancy with retrospective examinations regarding the frequency with which certain symptoms were reported. For instance, in an EMA study with adult patients suffering from PTSD after childhood sexual abuse, participants reported roughly 50% more intrusions and flashbacks than in the subsequent retrospective investigation [17]. To date, however, little EMA research has been done among refugee

youths. Although a study in Sweden examined intrusive memories in young refugees (age 16–25 years) in a daily diary format [18], real-time smartphone-based EMA among minor refugees has, to the authors' knowledge, not yet been conducted. Some meta-analyses indicate that EMA studies among children and adolescents might yield lower compliance rates than studies among adults [19,20]. In addition, ASCs are likely to have lower language skills than native youths and may generally be less familiar with psychological test formats [21,22]—which is why we do not know whether the EMA approach is suitable for this population. Consequently, a key objective of this pilot study was to test the EMA approach among ASCs and to investigate their compliance to the EMA protocol as one aspect of its feasibility in this population.

Retrospective surveys indicate a wide range of post-migration factors that may affect the mental health of ASCs in the host country and suggest that ASCs regularly experience hassles regarding their asylum process [23,24], financial difficulties [23], and discriminatory incidents [7,8], among others. A very comprehensive review on risk and protective factors in ASCs distinguishes post-migration factors at the individual, family and community levels and demonstrates that lack of social support and resources in the host country and experiences of discrimination were among the most important post-migration factors to be associated with poorer mental health outcomes [25]. Ecological frameworks suggest that these post-migration factors are heavily interlinked [26], and, along with migration-related adversities, might have a cumulative effect on the mental health of ASCs [27]. Indeed, data from a Norwegian sample of minor refugees support this link by showing that higher levels of social support not only had a direct positive effect on mental health, but also had indirect positive effects on competence in dealing with experiences of discrimination [28]. However, the extent to which ASCs experience daily post-migration factors such as social support, resources, and discrimination is still unknown as assessed by real-time everyday data as these findings rely solely on retrospective investigations and there are, to date, no EMA investigations. In order to gather information on the most relevant aspects of the abovementioned post-migration factors in ASCs and as a precursor for a larger study that will look at the association between daily assessed post-migration factors and daily assessed mood and symptom scores of ASCs, this pilot study aimed at giving a first account of the as-is state regarding post-migration factors, daily mood, and sleep patterns.

The main body of clinical research among ASCs demonstrates large numbers of potentially traumatic experiences and high rates of psychological distress in this group, whereby posttraumatic stress symptoms (PTSS)/posttraumatic stress disorder (PTSD), depression, anxiety, and sleeping problems appear to be the major mental health problems [6,27,29,30]. In addition, the high rates of psychological distress seem to be stable over the course of the first years after arrival in the host country [31], even though a recent publication reported on the improvement of symptoms in a cohort of ASCs resettled to Germany [32]. However, it has been suggested very early on that ASCs might show good adaptation in daily life despite high symptom levels [33,34]. Primary caregivers might therefore simply overlook ASCs' severe mental health status because it seems as though ASCs were not affected in everyday life. In addition, clinicians in low-resources environments, such as the refugee context, rely on concise screening measures that have mostly been validated in western countries [22]. While some may well be validated—or at least have been broadly used—with ASCs at the symptom level, cross-cultural validity of clinical screening measures remains an area of debate [35–37]. For example, we do not know whether they have predictive validity at a culturally less disputable, and therefore lower threshold and more easily retrievable, level in ASCs, that is, whether they succeed in reflecting negative consequences in everyday life as assessed by real-time data on areas such as daily mood and sleep problems. Even though we assume that standardized screening measures are likely to reflect these consequences, as this association has been documented in different

settings [38–41], it is yet to be tested in the context of ASCs that, as mentioned above, may be a particular population where symptom levels might be high, yet, undetectable as demonstrated in everyday outcomes. Taken together, these results reveal the severe situation facing ASCs in western countries with regards to mental health issues, and the challenges for mental health care systems and professionals to adequately deliver services.

As outlined above, using EMA to inquire into the day-to-day experiences of ASCs, such as post-migration factors, daily mood, and sleep patterns, might constitute a worthwhile addition to the retrospective screening of ASCs' symptom levels that has already been established in clinical research over the past few years. Accordingly, this pilot study aimed 1) to investigate the compliance of smartphone-assisted EMA among ASCs by deploying it for the first time in this group, 2) to depict the as-is state with regard to daily mood and post-migration factors of ASCs in day-to-day life (e.g. with whom do the ASCs interact most in everyday life? What activities do the ASCs pursue and enjoy in their daily lives? To what extent do they experience discrimination during the day?), and 3) to identify the association between ASCs' symptom levels obtained by standardized questionnaire data and daily mood and sleep patterns obtained by EMA data. Specifically, we hypothesized that ASCs with higher symptom levels show poorer outcomes of daily mood and sleep parameters in everyday life.

Methods

We followed the reporting guidelines for EMA studies as outlined recently by Trull and Ebner-Priemer [16,42] when drafting this manuscript.

Ethics statement

The study was approved by the ethics board of the Catholic University Eichstätt-Ingolstadt in December 2016 (ethics approval number: 2016/23). An amendment for the original study was granted in July 2018 (ethics approval number: 2018/5). All participants and, if they were under 18, their legal guardians gave their written informed consent to participate in the study.

Procedure

This study is an EMA study on ASCs' experience of post-migration factors, and the association of daily assessed mood and sleep patterns with the mental health of this population reported in retrospective questionnaires. It was carried out in the summer of 2018 in Bavaria, Germany. It is based on two pre-studies. Study 1 [43] was a cross-sectional mental health screening among ASCs resettled to Germany conducted in 2017. Study 2 [32] was the 1-year follow-up of the initial screening. In this study, we report on the EMA subsequent to the 1-year follow-up, and link daily EMA data to standardized questionnaire data obtained from the 1-year follow-up.

Power analysis had been carried out prior to the baseline screenings in Study 1. According to the power analysis, a total of $N = 112$ ASCs had been recruited initially, 14 of whom had dropped out before completing the interviews, resulting in a sample of $N = 98$ ASCs for the baseline screening in Study 1. All youths, who had participated in baseline assessments, were contacted again in 2018. In this way, a sample of $N = 72$ ASCs could be secured for the 1-year follow-up assessment in Study 2. As part of the follow-up assessments in Study 2, all participants were asked whether they wanted to participate in the subsequent EMA investigation. Of these, 26 ASCs were not interested in participating in the EMA due to time issues or language difficulties, resulting in a total of $N = 46$ ASCs who agreed to participate in this study. Six participants were excluded from the analysis, due either to incomplete questionnaire data or incomplete EMA forms (completed prompts < 3). Accordingly, this study comprises a final

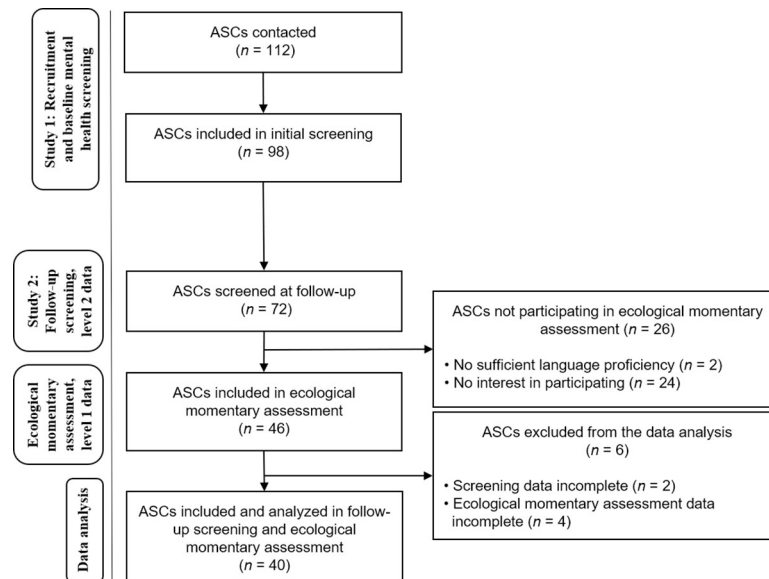


Fig 1. Participant flow chart. This chart shows the participant flow through different stages of study 1 (cross-sectional mental health screening), study 2 (1-year follow-up screenings), and this study (EMA).

<https://doi.org/10.1371/journal.pone.0246069.g001>

sample of $N = 40$ ASCs who completed both the 1-year follow-up questionnaires and the EMA, and were therefore included in the statistical analysis. Fig 1 shows the participant flow.

According to the inclusion criteria, ASCs who were under 18 when they entered the European Union and who had been resident in Germany for at least one year, were included in the original study (Study 1). At every stage of the different studies (baseline screening, follow-up, and EMA), participants and, in case of minors, their legal guardians were asked to give their informed written consent for participation. The follow-up screenings with standardized questionnaires (Study 2) were carried out in a face-to-face interview-like setting by either bachelor-level or master-level psychologists. See [32] for a more detailed account of the screening procedure.

After the face-to-face assessment in Study 2, all participating ASCs were asked if they were interested in taking part in the EMA study that took place over the course of two consecutive weeks. Nine days, on average, elapsed between the mental health screening and the completion of the first EMA prompt ($M = 8.53$, $SD = 7.21$, range 1–30). An additional inclusion criterion for the EMA was sufficient language proficiency in order to understand the forms. If the ASCs agreed to participate, they were given a programmed Android smartphone and were informed about the study aims, the procedure, the obligation of all professionals involved to preserve confidentiality, and the data privacy of the study. The authors clarified whether participants' language proficiency was sufficient and went through all measures on an electronic tablet device prior to study intake so as to ensure the correct understanding of the items and the technical procedure. We designed the EMA as time-based monitoring with fixed-time sampling using the Android application movisensXS, version 1.4.8 (movisens GmbH, Karlsruhe, Germany). Since most participants still attended school, we chose fixed-time sampling in order to guarantee that no prompt was going to occur during school time or during scheduled afternoon activities. Throughout the day, three prompts occurred over a period of two consecutive weeks, in the morning at 7.15 a.m., in the afternoon at 2.15 p.m., and in the evening at 9.15 p.m. Participants could choose to suspend any prompt for up to 25 minutes. If participants did not respond to a prompt, it re-occurred 3 times with a time lag of 5 minutes before

being counted as a missing. In order to enhance compliance, participants could contact the researchers at any time if they experienced any technical issues or problems of comprehension. In case of any mental or physical distress caused by the assessment, the researchers provided immediate psychological support. However, no emergencies occurred in the context of this study. At the end of the EMA, participants were given EUR 10, and the researchers retrieved the smartphones and extracted the EMA data.

Measures

Standardized questionnaires. The sociodemographic characteristics were assessed by self-report at the beginning of the face-to-face assessment. Asylum status, placement changes, educational background in the country of origin, and previous psychosocial treatment were covered in addition to common demographic variables. Furthermore, the following measures were conducted in German during the interviews.

The *Child and Adolescent Trauma Screen* (CATS; [44]) consists of three parts. It assesses potentially traumatic events (CATS trauma list) and the frequency of PTSS during the previous two weeks (CATS symptom scale). The CATS trauma list originally comprises 15 items, and we added 4 items that examine potentially traumatic events related to flight and resettlement experiences (deprivation, dangerous journey, imprisonment and/or abduction, and the committing of violating acts (voluntary or involuntary)). In the CATS symptom scale, the participants rated the frequency of PTSS over the course of the previous two weeks on a 4-point Likert scale. The CATS symptom scale consists of 20 items and its sum score ranges from 0 to 60 with a suggested cut-off value of 21 to indicate clinically significant levels of PTSS. The CATS is based on the DSM-5 criteria for PTSD and has shown good psychometric properties [45]. It has previously been used among the ASC population in a variety of studies [32,46,47]. In this study, the inter-item reliability of the CATS symptom scale was $\alpha = .81$.

The *Hopkins Symptom Checklist-37 for Adolescents* (HSCL-37A; [48]) examines both internalizing symptoms such as depression and anxiety, and externalizing symptoms. We used the included subscales for anxiety (range 10–40, cut-off 20) and depression (range 15–60, cut-off 33) as they represent two major symptom clusters among ASCs [27]. The frequency of the symptoms was assessed over the previous four weeks on a 4-point Likert scale. The HSCL-37A is a widely used questionnaire and has shown good psychometric properties for different populations including ASCs. The inter-item reliability of the constituent scales in this study was as follows: depression (15 items, $\alpha = .87$), anxiety (10 items, $\alpha = .76$).

Ecological momentary assessment (EMA). The German version of the *Multidimensional Mood Questionnaire* (MDMQ; [49]) is a questionnaire on daily mood that, in its long version, comprises 24 items which are rated on a 6-point Likert scale. Analogous to Wilhelm & Schoebi [50], we modified the questionnaire for the EMA in order to guarantee an appropriate length and tailor it to the language proficiency of the ASCs. Consequently, the modified MDMQ version used in this study included 6 bipolar items rated by a visual analogue scale ranging from 0 to 100 where respondents were asked to indicate how they felt at that given moment. The scales, each comprising 2 bipolar items, were as follows: good mood vs. bad mood, awake vs. tired, calm vs. nervous. The bipolar items of the scales used during the EMA were happy ↔ unhappy and content ↔ discontent for the *mood scale*, alert ↔ tired and rested ↔ worn out for the *tiredness scale*, and relaxed ↔ tense and calm ↔ nervous for the *nervousness scale*. The term “very” was added to the endpoints of the visual analogue scales, and “0” represented the “positive” endpoints (i.e. happy/content, alert/rested, and relaxed/calm) and “100” represented the “negative” endpoints (i.e. unhappy/discontent, tired/worn out, tense/nervous) of the scales. Beyond that, no other linguistic anchor points were added. The MDMQ is a widely used

questionnaire and has already been utilized in EMA studies with a variety of populations [51] including adolescents [52,53]. Within-person inter-item reliability for the mentioned scales in this study was as follows, good mood vs. bad mood (2 items, $\alpha = .84$), awake vs. tired (2 items, $\alpha = .72$), and calm vs. nervous (2 items, $\alpha = .74$).

Since many ASCs present sleep problems [29,30], we assessed sleep functioning as additional aspects by quality of sleep, sleep duration, and sleep onset latency (i.e., time needed to fall asleep). Participants rated sleep quality using a single item on a visual analogue scale ranging from 0 (“very well”) to 100 (“very badly”), with lower numbers representing a more “positive” outcome. Furthermore, they rated sleep duration and sleep onset latency by stating hours and minutes. These items were addressed exclusively in the mornings. We designed both daily mood (MDMQ) and sleep parameters forms as forced-choice items.

In addition, the EMA examined everyday experiences regarding post-migration factors, namely activities undertaken by the participants and their valence (as aspects of everyday resources), the occurrence of social interactions and their valence (as aspects of everyday social support), and experiences of discrimination. Participants recorded activities they had undertaken since the last prompt in a single multiple-choice item and rated whether they experienced them as pleasant or unpleasant on a bipolar visual analogue scale ranging from 0 to 100 where lower numbers represented a less pleasant specification of the item (with “very pleasant” and “very unpleasant” as the linguistic endpoints). The same procedure was applied to social interactions, where participants could first indicate with whom they had contact since the last prompt. Participants could then state the person with whom they had the most memorable interaction, and were asked to rate the valence of this interaction on a bipolar visual analogue scale. Furthermore, experiences of discrimination were examined using a modified 4-item version of the Everyday Discrimination Scale (EDS) [54] adjusted to the EMA design, such that participants could state how often they had experienced different discriminatory events since the last prompt (i.e., ‘being treated with less courtesy or respect than youths without history of flight’; ‘people acting as if they thought I was not as smart as youths without history of flight’; ‘people acting as if they were afraid of me’; ‘being threatened or harassed’). The operationalization of post-migration factors and sleep patterns as well as their item formulation were based on consensual literature research pointing to the most relevant aspects of these constructs [25,55,56] and consultation with experts in the field. See [S2 Table](#) for the German EMA forms used in this study, and see [S3 Table](#) for the translated forms.

Statistical analyses

Data were analyzed using SPSS statistics, version 25. Prior to analysis, the uncentered questionnaires and EMA data were analyzed using descriptive statistics. Next, all person-related predictors (level 2) were grand-mean centered [57] in line with the recommendations by Ohly, Sonnentag, Niessen, and Zapf [58]. We then performed random intercept models to examine whether PTSS, depression or anxiety (level 2) were predictors of the mean levels of daily mood (good mood vs. bad mood, awake vs. tired, calm vs. nervous) and sleep parameters (quality, duration, and onset latency) (level 1). Based on the hierarchical structure of data, in which the daily within-person variables (daily mood and sleep parameters) were nested in persons, we performed random intercept models for each level 1 outcome variable [57]. Based on the null models we calculated the intraclass correlations (*ICC*) in order to estimate the distribution of variances for all level 1 variables. To test our hypotheses, all level 2 variables including main effects (PTSS, depression, anxiety) and interaction effects (PTSS \times depression, PTSS \times anxiety, depression \times anxiety) were added simultaneously. The models included a random intercept.

For the model fit, we used chi-square tests to examine the differences in the log likelihood ratios and degrees of freedom between the null models and the main and interaction models.

Results

Sample characteristics

Forty ASCs were included in the final analysis. The majority were male ($n = 34$, 85%), members of the Islamic faith ($n = 34$, 85%), had immigrated unaccompanied to Europe ($n = 17$, 43%), came from Afghanistan ($n = 20$, 50%), and attended a public school in Germany ($n = 27$, 68%). Most of the adolescents kept in touch with family members who were living in their home country at the time of the study ($n = 35$, 88%). The majority of ASCs were living in either semi- ($n = 14$, 35%) or full-care facilities ($n = 11$, 28%) of the German child and youth welfare system or were living with their families in private accommodation ($n = 11$, 28%). The asylum applications of most participating ASCs had been accepted ($n = 28$, 70%), even though the applications of some participants had been rejected ($n = 11$, 28%) or were still pending ($n = 1$, 2%). The majority had not received any kind of psychotherapeutic treatment ($n = 32$, 80%) since their arrival in Germany, 5 ASCs had completed psychotherapy (12%), and 3 participants were receiving some kind of therapeutic treatment at the time of assessment (8%). The mean age of the participating ASCs was 17.5 years ($SD = 1.88$, range 13 to 20 years) and they had been living in Germany for almost 3 years ($M = 2.92$, $SD = .85$). No differences regarding the sociodemographic characteristics between the ASCs, who participated in the EMA and the ones who did not, were identified using t -tests for independent samples with all p values above .07.

Participating ASCs had experienced a mean of almost 9 different potentially traumatic events in their lifetime ($M = 8.7$, $SD = 3.35$). The proportion of individuals who scored above the clinical cut-offs was as follows, CATS symptom score ($n = 21$, 52.5%), HSCL-37A total scale ($n = 11$, 27.5%), HSCL-37A depression scale ($n = 11$, 27.5%), and HSCL-37A anxiety scale ($n = 9$, 22.5%). Participants in EMAs differed significantly from non-participants with respect to mental health outcomes, such that participants showed higher levels of PTSS (CATS symptom score, $t(70) = 2.44$; $p < .05$), depression (HSCL-37A depression scale, $t(70) = 2.94$; $p < .01$), and anxiety (HSCL-37A anxiety scale, $t(70) = 2.13$; $p < .05$). See [S1 Table](#) for further information regarding demographics and mental health outcomes assessed using standardized questionnaire data.

Compliance with the EMA protocol. To allow for a sufficient intra-person variance in EMA measurement points, only participants who responded to a minimum of 3 prompts were included in further analyses. Overall, 42 EMA prompts occurred for each participant over the course of the study, resulting in a total of 1680 prompts across all participants and measurement points. Of those, participants dismissed a total of 123 prompts (7.3%), and responded to a total of 680 prompts, 57 of which were incomplete (8.4%), resulting in an overall compliance rate of 40.5%. Compliance rates were highly heterogeneous ranging from 7.1% to 100% between persons, and participants responded to an average of $M = 17$ prompts ($SD = 9.85$, range 3–42). The measurement point with the highest compliance was the evening prompt (48.8%), compliance rates in the morning and in the afternoon were 43.9% and 28.8%, respectively. Compliance was not correlated with any of the symptom levels assessed in the study as identified by correlation analyses with all p values above .31. Participants responded within 2.5 minutes, on average ($SD = 6.18$), after the first prompt occurred and took 2 minutes to answer the EMA questionnaire ($M = 2.0$, $SD = 2.4$).

EMA data on daily mood, sleep parameters, and post-migration factors. [Table 1](#) gives the descriptive statistics of the EMA data with regard to daily mood and sleep parameters. Participants reported different levels of daily mood over the course of the day, ranging from $M = 41.9$ ($SD = 25.3$) to $M = 39.81$ ($SD = 28.07$) for the mood scale, from $M = 51.11$

Table 1. Descriptive representation of daily mood (good mood vs. bad mood, awake vs. tired, calm vs. nervous) and sleep parameters (quality, duration, onset latency) as reported by the participants ($N_1 = 40$) at different points during the EMA ($N_2 = 680$).

Variables	Morning ^a		Afternoon ^a		Evening ^a	
	<i>M</i> (<i>SD</i>)	range	<i>M</i> (<i>SD</i>)	range	<i>M</i> (<i>SD</i>)	range
Daily mood, <i>M</i> (<i>SD</i>)						
good mood vs. bad mood ^b	41.9 (25.3)	0–99.5	39.81 (28.07)	0–100	40 (28.6)	0–100
awake vs. tired ^b	51.11 (26.27)	1–100	44.26 (27.2)	0–100	43.12 (27.99)	0–100
calm vs. nervous ^b	40.28 (24.31)	0–100	38.92 (26.3)	0–100	39.5 (27.21)	0–100
Sleep parameters, <i>M</i> (<i>SD</i>)						
quality ^b	45.28 (23.41)	0–100	–	–	–	–
duration in hours	5.42 (2.55)	0–12	–	–	–	–
onset latency in hours	1.2 (1.06)	0–4	–	–	–	–

^a Across all participants and prompts.

^b Assessed using a visual analogue scale whereby lower numbers represent more positive values, and higher numbers represent more negative values.

<https://doi.org/10.1371/journal.pone.0246069.t001>

($SD = 26.27$) to $M = 43.12$ ($SD = 27.99$) for the tiredness scale, and from $M = 40.28$ ($SD = 24.31$) to $M = 38.92$ ($SD = 26.3$) for the nervousness scale. Their reported mean level of sleep quality was $M = 45.28$ ($SD = 23.41$), and they reported an average of some 5 hours of sleep a night ($M = 5.42$, $SD = 2.55$), and a latency of one hour, on average, to fall asleep ($M = 1.2$, $SD = 1.06$).

Table 2 gives the descriptive statistics of the EMA data with regard to post-migration factors. For social interactions, either virtually or in person, friends from the same country were indicated most frequently as the most memorable social interactions (in the evening, $n = 71$, 27.6%; in the afternoon, $n = 33$, 22.1%). In both cases this implied that the social interaction had occurred since the last prompt. Siblings were indicated the least frequently as the most memorable interactions both in the afternoon ($n = 8$, 5.4%) and in the evening ($n = 17$, 6.6%). Participants rated their most memorable social interactions similarly in the evening ($M = 29.53$, $SD = 25.77$) and in the afternoon ($M = 27.58$, $SD = 25.29$). Social interactions with fathers were rated as most pleasant both in the evening ($M = 9.22$, $SD = 7.95$) and in the afternoon ($M = 14.21$, $SD = 14.39$).

Activities undertaken by the participants were reported in the evening only since most ASCs were attending school. The most frequent activity reported by the participants was using media such as listening to music or watching videos ($n = 128$, 50%) which was rated $M = 28.45$ ($SD = 24.84$) on the valence scale. Religious activities were the rarest activities ($n = 52$, 20.3%), but were perceived the most pleasant ($M = 13.75$, $SD = 14.2$).

Across all prompts, participants reported 139 incidents of at least one discriminatory event since the last prompt (8.5% of all queries), and a mean of some 5 discriminatory events over the course of the study ($M = 4.88$, $SD = 7.72$). ‘Being treated with less courtesy or respect’ was the most common incident both in the afternoon ($n = 19$) and in the evening ($n = 43$), whereas ‘being threatened or harassed’ was the rarest incident in the afternoon ($n = 5$), and ‘people acting as if they were afraid of me’ was the rarest incident in the evening ($n = 11$).

Relation between symptom levels assessed using standardized questionnaire data and daily mood and sleep parameters assessed using EMA data

ICCs indicated that a considerable proportion of variance could be observed on the within-person level: $\rho = .46$ for good mood vs. bad mood; $\rho = .35$ for awake vs. tired; $\rho = .47$ for calm vs. nervous; $\rho = .37$ for quality of sleep; $\rho = .49$ for duration of sleep; and $\rho = .49$ for sleep onset

Table 2. Descriptive representation of post-migration factors (social interactions, activities undertaken, discrimination) as reported by the participants ($N_1 = 40$) at different points during the EMA ($N_2 = 435$).

Variables	Afternoon		Evening	
	Total occurrences ^a <i>n</i> (%)	Valence ^b <i>M</i> (<i>SD</i>)	Total occurrences ^a <i>n</i> (%)	Valence ^b <i>M</i> (<i>SD</i>)
Most memorable social interaction	149	27.58 (25.29)	257	29.53 (25.77)
Mother	19 (12.8)	20.32 (27.55)	50 (19.5)	18.14 (20.67)
Father	20 (13.4)	14.21 (14.39)	18 (7.0)	9.22 (7.95)
Siblings	8 (5.4)	22.5 (17.97)	17 (6.6)	21.65 (25.34)
Other relatives	11 (7.4)	45.7 (23.25)	20 (7.8)	38.4 (23.93)
Friends from my home country	33 (22.1)	25.73 (21.39)	71 (27.6)	38.72 (25.38)
German friends	24 (16.1)	28.33 (25.79)	24 (9.3)	30.87 (27.94)
Professionals (e.g. caregivers)	18 (12.1)	46 (30.97)	18 (7.0)	33.17 (24.26)
Another person	16 (10.7)	26.37 (24.7)	39 (15.2)	32.85 (28.32)
Activities undertaken	–	–	256	
Sport	–	–	98 (38.3)	19.63 (21.57)
Religious practices (e.g. praying)	–	–	52 (20.3)	13.75 (14.2)
Listening to music or watching a movie	–	–	128 (50.0)	28.45 (24.84)
Educational activities (e.g. reading, doing homework)	–	–	62 (24.2)	27.37 (22.95)
Another activity	–	–	67 (26.2)	28.51 (25.06)
Discrimination—Being treated with less courtesy or respect than youths without history of flight	149		260	
No such incident	130 (87.2)		217 (83.5)	
At least one incident	19 (12.7)		43 (16.5)	
Discrimination—People acting as if they thought I was not as smart as youths without history of flight	149		260	
No such incident	136 (91.3)		234 (90.0)	
At least one incident	13 (8.7)		26 (10.0)	
Discrimination—People acting as if they were afraid of me	149		260	
No such incident	143 (96.0)		249 (95.8)	
At least one incident	6 (4.0)		11 (4.2)	
Discrimination—Being threatened or harassed	149		260	
No such incident	144 (96.6)		244 (93.8)	
At least one incident	5 (3.4)		16 (6.2)	

Note. Post-migration factors were queried in the afternoon and in the evening only which is why morning prompts are not displayed.

^a Across all participants and prompts.

^b Assessed using a visual analogue scale whereby lower numbers represent more positive values, and higher numbers represent more negative values.

<https://doi.org/10.1371/journal.pone.0246069.t002>

latency. For the model fit, we examined the differences in the log likelihood ratios and degrees of freedom between the null models and the main and interaction models by chi-square tests. As stated in Table 3, none of the chi-square tests for good vs. bad mood, $\chi^2(6) = 9.68, p = .139$, awake vs. tired, $\chi^2(6) = 8.62, p = .196$, and calm vs. nervous, $\chi^2(6) = 7.58, p = .271$, proved to be significant, indicating no significant difference between the null models and the main and interaction models. For sleep parameters (see Table 4), differences between the null models and the main and interaction models proved to be insignificant for quality, $\chi^2(6) = 2.15, p = .906$, and highly significant for duration, $\chi^2(6) = 18.61, p < .01$, and onset latency, $\chi^2(6) = 36.28, p < .001$.

The results show that some symptom measures assessed in the standardized questionnaires significantly determined the mean level of daily mood (see Table 3). Higher levels of PTSS

Table 3. Multilevel models predicting daily mood (good mood vs. bad mood, awake vs. tired, calm vs. nervous).

	Good vs. bad mood		Awake vs. tired		Calm vs. nervous	
	Estimate (SE)	<i>p</i>	Estimate (SE)	<i>p</i>	Estimate (SE)	<i>p</i>
Fixed effects						
Intercept	35.61 (4.84)	< .001**	44.33 (4.30)	< .001**	34.09 (4.85)	< .001**
PTSS	1.23 (.64)	.032*	.86 (.57)	.070	1.30 (.64)	.025*
Depression	-1.14 (.96)	.124	-.74 (.86)	.199	-1.23 (.96)	.105
Anxiety	2.65 (1.31)	.026*	2.5 (1.16)	.020*	2.46 (1.31)	.035*
PTSS × depression	.16 (.11)	.153	.12 (.09)	.212	.19 (.11)	.089
PTSS × anxiety	-.34 (.20)	.092	-.21 (.17)	.231	-.37 (.19)	.066
Depression × anxiety	.13 (.13)	.306	-.01 (.11)	.944	.10 (.13)	.413
Random effects	Estimate (SE)		Estimate (SE)		Estimate (SE)	
Intercept	271.56 (79.92)		192.88 (63.94)		263.56 (74.73)	
Model comparison	Main effects and interaction model	Null model	Main effects and interaction model	Null model	Main effects and interaction model	Null model
-2* Log likelihood	5881.30	5890.98	5995.76	6004.38	5684.90	5692.48
χ^2	9.68		8.62		7.58	
<i>df</i>	6		6		6	

Note. N_1 (persons) = 40, N_2 (assessments) = 680.

*** $p < .001$

** $p < .01$

* $p < .05$.

<https://doi.org/10.1371/journal.pone.0246069.t003>

were significantly associated with higher levels of bad mood ($\gamma = 1.23, t(31) = 1.925, p < .05$). The same was true for anxiety ($\gamma = 2.65, t(32) = 2.021, p < .05$), indicating that ASCs with higher ratings of PTSS and anxiety showed higher levels of bad mood. Anxiety was the only

Table 4. Multilevel models predicting sleep parameters (quality, duration, onset latency).

	Quality		Duration		Onset latency	
	Estimate (SE)	<i>p</i>	Estimate (SE)	<i>p</i>	Estimate (SE)	<i>p</i>
Fixed effects						
Intercept	43.72 (4.99)	< .001**	6.15 (.53)	< .001**	1.25 (.25)	< .001**
PTSS	1.02 (.64)	.062	-.15 (.07)	.021*	.01 (.03)	.427
Depression	-.65 (1.02)	.202	.09 (.11)	.197	-.04 (.05)	.224
Anxiety	1.18 (1.39)	.266	.23 (.15)	.067	.13 (.07)	.039*
PTSS × depression	.10 (.11)	.354	-.01 (.01)	.347	.00 (.01)	.727
PTSS × anxiety	-.178 (.20)	.375	.02 (.02)	.352	-.00 (.01)	.824
Depression × anxiety	.01 (.13)	.961	-.03 (.01)	.072	-.00 (.01)	.693
Random effects	Estimate (SE)		Estimate (SE)		Estimate (SE)	
Intercept	206.51 (77.55)		2.48 (.87)		.61 (.19)	
Model comparison	Main effects and interaction model	Null model	Main effects and interaction model	Null model	Main effects and interaction model	Null model
-2* Log likelihood	2001.60	2003.75	1012.78	994.16	625.86	589.58
χ^2	2.15		18.62**		36.28***	
<i>df</i>	6		6		6	

Note. N_1 (persons) = 40, N_2 (assessments) = 680.

*** $p < .001$

** $p < .01$

* $p < .05$.

<https://doi.org/10.1371/journal.pone.0246069.t004>

variable related to tiredness ($\gamma = 2.50$, $t(30) = 2.16$, $p < .05$), such that ASCs with higher levels of anxiety showed higher levels of tiredness. Both anxiety and PTSS, were significantly related to nervousness (PTSS, $\gamma = 1.30$, $t(34) = 2.04$, $p < .05$; anxiety, $\gamma = 2.46$, $t(35) = 1.877$, $p < .05$), such that ASCs suffering from higher symptom levels reported higher levels of nervousness. Neither depression scores nor any of the analyzed interactions between the level 2 variables proved to be associated with any of the level 1 outcome measures.

For sleep parameters, we observed some level 2 effects (see Table 4). None of the between-person symptom scales turned out to be significantly associated with sleep quality. For sleep duration, there was a negative association with PTSS ($\gamma = -.15$, $t(31) = -2.12$, $p < .05$), showing that participants with higher levels of PTSS slept less. Anxiety levels were significantly related to sleep onset latency ($\gamma = .13$, $t(37) = 1.82$, $p < .05$), such that ASCs with higher ratings for anxiety needed more time to fall asleep.

Discussion

To our knowledge, this is the first study to report on a smartphone-assisted EMA study undertaken among ASCs resettled to western countries. ASCs are a psychologically distressed [6,27] and hard-to-reach population that appears to be understudied with regard to domains such as day-to-day living, daily mood, and post-migration factors [6].

Consequently, one major aim of this pilot study was to probe the EMA approach in this particular group, and examine participants' compliance to the EMA protocol, in order to gain insight as to whether it might constitute a worthwhile addition to conventional assessment formats for ASCs. With this in mind, the results of this study are promising although some limitations have to be borne in mind. The approach proved to be implementable overall given that a large number of the ASCs contacted prior to the study showed interest in participating in the assessments, and the survey format appeared to appeal overall to the participants. Electronic devices such as smartphones are widely used and appreciated among refugee populations [59], and arguably even more so in refugee youth. This may have facilitated the favourable outcome regarding the readiness of ASCs to participate in this particular form of assessment. Having said that, the compliance rate in this study (40.5%) was rather low compared to a literature review on EMA studies in children and adolescents where rates ranged from 54.6% to 96.21% [20]. This finding corresponds to a recent EMA study with adult refugees [60] where the overall compliance rate was shown to be 55% after excluding 7 participants with a particularly low response rate (<20%). There are several plausible explanations for the low compliance rate determined in our study. First, we excluded only those participants who completed less than 3 prompts (<5%), whereas exclusion criteria in other EMA studies among adolescents vary broadly and are sometimes as high as <50% [61]. Consequently, excluding more participants with especially low response rates would have resulted in a more favourable overall compliance rate. Second, refugee youths might not be familiar with psychological survey formats [21,22,36,62]. This is why problems of comprehension might have emerged over the study runtime, possibly resulting in a lack of motivation to pursue the study protocol. Even though we ensured correct understanding of all items prior to study intake, and offered close guidance and support over the course of the study, we cannot dispel this uncertainty. Third, the sampling frequency might have affected the compliance rate. While there seems to be an association between fewer prompts per day and higher compliance rates in non-clinical samples, quite the opposite proved to be the case in clinical samples as determined in a meta-analysis of EMA studies with children and adolescents [20]. Even though our sample was not a clinical sample per se, participants were severely traumatized and showed high levels of psychological distress that clearly exceed the levels of psychological problems reported in non-clinical

community settings [63,64]. Following the line of reasoning of the Wen et al. (2017) meta-analysis [20], these severely distressed individuals may experience the daily assessment of symptom-related aspects such as daily mood as meaningful and intrinsically relevant. Accordingly, close-meshed monitoring including more prompts per day while, at the same time, taking into account the multitude of obligations of ASCs over the course of the day, might produce more favourable compliance outcomes. To sum up, future EMA investigations with ASCs should, first, carefully weigh the ideal frequency and times of day to incorporate assessment prompts. Second, they might consider including compliance-linked incentives as well as ASCs' caregivers to guide adherence to the study protocol. Last, they should consider adding a conclusive interview to gather information regarding participants' acceptance of the survey format and the question why some participants respond only infrequently. This could shed light on further aspects of the feasibility of EMA studies among ASCs, and could help to identify potential design modifications that might facilitate better compliance.

The second objective of this study was to give an account of the day-to-day experiences of ASCs after resettlement with regard to post-migration factors and daily mood. In view of the pilot character of this study, it must first be pointed out that a central shortcoming of this study is the lack of a comparison group. Including an appropriate comparison group (e.g., native-born adolescents, young migrants without a history of flight, or the comparison of unaccompanied to accompanied ASCs) would allow for more in-depth statistical and clinical conclusions. Moreover, there are no corresponding normative values for either the age group under investigation or the modified version of the MDMQ [65]—the same is true for the further measures used in this study. Interpretations and classifications of the participants' data should therefore be made with caution. Since ASCs are a little studied population, it is nevertheless worthwhile to give a first picture of daily collected mood and post-migration factors and to draw at least some tentative comparisons to methodologically similar studies with non-ASCs.

Participants reported moderate levels of daily mood over the course of the day, with the morning prompt showing the poorest levels of daily mood on all scales recorded (good vs. bad mood, awake vs. tired, calm vs. nervous). This could be a consequence of their mediocre rating of sleep quality [66] and very short sleep duration (some 5.4 hours) as compared to both a sample of ASCs in the UK [29] and a sample of German adolescents [67] who both reported some 7–8 hours of sleep on weekdays. This—in conjunction with the fact that the American Academy of Sleep Medicine recommends 8 to 10 hours of sleep per night in the 13–18 age group [56]—further illustrates that sleep problems are central symptoms of ASCs [30]. With regard to the levels of daily mood assessed in this study, there is only a limited number of comparable EMA studies that used both the modified version of the MDMQ and examined adolescents. For example, compared to a study with adolescents suffering from non-suicidal self-injury in Germany, participants in our study showed somewhat higher mean daily mood values which, on the other hand, were also well below the values of the healthy control group [52]. This might be another indication of the severe levels of psychological distress in our sample as determined by retrospective clinical screening measures.

Across all prompts, interactions with friends from the same country were reported most frequently and were considered pleasant overall. These social networks appear to be important sources of social support for ASCs [68]. This might have been encouraged by the fact that most participants were still integrated in full-care units of the German child and youth welfare system where they regularly live alongside youths from the same country. Even tough interactions with their parents occurred more rarely; they were consistently rated to be the most pleasant and supportive interactions, in particular the ones with their father. The latter is a notable finding considering that past research has mainly outlined the essential role of the mother as a

protective factor [69,70]. As many unaccompanied ASCs in this study stayed in touch with their parents over the phone, this re-emphasizes the fact that access to electronic communication devices is absolutely key for them to experience social support from their parents [68]. Accordingly, ASCs who had difficulty staying in touch with their relatives presented poorer psychological functioning in earlier studies [71]. With regard to recreation activities, participants reported doing sports and using multimedia (e.g. listening to music or watching videos) most frequently and rated them as pleasant overall. Of all activities queried in the assessments, religious practices such as praying were reported the least frequently, yet, rated the most pleasant. This points to the value of religious practices as potential coping strategies for ASCs who have resettled to western countries [72–74]. Doing sports also ranked among the most pleasant activities and this is largely in line with past research that has highlighted the vital role of sports for ASCs after resettlement. This may impact a wide array of favourable processes such as acculturating into a host country [75,76]. Consequently, special sports programs for refugee youth have been developed and evaluated in the past [77], and encouraging their proliferation and accessibility to ASC is desirable. By and large, the reported experiences of discrimination in our study were comparable to a daily diary study of ethnic minority youth in the US, with participants in our study reporting roughly one event more over the course of the study [78]. However, the comparability is limited as there was a different measure in use. As was reported there, one of the negative effects of the discrimination experiences was that already anxious individuals showed further increased anxiety values over the course of the days. Negative effects of experiences of discrimination are also extensively documented in ASC literature [25]. Consequently, the prevention of such experiences should be a decisive goal of current policies.

Finally, we sought to investigate the relationship between ASCs' symptom levels obtained using standardized questionnaires and daily mood and sleep parameters obtained using EMAs. The results indicate that higher symptom levels (i.e., PTSS and anxiety scores) were associated with poorer daily mood (i.e., bad mood, tiredness, nervousness) and poorer outcomes of some sleep parameters (i.e., duration and onset latency) in everyday life. While this might be considered a corollary of high symptom levels, given that these mental health problems regularly encompass sleeping problems and low mood [79], it is still an important finding and can be thought of as a further component of the predictive validation of the CATS and HSCL-37A [80]. Symptom levels reported in retrospective investigations and as assessed using brief screening measures did, in fact, correspond to daily assessed implications and were shown to affect the participating ASCs in their day-to-day lives. It has been argued that querying lower-threshold problems, such as sleep parameters or mood, could be a worthwhile and culturally more accepted form of symptom retrieval in primary care settings that could still provide initial indications of clinically noticeable symptoms [29], and the findings of our study support this argumentation. Besides that, sleeping problems and poor daily mood have been shown to have detrimental effects on important domains such as academic performance and self-esteem [81–83]. Consequently, and in order to facilitate integration and good everyday functioning, providing care models that include systematic screening and access to treatment of mental health problems should be a major aim of current policies. Despite the paucity of adequate treatments, there are promising approaches that have been pursued in the past [46,47,84]. It is, moreover, worth noting that participants who took part in the EMA, showed significantly higher symptom levels than those who merely completed the standardized questionnaires. This indicates that ASCs with the highest levels of psychological distress showed particular interest in participating in the EMA. While this may be contrary to our presumptions, it illustrates both the need of severely traumatized ASCs for appropriate care and their openness to long-term monitoring [85], and increases the scope for the potential of innovative technology-based treatment approaches.

Limitations

Certain limitations should be borne in mind with respect to the appraisal of this study. As has been discussed above, the major shortcomings of this study are the lack of a control group and the relatively low compliance rate. Beyond that, it should be pointed out that our sample was of a convenient nature for various reasons. The participants were not recruited at random, and only those who had acquired sufficient language proficiency in order to understand the EMA forms were included in the study which might have resulted in selection bias. Also, the sample size was rather small which impeded more nuanced analyses and limits generalizability to the population of ASCs as a whole. Apart from issues concerning the sample composition, there may also have been procedural distortions. Even though we offered close guidance and support to all participants throughout the study runtime, the compliance rate was quite low which may impair the validity of the current findings. As has been discussed earlier, future investigations should, therefore, take certain steps to address this shortcoming. Furthermore, we cannot exclude with absolute certainty that problems of understanding cropped up over the course of the EMAs which might have resulted in invalid responses to the questionnaires. Finally, it should be mentioned that we only assessed post-migration factors and daily mood but not symptom levels on a daily basis. Gathering further data on day-to-day symptom levels might, therefore, contribute to deriving more in-depth conclusions about the mental health of this vulnerable population.

Conclusions

Examining everyday daily mood and post-migration factors in ASCs from 10 different countries using smartphone-assisted EMA was shown to be implementable. Not only do ASCs show high symptom levels, they are also affected by these symptoms in their daily lives as determined by the EMA data. We would welcome the regular implementation of EMA in future research efforts with ASCs. In order to ensure access for the widest possible range of participants, including ASCs with a low language level or no literacy, possible modifications should include translated EMA forms or audio-assisted assessment tools [86]. Due to the lack of evidence pointing to empirically supported strategies to promote compliance in children and adolescents [20,87], we can only assume that individually tailored assessment schedules, compliance-linked incentives, and the involvement of ASCs' caregivers could offer an opportunity for improvement. Future research efforts could also focus on the relationship between daily mood and post-migration factors as well as intra-individual fluctuations during the day. The results of this study, as well as the EMA approach in and of itself, may help to establish low-threshold screening possibilities in primary care and to identify specific resources and coping strategies of ASCs in everyday life that should be promoted accordingly in the future.

Supporting information

S1 Table. Socio-demographic characteristics of the participating ASCs.
(DOCX)

S2 Table. Original wording of the items used for the scales *post-migration factors* (social contacts, activities undertaken, experiences of discrimination) and *sleep parameters* in the ecological momentary assessment.
(DOCX)

S3 Table. English translation of the items used for the scales *post-migration factors* (social contacts, activities undertaken, experiences of discrimination) and *sleep parameters* in the

ecological momentary assessment.
(DOCX)

Acknowledgments

The authors would like to thank all the participants, caregivers, and interpreters involved in the study.

Consent for publication

All participants and, if they were under 18, their legal guardians gave their consent for publication of the study results ahead of study participation.

Author Contributions

Conceptualization: Lauritz Rudolf Floribert Müller, Katharina Gossmann, Regina F. Schmid, Rita Rosner, Johanna Unterhitzberger.

Data curation: Katharina Gossmann, Regina F. Schmid.

Formal analysis: Katharina Gossmann, Regina F. Schmid.

Funding acquisition: Johanna Unterhitzberger.

Investigation: Lauritz Rudolf Floribert Müller, Katharina Gossmann.

Methodology: Lauritz Rudolf Floribert Müller, Katharina Gossmann, Regina F. Schmid.

Project administration: Lauritz Rudolf Floribert Müller, Rita Rosner, Johanna Unterhitzberger.

Supervision: Lauritz Rudolf Floribert Müller, Rita Rosner, Johanna Unterhitzberger.

Validation: Johanna Unterhitzberger.

Writing – original draft: Lauritz Rudolf Floribert Müller, Katharina Gossmann, Regina F. Schmid.

Writing – review & editing: Lauritz Rudolf Floribert Müller.

References

1. Federal Office for Migration and Refugees (Bundesamt für Migration und Flüchtlinge). Aktuelle Zahlen zu Asyl. Ausgabe: Dezember 2016 [Asylum statistics. Version: December 2016]; 2016 [cited 2019 Oct 28]. Available from: URL: http://www.bamf.de/SharedDocs/Anlagen/DE/Downloads/Infothek/Statistik/Asyl/aktuelle-zahlen-zu-asyl-dezember-2016.pdf?__blob=publicationFile.
2. Federal Office for Migration and Refugees (Bundesamt für Migration und Flüchtlinge). Aktuelle Zahlen zu Asyl. Ausgabe: Dezember 2015 [Asylum statistics. Version: December 2015]; 2015 [cited 2018 Oct 28]. Available from: URL: http://www.bamf.de/SharedDocs/Anlagen/DE/Downloads/Infothek/Statistik/Asyl/aktuelle-zahlen-zu-asyl-dezember-2016.pdf?__blob=publicationFile.
3. Federal Office for Migration and Refugees (Bundesamt für Migration und Flüchtlinge). Aktuelle Zahlen zu Asyl. Ausgabe: Dezember 2017 [Asylum statistics. Version: December 2017]; 2017 [cited 2019 Oct 28]. Available from: URL: http://www.bamf.de/SharedDocs/Anlagen/DE/Downloads/Infothek/Statistik/Asyl/aktuelle-zahlen-zu-asyl-dezember-2017.pdf?__blob=publicationFile.
4. Hodes M, Jagdev D, Chandra N, Cunniff A. Risk and resilience for psychological distress amongst unaccompanied asylum seeking adolescents. *J Child Psychol Psychiatry* 2008; 49(7):723–32. <https://doi.org/10.1111/j.1469-7610.2008.01912.x> PMID: 18492037
5. Jakobsen M, Demott MAM, Heir T. Prevalence of Psychiatric Disorders Among Unaccompanied Asylum- Seeking Adolescents in Norway. *Clin Pract Epidemiol Ment Health* 2014; 10:53–8. <https://doi.org/10.2174/1745017901410010053> PMID: 25006343

6. Frounfelker RL, Miconi D, Farrar J, Brooks MA, Rousseau C, Betancourt TS. Mental Health of Refugee Children and Youth: Epidemiology, Interventions, and Future Directions. *Annu Rev Public Health* 2020; 41:159–76. <https://doi.org/10.1146/annurev-publhealth-040119-094230> PMID: 31910713
7. Beiser M, Hou F. Mental Health Effects of Premigration Trauma and Postmigration Discrimination on Refugee Youth in Canada. *J Nerv Ment Dis* 2016; 204(6):464–70. <https://doi.org/10.1097/NMD.0000000000000516> PMID: 27101023
8. Ellis BH, MacDonald HZ, Lincoln AK, Cabral HJ. Mental health of Somali adolescent refugees: The role of trauma, stress, and perceived discrimination. *J Consult Clin Psychol* 2008; 76(2):184–93. <https://doi.org/10.1037/0022-006X.76.2.184> PMID: 18377116
9. Salkind NJ, editor. *Encyclopedia of research design*. Los Angeles, Calif., London: SAGE; 2010. <https://doi.org/10.1097/SMJ.0b013e3181eab419> PMID: 20697321
10. Ebner-Priemer UW, Trull TJ. Ambulatory Assessment. *Eur Psychol* 2009; 14(2):109–19.
11. Christensen-Szalanski JJJ. The Hindsight Bias: A Meta-analysis. *Organ Behav Hum Decis Process* 1991; 48:147–68.
12. Roese NJ, Vohs KD. Hindsight Bias. *Perspect Psychol Sci* 2012; 7(5):411–26. <https://doi.org/10.1177/1745691612454303> PMID: 26168501
13. van Giezen AE, Arensman E, Spinhoven P, Wolters G. Consistency of memory for emotionally arousing events: A review of prospective and experimental studies. *Clin Psychol Rev* 2005; 25(7):935–53. <https://doi.org/10.1016/j.cpr.2005.04.011> PMID: 15979220
14. Spinhoven P, Bean TM, Eurelings-Bontekoe E. Inconsistencies in the self-report of traumatic experiences by unaccompanied refugee minors. *J Trauma Stress* 2006; 19(5):663–73. <https://doi.org/10.1002/jts.20152> PMID: 17075917
15. Aalsma MC, Zimet GD, Fortenberry JD, Blythe M, Orr DP. Reports of childhood sexual abuse by adolescents and young adults: stability over time. *J Sex Res* 2002; 39(4):259–63. <https://doi.org/10.1080/00224490209552149> PMID: 12545408
16. Trull TJ, Ebner-Priemer UW. Ambulatory Assessment. *Annu Rev Clin Psychol* 2012; 9:151–76. <https://doi.org/10.1146/annurev-clinpsy-050212-185510> PMID: 23157450
17. Priebe K, Kleindienst N, Zimmer J, Koudela S, Ebner-Priemer UW, Bohus M. Frequency of intrusions and flashbacks in patients with posttraumatic stress disorder related to childhood sexual abuse: an electronic diary study. *Psychol Assess* 2013; 25(4):1370–6. <https://doi.org/10.1037/a0033816> PMID: 23876157
18. Holmes EA, Ghaderi A, Eriksson E, Lauri KO, Kukacka OM, Mamish M, et al. 'I Can't Concentrate': A Feasibility Study with Young Refugees in Sweden on Developing Science-Driven Interventions for Intrusive Memories Related to Trauma. *Behav Cogn Psychother* 2017; 45(2):97–109. <https://doi.org/10.1017/S135246581600062X> PMID: 28229806
19. Morren M, van Dulmen S, Ouwerkerk J, Bensing J. Compliance with momentary pain measurement using electronic diaries: A systematic review. *European Journal of Pain* 2009; 13:354–65. <https://doi.org/10.1016/j.ejpain.2008.05.010> PMID: 18603458
20. Wen CKF, Schneider S, Stone AA, Spruijt-Metz D. Compliance With Mobile Ecological Momentary Assessment Protocols in Children and Adolescents: A Systematic Review and Meta-Analysis. *J Med Internet Res* 2017; 19(4):e132. <https://doi.org/10.2196/jmir.6641> PMID: 28446418
21. Ehntholt KA, Yule W. Practitioner review: assessment and treatment of refugee children and adolescents who have experienced war-related trauma. *J Child Psychol Psychiatry* 2006; 47(12):1197–210. <https://doi.org/10.1111/j.1469-7610.2006.01638.x> PMID: 17176375
22. Rassenhofer M, Fegert JM, Plener PL, Witt A. Validierte Verfahren zur psychologischen Diagnostik unbegleiteter minderjähriger Flüchtlinge—eine systematische Übersicht/Validated Instruments for the Psychological Assessment of Unaccompanied Refugee Minors—a Systematic Review. *Prax Kinderpsychol K* 2016; 65:97–112.
23. Heptinstall E, Sethna V, Taylor E. PTSD and depression in refugee children: Associations with pre-migration trauma and post-migration stress. *Eur Child Adolesc Psychiatry* 2004; 13(6):373–80. <https://doi.org/10.1007/s00787-004-0422-y> PMID: 15619050
24. Jakobsen M, Meyer DeMott MA, Wentzel-Larsen T, Heir T. The impact of the asylum process on mental health: A longitudinal study of unaccompanied refugee minors in Norway. *BMJ Open* 2017; 7(6):e015157. <https://doi.org/10.1136/bmjopen-2016-015157> PMID: 28637731
25. Fazel M, Reed RV, Panter-Brick C, Stein A. Mental health of displaced and refugee children resettled in high-income countries: Risk and protective factors. *Lancet* 2012; 379(9812):266–82. [https://doi.org/10.1016/S0140-6736\(11\)60051-2](https://doi.org/10.1016/S0140-6736(11)60051-2) PMID: 21835459
26. Miller KE, Rasco LM. An ecological framework for addressing the mental health needs of refugee communities. In: Miller KE, Rasco LM, editors. *The Mental Health of Refugees: Ecological Approaches To Healing and Adaptation*. London: Lawrence Erlbaum Associates; 2004. p. 1–64.

27. Bronstein I, Montgomery P. Psychological distress in refugee children: A systematic review. *Clin Child Fam Psychol Rev* 2011; 14(1):44–56. <https://doi.org/10.1007/s10567-010-0081-0> PMID: 21181268
28. Oppedal B, Idsoe T. The role of social support in the acculturation and mental health of unaccompanied minor asylum seekers. *Scand J Psychol* 2015; 56(2):203–11. <https://doi.org/10.1111/sjop.12194> PMID: 25614276
29. Bronstein I, Montgomery P. Sleeping patterns of Afghan unaccompanied asylum-seeking adolescents: a large observational study. *PLoS ONE* 2013; 8(2):e56156. <https://doi.org/10.1371/journal.pone.0056156> PMID: 23457517
30. Horlings A, Hein I. Psychiatric screening and interventions for minor refugees in Europe: An overview of approaches and tools. *Eur J Pediatr* 2018; 177(2):163–9. <https://doi.org/10.1007/s00431-017-3027-4> PMID: 29124447
31. Tam SY, Houlihan S, Melendez-Torres GJ. A Systematic Review of Longitudinal Risk and Protective Factors and Correlates for Posttraumatic Stress and Its Natural History in Forcibly Displaced Children. *Trauma Violence Abuse* 2017; 18(4):377–95. <https://doi.org/10.1177/1524838015622437> PMID: 26721887
32. Müller LRF, Gossmann K, Hartmann F, Büter KP, Rosner R, Unterhitzberger J. 1-year follow-up of the mental health and stress factors in asylum-seeking children and adolescents resettled in Germany. *BMC Public Health* 2019; 19(908):1–11. <https://doi.org/10.1186/s12889-019-7263-6> PMID: 31286909
33. Mollica RF, Poole C, Son L, Murray CC, Tor S. Effects of war trauma on Cambodian refugee adolescents' functional health and mental health status. *J Am Acad Child Psy* 1997; 36(8):1098–106. <https://doi.org/10.1097/00004583-199708000-00017> PMID: 9256589
34. Sack WH, Clarke GN, Him C, Dickason D, Goff B, Lanham K et al. A 6-year follow-up study of Cambodian refugee adolescents traumatized as children. *J Am Acad Child Psy* 1993; 32:431–7. <https://doi.org/10.1097/00004583-199303000-00027> PMID: 8444775
35. Bhui K, Mohamad S, Warfa N, Craig TJ, Stansfeld SA. Cultural adaptation of mental health measures: improving the quality of clinical practice and research. *Brit J Psychiat* 2003; 183:184–6. <https://doi.org/10.1192/bjp.183.3.184> PMID: 12948986
36. Paalman CH, Terwee CB, Jansma EP, Jansen LMC. Instruments measuring externalizing mental health problems in immigrant ethnic minority youths: a systematic review of measurement properties. *PLoS ONE* 2013; 8(5):e63109. <https://doi.org/10.1371/journal.pone.0063109> PMID: 23704892
37. Prince M. Measurement validity in cross-cultural comparative research. *Epidemiol Psychiatr Soc* 2008; 17(3):211–20. <https://doi.org/10.1017/s1121189x00001305> PMID: 18924560
38. Ouimette P, Goodwin E, Brown PJ. Health and well being of substance use disorder patients with and without posttraumatic stress disorder. *Addict Behav* 2006; 31(8):1415–23. <https://doi.org/10.1016/j.addbeh.2005.11.010> PMID: 16380217
39. Duffy A, Keown-Stoneman CD, Goodday SM, Saunders K, Horrocks J, Grof P, et al. Daily and weekly mood ratings using a remote capture method in high-risk offspring of bipolar parents: Compliance and symptom monitoring. *Bipolar Disord* 2019; 21(2):159–67. <https://doi.org/10.1111/bdi.12721> PMID: 30422376
40. Schwartz S, Schultz S, Reider A, Saunders EFH. Daily mood monitoring of symptoms using smartphones in bipolar disorder: A pilot study assessing the feasibility of ecological momentary assessment. *J Affect Disord* 2016; 191:88–93. <https://doi.org/10.1016/j.jad.2015.11.013> PMID: 26655117
41. Cormack F, McCue M, Taptiklis N, Skirrow C, Glazer E, Panagopoulos E et al. Wearable Technology for High-Frequency Cognitive and Mood Assessment in Major Depressive Disorder: Longitudinal Observational Study. *JMIR Ment Health* 2019; 6(11):e12814. <https://doi.org/10.2196/12814> PMID: 31738172
42. Trull TJ, Ebner-Priemer UW. Ambulatory assessment in psychopathology research: A review of recommended reporting guidelines and current practices. *J Abnorm Psychol* 2020; 129(1):56–63. <https://doi.org/10.1037/abn0000473> PMID: 31868388
43. Müller LRF, Büter KP, Rosner R, Unterhitzberger J. Mental health and associated stress factors in accompanied and unaccompanied refugee minors resettled in Germany: a cross-sectional study. *Child Adolesc Psychiatry Ment Health* 2019; 13(8):1–13. <https://doi.org/10.1186/s13034-019-0268-1> PMID: 30719070
44. Berliner L, Goldbeck L. Instructions for the CATS (Child and Adolescent Trauma Screening); 2014. Available from: URL: <https://ulmer-onlineklinik.de/course/view.php?id=1701>.
45. Sachser C, Berliner L, Holt T, Jensen TK, Jungbluth N, Risch E, et al. International development and psychometric properties of the Child and Adolescent Trauma Screen (CATS). *J Affect Disord* 2017; 210(1):189–95. <https://doi.org/10.1016/j.jad.2016.12.040> PMID: 28049104

46. Unterhitzberger J, Wintersohl S, Lang M, König J, Rosner R. Providing manualized individual trauma-focused CBT to unaccompanied refugee minors with uncertain residence status: a pilot study. *Child Adolesc Psychiatry Ment Health* 2019; 13:22. <https://doi.org/10.1186/s13034-019-0282-3> PMID: 31131021
47. Pfeiffer E, Sachser C, Rohlmann F, Goldbeck L. Effectiveness of a trauma-focused group intervention for young refugees: a randomized controlled trial. *J Child Psychol Psychiatry* 2018; 59(11):1171–9. <https://doi.org/10.1111/jcpp.12908> PMID: 29624664
48. Bean TM, Eurelings-Bontekoe E, Derluyn I, Spinhoven P. HSCL-37A User's Manual. Available from: URL: <http://www.centrum45.nl>.
49. Steyer R, Schwenkmezger P, Notz P, Eid M. Der mehrdimensionale Befindlichkeitsfragebogen (MDBF): [The multidimensional mood questionnaire (MDMQ)]. Göttingen: Hogrefe; 1997.
50. Wilhelm P, Schoebi D. Assessing Mood in Daily Life: Structural Validity, Sensitivity to Change, and Reliability of a Short-Scale to Measure Three Basic Dimensions of Mood. *Eur J Psychol Assess* 2007; 23(4):258–67.
51. Forster SD, Gauggel S, Petershofer A, Völzke V, Mainz V. Ecological Momentary Assessment in Patients With an Acquired Brain Injury: A Pilot Study on Compliance and Fluctuations. *Front Neurol* 2020; 11:115. <https://doi.org/10.3389/fneur.2020.00115> PMID: 32194494
52. Santangelo PS, Koenig J, Funke V, Parzer P, Resch F, Ebner-Priemer UW, et al. Ecological Momentary Assessment of Affective and Interpersonal Instability in Adolescent Non-Suicidal Self-Injury. *J Abnorm Child Psychol* 2017; 45(7):1429–38. <https://doi.org/10.1007/s10802-016-0249-2> PMID: 27995358
53. Koenig J, Klier J, Parzer P, Santangelo P, Resch F, Ebner-Priemer U, et al. High-frequency ecological momentary assessment of emotional and interpersonal states preceding and following self-injury in female adolescents. *Eur Child Adolesc Psychiatry* 2020. <https://doi.org/10.1007/s00787-020-01626-0> PMID: 32862250
54. Williams DR, Yu Y, Jackson JS, Anderson NB. "Racial Differences in Physical and Mental Health: Socioeconomic Status, Stress, and Discrimination. *J Health Psychol* 1997; 2(3):335–51. <https://doi.org/10.1177/135910539700200305> PMID: 22013026
55. Sleijpen M, Boeije HR, Kleber RJ, Mooren T. Between power and powerlessness: a meta-ethnography of sources of resilience in young refugees. *Ethn Health* 2016; 21(2):158–80. <https://doi.org/10.1080/13557858.2015.1044946> PMID: 26107385
56. Paruthi S, Brooks LJ, D'Ambrosio C, Hall WA, Kotagal S, Lloyd RM, et al. Recommended Amount of Sleep for Pediatric Populations: A Consensus Statement of the American Academy of Sleep Medicine. *J Clin Sleep Med* 2016; 12(6):785–6. <https://doi.org/10.5664/jcsm.5866> PMID: 27250809
57. Nezlek JB. *Multilevel Modeling for Social and Personality Psychology*. Los Angeles: SAGE; 2011.
58. Ohly S, Sonnentag S, Niessen C, Zapf D. *Diary Studies in Organizational Research: An Introduction and Some Practical Recommendations*. *J Pers Psychol* 2010; 9(2):79–93.
59. Mohr DC, Schueller SM, Araya R, Gureje O, Montague E. Mental health technologies and the needs of cultural groups. *Lancet Psychiat* 2014; 1:326–7. [https://doi.org/10.1016/S2215-0366\(14\)70261-5](https://doi.org/10.1016/S2215-0366(14)70261-5) PMID: 26360986
60. Koch T, Liedl A, Takano K, Ehring T. Daily Worry in Trauma-Exposed Afghan Refugees: Relationship with Affect and Sleep in a Study Using Ecological Momentary Assessment. *Cogn Ther Res* 2020; 16(6):1247.
61. Heron KE, Everhart RS, McHale SM, Smyth JM. Using Mobile-Technology-Based Ecological Momentary Assessment (EMA) Methods With Youth: A Systematic Review and Recommendations. *J Pediatr Psychol* 2017; 42(10):1087–107. <https://doi.org/10.1093/jpepsy/jsx078> PMID: 28475765
62. Gadeberg AK, Montgomery E, Frederiksen HW, Norredam M. Assessing trauma and mental health in refugee children and youth: a systematic review of validated screening and measurement tools. *Eur J Public Health* 2017; 27(3):439–46. <https://doi.org/10.1093/eurpub/ckx034> PMID: 28472394
63. Alisic E, Zalta AK, van Wesel F, Larsen SE, Hafstad GS, Hassanpour K, et al. Rates of post-traumatic stress disorder in trauma-exposed children and adolescents: Meta-analysis. *Brit J Psychiat* 2014; 204:335–40. <https://doi.org/10.1192/bjp.bp.113.131227> PMID: 24785767
64. Costello EJ, Mustillo S, Erkanlin A, Keeler G, Angold A. Prevalence and Development of Psychiatric Disorders in Childhood and Adolescence. *Arch Gen Psychiatry* 2003; 60:837–44. <https://doi.org/10.1001/archpsyc.60.8.837> PMID: 12912767
65. Hinz A, Daig I, Petrowski K, Brähler E. Die Stimmung in der deutschen Bevölkerung: Referenzwerte für den Mehrdimensionalen Befindlichkeitsfragebogen MDBF. [Mood in the German population: Norms of the Multidimensional Mood Questionnaire MDBF]. *Psychother Psychosom Med Psychol* 2012; 62(2):52–7. <https://doi.org/10.1055/s-0031-1297960> PMID: 22271232

66. Owens, Judith A., Weiss, Miriam R. Insufficient sleep in adolescents: causes and consequences. *Minerva Pediatrica* 2017; 69(4):326–36. <https://doi.org/10.23736/S0026-4946.17.04914-3> PMID: 28211649
67. Randler C, Wolfgang L, Matt K, Demirhan E, Horzum MB, Beşoluk Ş. Smartphone addiction proneness in relation to sleep and morningness-eveningness in German adolescents. *J Behav Addict* 2016; 5(3):465–73. <https://doi.org/10.1556/2006.5.2016.056> PMID: 27499228
68. Sierau S, Schneider E, Nesterko Y, Glaesmer H. Alone, but protected? Effects of social support on mental health of unaccompanied refugee minors. *Eur Child Adolesc Psychiatry* 2019; 28(6):769–80. <https://doi.org/10.1007/s00787-018-1246-5> PMID: 30382357
69. Derluyn I, Mels C, Broekaert E. Mental health problems in separated refugee adolescents. *J Adolesc Health* 2009; 44(3):291–7. <https://doi.org/10.1016/j.jadohealth.2008.07.016> PMID: 19237116
70. Derluyn I, Broekaert E, Schuyten G, Temmerman ED. Post-traumatic stress in former Ugandan child soldiers. *Lancet* 2004; 363(9412):861–3. [https://doi.org/10.1016/S0140-6736\(04\)15734-6](https://doi.org/10.1016/S0140-6736(04)15734-6) PMID: 15031032
71. Almqvist K, Brandell-Forsberg M. Refugee Children in Sweden: Post-Traumatic Stress Disorder in Iranian Preschool Children Exposed to Organized Violence.
72. Seybold KS, Hill PC. The Role of Religion and Spirituality in Mental and Physical Health. *Curr Dir Psychol Sci* 2001; 10(1):21–4.
73. Sleijpen M, Boeije HR, Kleber RJ, Mooren T. Between power and powerlessness: a meta-ethnography of sources of resilience in young refugees. *Ethn Health* 2016; 21(2):158–80. <https://doi.org/10.1080/13557858.2015.1044946> PMID: 26107385
74. Ní Raghallaigh M, Gilligan R. Active survival in the lives of unaccompanied minors: coping strategies, resilience, and the relevance of religion. *Child Family Social Work* 2010; 15(2):226–37.
75. Ha J-P, Lyras A. Sport for refugee youth in a new society: the role of acculturation in sport for development and peace programming. *S Afr J Res Sport Ph* 2013; 35(2):121–40.
76. Doherty A, Taylor T. Sport and physical recreation in the settlement of immigrant youth. *Leisure* 2007; 31(1):27–55.
77. Whitley MA, Coble C, Jewell GS. Evaluation of a sport-based youth development programme for refugees. *Leisure* 2016; 40(2):175–99.
78. Douglass S, Mirpuri S, English D, Yip T. "They were just making jokes": Ethnic/racial teasing and discrimination among adolescents. *Cultur Divers Ethnic Minor Psychol* 2016; 22(1):69–82. <https://doi.org/10.1037/cdp0000041> PMID: 26009942
79. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 5th ed. Arlington, VA: American Psychiatric Publishing.
80. Cronbach LJ, Meehl PE. Construct validity in psychological tests. *Psychol Bull* 1955; 52:281–302. <https://doi.org/10.1037/h0040957> PMID: 13245896
81. Roberts RE, Roberts CR, Duong HT. Sleepless in adolescence: prospective data on sleep deprivation, health and functioning. *J Adolesc* 2009; 32(5):1045–57. <https://doi.org/10.1016/j.adolescence.2009.03.007> PMID: 19361854
82. Frederiksen K, Rhodes J, Reddy R, Way N. Sleepless in Chicago: Tracking the Effects of Adolescent Sleep Loss During the Middle School Years. *Child Dev* 2004; 75(1):84–95. <https://doi.org/10.1111/j.1467-8624.2004.00655.x> PMID: 15015676
83. Huppert FA. Psychological Well-being: Evidence Regarding its Causes and Consequences. *Appl Psychol Health Well Being* 2009; 1(2):137–64.
84. Fazel M, Betancourt TS. Preventive mental health interventions for refugee children and adolescents in high-income settings. *Lancet Child Adolesc Health* 2018; 2(2):121–32. [https://doi.org/10.1016/S2352-4642\(17\)30147-5](https://doi.org/10.1016/S2352-4642(17)30147-5) PMID: 30169234
85. Runyan JD, Steenbergh TA, Bainbridge C, Daugherty DA, Oke L, Fry BN. A smartphone ecological momentary assessment/intervention "app" for collecting real-time data and promoting self-awareness. *PLoS ONE* 2013; 8(8):e71325. <https://doi.org/10.1371/journal.pone.0071325> PMID: 23977016
86. Morina N, Ewers SM, Passardi S, Schnyder U, Knaevelsrud C, Müller J, et al. Mental health assessments in refugees and asylum seekers: evaluation of a tablet-assisted screening software. *Confl Health* 2017; 11:18. <https://doi.org/10.1186/s13031-017-0120-2> PMID: 29026438
87. Liao Y, Skelton K, Dunton G, Bruening M. A Systematic Review of Methods and Procedures Used in Ecological Momentary Assessments of Diet and Physical Activity Research in Youth: An Adapted STROBE Checklist for Reporting EMA Studies (CREMAS). *J Med Internet Res* 2016; 18(6):e151. <https://doi.org/10.2196/jmir.4954> PMID: 27328833

Publication 3. Evaluation of the Child and Adolescent Trauma Screen (CATS): Comparison of the assessment with and without the inclusion of interpreters.

Exact title	Screening for Posttraumatic Stress Symptoms in Young Refugees: Comparison of Questionnaire Data With and Without Involvement of an Interpreter
Authors	Lauritz Rudolf Floribert Müller ¹ Johanna Unterhitzenberger ¹ Svenja Wintersohl Rita Rosner Julia König
	¹ joint first authors
Affiliation	Catholic University Eichstätt-Ingolstadt
My contribution	I collected the data for one study of the total sample. I conceptualized the research question, drafted the manuscript and initiated and finalized the publication process.
Journal	International Journal of Environmental Research and Public Health
Submitted	April 30, 2021
Feedback of the reviewers	June 14, 2021
Resubmitted	June 21, 2021
Accepted	June 23, 2021
Published	June 24, 2021



Brief Report

Screening for Posttraumatic Stress Symptoms in Young Refugees: Comparison of Questionnaire Data with and without Involvement of an Interpreter

Lauritz Rudolf Floribert Müller ^{*,†}, Johanna Unterhitzberger [†] , Svenja Wintersohl, Rita Rosner and Julia König

Department of Psychology, Catholic University Eichstätt-Ingolstadt, Ostenstraße 25, 85072 Eichstätt, Germany; johanna.unterhitzberger@ku.de (J.U.); svenja.wintersohl@gmx.de (S.W.); rita.rosner@ku.de (R.R.); julia.koenig@ku.de (J.K.)

* Correspondence: lauritz.mueller@ku.de; Tel.: +49-842-193-21265

† Joint first authors.



Citation: Müller, L.R.F.; Unterhitzberger, J.; Wintersohl, S.; Rosner, R.; König, J. Screening for Posttraumatic Stress Symptoms in Young Refugees: Comparison of Questionnaire Data with and without Involvement of an Interpreter. *Int. J. Environ. Res. Public Health* **2021**, *18*, 6803. <https://doi.org/10.3390/ijerph18136803>

Academic Editor: Paul B. Tchounwou

Received: 30 April 2021

Accepted: 23 June 2021

Published: 24 June 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Abstract: Background: The substantial number of young refugees who have arrived in Europe since 2015 requires rapid screening to identify those in need of treatment. However, translated versions of screening measures are not always available, necessitating the support of interpreters. The Child and Adolescent Trauma Screen (CATS) is a validated questionnaire for posttraumatic stress symptoms. Here, we report on the psychometric properties of the CATS in a sample of young refugees as a function of interpreter involvement. **Methods:** A total of $N = 145$ ($M_{age} = 16.8$, $SD = 1.54$; 93% male) were assessed with the CATS, with half of the screenings conducted with and half without interpreters. Post hoc analyses included calculating internal consistency using Cronbach's α . We used confirmative factor analysis to investigate the factor structure. **Results:** The CATS total scale showed good reliability ($\alpha = 0.84$). Differences in psychometric properties between the interpreter vs. the no interpreter group were minor and tended to be in favor of the interpreter group. Results of a confirmatory factor analysis were acceptable after the exclusion of items with low item-scale correlations. **Conclusions:** The sample and the administration of the assessment represent the situation of young refugees in Germany, where resources are low and translated versions not always available. The CATS may be a helpful screening tool for clinicians working with young refugees, even when administered with an interpreter. Limitations include the post hoc design of the analysis without randomization of participants and the lack of a third comparison group using translated questionnaire versions.

Keywords: refugee; adolescent; assessment; screening; PTSD; interpreter

1. Introduction

Asylum-seeking youth, and especially unaccompanied asylum-seeking youth, have a high risk for posttraumatic stress disorder (PTSD; [1,2]). A brief and valid screening should constitute the first step of recently proposed stepped-care models to meet the psychological needs of young refugees, which are currently being tested in this group [3]. To this end, measures must be validated for culturally diverse samples. The Child and Adolescent Trauma Screen (CATS; [4]) is a short self-report questionnaire with items corresponding to PTSD criteria in the Diagnostic and Statistical Manual for Mental Disorders, 5th edition (DSM-5; [5]). It has been validated in an international (Western) sample with good reliability and validity and has since been used repeatedly with refugee youth [1,6,7].

However, self-report screening measures, including the CATS, are not available for all languages of interest in the refugee context, and, moreover, many asylum-seeking youth are illiterate and cannot use translated versions even when they exist [8]. Accordingly, in real-life care settings, screenings are often conducted with non-native language versions even

when the respondents' language proficiency is low or must be supported by interpreters. In this context, untrained lay interpreters, who might be unfamiliar with mental health services, are often employed [9]. In principle, it is conceivable that the involvement of (lay) interpreters could change both screening results and therapeutic processes for a variety of reasons, including omission of cultural taboos in the translation process, role difficulties that might lead interpreters to take a directive rather than a neutral role, and lack of professional understanding regarding mental health services [10]. In terms of therapy effectiveness, the few existing post hoc findings on interpreter involvement present a mixed picture [11,12], whereby the latest study found that the group with interpreters involved showed poorer results than the comparison group without interpreters [12]. However, there are very few quantitative findings on the effects of employing an interpreter in mental health settings in general and, to our knowledge, no studies on the effects on screening or diagnostic results in particular.

Accordingly, this post hoc study aims (1) to investigate the internal consistency of the CATS in a sample of young refugees resettled to Germany using German language versions with vs. without the involvement of an interpreter; (2) to compare symptom severity, item values and item-scale correlations between the two groups; and (3) to examine the factor structure of the CATS in the total sample.

2. Materials and Methods

2.1. Procedure and Participants

Data from two studies were used with a total of $N = 145$. Study 1 assessed the mental health of $n = 98$ minor refugees resettled in southern Germany in an interview-like setting [1]. Study 2 was a pilot study [6] examining trauma-focused cognitive behavioral therapy [13] with $n = 47$ unaccompanied refugee minors. Overall, participants were, on average, $M = 16.73$ years of age ($SD = 1.54$). Most participants were unaccompanied ($n = 115, 78.8\%$) and boys ($n = 135, 93.1\%$), reflecting the population structure in Germany, where most unaccompanied refugee minors are male (for further sociodemographic information, see Supplementary Material Table S1).

Both studies were approved by the IRB of the Catholic University Eichstätt-Ingolstadt (2016/23 and 2015/02/16) and participants gave their written informed consent to participate in the respective study.

2.2. Measure

The Child and Adolescent Trauma Screen (CATS) assesses posttraumatic stress symptoms (PTSS) according to DSM-5 in youngsters aged 7 to 17 years [4]. Participants indicate whether they have experienced 15 potentially traumatic events (yes/no) and specify the currently most distressing event. Then, they rate 20 items on PTSS on a 4-point Likert scale (0—*never* to 3—*almost always*). The sum score is between 0 and 60, with scores ≥ 21 indicating clinically relevant PTSS. The four subscales—*intrusion*, *avoidance*, *negative alterations in cognition and mood (NACM)*, and *hyperarousal*—can be formed, which refer to the PTSD diagnostic criteria in the DSM-5. The CATS has been validated in English, German, and Norwegian language versions. We used the German version. In half of the sample, $n = 72$ (50%), interpreters supported diagnostics (for one Study 1 participant, information on interpreter involvement was missing).

3. Data Analysis

We used SPSS version 25 (IBM, Armonk, USA) for all analyses. We examined descriptive statistics and internal consistency (Cronbach's α) for the CATS total score and symptom subscales, and for cases with and without involvement of an interpreter. We computed χ^2 -statistics to examine differences in internal consistency between the two subgroups using cocron [14]. A confirmative factor analysis was applied to investigate the previously confirmed DSM-5 factor structure using AMOS for SPSS version 25. For RM-

SEA, values ≤ 0.06 (marginal: 0.07–0.08) [15] and for CFI and TLI, values ≥ 0.95 (marginal: 0.90–0.94) indicate a good fit [16].

4. Results

4.1. Internal Consistency

The CATS showed a good internal consistency with Cronbach's $\alpha = 0.84$ in the total sample. Internal consistency was slightly, but not significantly, higher when assessed with an interpreter ($n = 72$; $\alpha = 0.85$) than without one ($n = 72$; $\alpha = 0.82$; $\chi^2(1) = 0.684$, $p = 0.408$). The four symptom clusters differed in their internal consistency and showed rather poor results (see Table 1). Internal consistencies of the four subscales were consistently, but not significantly, lower in the group without an interpreter, with avoidance even having a negative value in this group.

Table 1. Internal consistencies (Cronbach's α) of the four subscales in the full sample and the two subsamples.

	Full Sample ($n = 145$)	Interpreter ($n = 72$)	No Interpreter ($n = 72$)	Group Difference	
				$\chi^2(1)$	p
CATS total	0.838	0.852	0.818	0.684	0.408
Intrusion	0.727	0.748	0.699	0.370	0.543
Avoidance	0.310	0.432	−0.029	1.813 ^a	0.178
NACM	0.659	0.656	0.654	<0.001	0.983
Hyperarousal	0.585	0.606	0.580	0.052	0.821

Note. CATS = Child and Adolescent Trauma Screen. NACM = Negative alterations in cognition and mood. ^a As it was not possible to compute the comparison with a negative value of α , $\alpha = 0$ was substituted in the group without interpreter.

4.2. Symptom Scores and Item Analyses

Participants from Study 1 had lower average CATS scores, $M = 22.40$, $SD = 9.35$, than participants from Study 2, $M = 26.87$, $SD = 10.35$, $F(143) = 2.61$, $p = 0.010$. CATS scores did not vary with interpreter involvement in either subsample. In Study 1, cases without interpreters had a mean CATS score of $M = 21.56$, $SD = 9.07$, and cases with interpreters of $M = 23.91$, $SD = 9.78$, $T(96) = -1.200$, $p = 0.233$, and in Study 2, cases without interpreters had a mean CATS score of $M = 29.33$, $SD = 7.14$ and with interpreters $M = 26.51$, $SD = 11.03$, $T(44) = 0.727$, $p = 0.471$.

Means and standard deviations, as well as corrected item-scale correlations of the 20 CATS items, are given in Table 2. Five items in the sample without interpreters, and three items in the sample with interpreters had item-scale correlations ≤ 0.30 , resulting in five items (8, 10, 12, 16, and 17) in the overall sample with item-scale correlations ≤ 0.30 .

4.3. Factorial Validity

The four-factor CFA model proposed by the DSM-5 and found by Sachser et al. (2017) did not show a very good fit. While RMSEA was good, at 0.06 (90% CI 0.04–0.07), the CFI was, at 0.86, below the acceptable range. Removing five items with item-scale correlations at or below $r = 0.30$ resulted in a slightly worse, but still acceptable, RMSEA of 0.07 (90% CI 0.05–0.09), and improved CFI to 0.89 (see Table 2).

Table 2. Item means, standard deviations and corrected item-scale correlations in the full sample and the two subsamples.

Item	Full Sample (n = 145)			Interpreter (n = 72)			No Interpreter (n = 72)		
	M	SD	ISC	M	SD	ISC	M	SD	ISC
1. Upsetting thoughts or pictures about what happened that pop into your head.	1.61	0.96	0.45	1.67	0.99	0.42	1.56	0.93	0.48
2. Bad dreams reminding you of what happened.	1.37	0.96	0.40	1.38	0.94	0.45	1.35	0.98	0.37
3. Feeling as if what happened is happening all over again.	0.99	1.05	0.47	1.19 ^a	1.11	0.50	0.81 ^a	0.96	0.41
4. Feeling very upset when you are reminded of what happened.	1.73	0.95	0.52	1.85	0.94	0.54	1.63	0.94	0.48
5. Strong feelings in your body when you are reminded of what happened (sweating, heart beating fast, upset stomach).	1.37	1.03	0.50	1.44	1.05	0.49	1.28	1.02	0.52
6. Trying not to think about what happened. Or to not have feelings about it.	2.00	0.90	0.37	2.14	0.92	0.52	1.88	0.85	0.17
7. Staying away from anything that reminds you of what happened (people, places, things, situations, talks).	1.05	1.11	0.38	1.32 ^b	1.17	0.33	0.79 ^b	0.99	0.40
8. <i>Not being able to remember part of what happened.</i>	0.70	0.89	0.13	0.74	0.87	0.15	0.67	0.92	0.10
9. Negative thoughts about yourself or others. Thoughts like I will not have a good life, no one can be trusted, the whole world is unsafe.	1.25	1.12	0.51	1.29	1.14	0.60	1.22	1.10	0.39
10. <i>Blaming yourself for what happened. Or blaming someone else when it is not their fault.</i>	0.67	0.87	0.30	0.69	0.87	0.33	0.65	0.87	0.25
11. Bad feelings (afraid, angry, guilty, ashamed) a lot of the time.	1.43	0.94	0.56	1.49	1.03	0.57	1.38	0.85	0.55
12. <i>Not wanting to do things you used to do.</i>	1.14	1.14	0.30	1.17	1.15	0.27	1.11	1.15	0.33
13. Not feeling close to people.	0.86	0.98	0.43	0.94	1.05	0.43	0.78	0.91	0.42
14. Not being able to have good or happy feelings.	1.15	1.00	0.57	1.24	1.05	0.61	1.07	0.95	0.52
15. Feeling mad. Having fits of anger and taking it out on others.	1.03	0.96	0.45	1.06	1.01	0.43	1.01	0.93	0.48
16. <i>Doing unsafe things.</i>	0.33	0.64	0.29	0.26	0.60	0.44	0.40	0.66	0.16
17. <i>Being overly careful (checking to see who is around you).</i>	1.23	1.12	0.17	1.19	1.11	0.14	1.26	1.14	0.22
18. Being jumpy.	1.11	1.05	0.43	1.03	1.01	0.39	1.19	1.10	0.52
19. Problems paying attention.	1.12	1.00	0.52	1.32 ^c	1.06	0.59	0.93 ^c	0.91	0.41
20. Trouble falling or staying asleep.	1.72	1.13	0.55	1.85	1.16	0.58	1.57	1.09	0.53

Note. The subscales are composed as follows: Intrusion (items 1, 2, 3, 4, 5), avoidance (items 6, 7), NACM (items 8, 9, 10, 11, 12, 13, 14), and hyperarousal (items 15, 16, 17, 18, 19, 20). *M* = mean; *SD* = standard deviation; *ISC* = item-scale correlations. *ISCs* ≤ 0.30 are in bold print. ^a significant difference between means, *T* (139.1) = −2.251, *p* = 0.026. ^b significant difference between means, *T* (138.1) = −2.915, *p* = 0.004. ^c significant difference between means, *T* (138.8) = −2.364, *p* = 0.019.

5. Discussion

We reported on the post hoc psychometric evaluation of the CATS as a function of interpreter involvement in a sample of severely traumatized refugee youngsters from 17 countries. The CATS previously showed good psychometric properties with translated versions and samples from Germany, Norway, and the US [4]. In our sample, the overall internal reliability was lower, but still good and did not differ between the subgroup that involved an interpreter and the one that did not. In our sample, however, avoidance, hyperarousal, and NACM showed questionable to very poor alphas, with a negative α for avoidance in the group without an interpreter. It must be kept in mind, however, that this subscale has only two items dealing with different forms of avoidance and is, therefore, not ideal to begin with from a factor analytic point of view [17]. Although the internal consistencies of the subscales tended to be consistently better in the group with interpreters, some of them were still outside the acceptable range. On the one hand, this could indicate that the young refugees were unfamiliar with psychological test formats [18], that language difficulties might have occurred, or that culturally divergent concepts were captured by the questionnaires. On the other hand, the sometimes low reliability even in the interpreter group may also stem from the difficulty of translating almost simultaneously in the screening situation and the resulting quality of translation for culturally disputable constructs. Accordingly, translated questionnaire versions, in which the translation process is more elaborate due to iterative improvements, could contribute to increasing the reliability in the recording of the subscales [19].

Five items had low corrected item-scale correlations of 0.30 or below, and this problem was more pronounced in the group not supported by an interpreter. The four-factor model showed an acceptable fit only after removing items with bad item characteristics and even then, fit indices were worse than those reported in the original study [4]. Given the heterogeneity of our sample including refugee youth from 17 countries, this deviation from the original study, which examined more homogeneous national samples, may not, however, be too surprising.

5.1. Limitations

A key limitation of this analysis is its retrospective nature and the fact that the variable of interest is difficult to manipulate experimentally. Study clinicians decided whether to employ an interpreter for screening according to their perception of participants' German language skills and preferences. However, most studies on the impact of interpreters on mental health services share this limitation. While sample 1 offered voluntary participation in a screening study, sample 2 was a service use sample, which might have resulted in selection biases affecting this analysis. Furthermore, a third group using translated versions was lacking and the subsamples were too small so as to conduct CFAs for both groups separately.

5.2. Implications

Overall, the psychometric differences between the two groups were small and tended to favor the assistance of interpreters (internal consistency, item-scale correlations). Considering the multilingual population of young refugees in Germany, where translated versions of screening measures are often lacking, the common practice to employ lay interpreters does not seem to be disadvantageous, at least in terms of reliability.

6. Conclusions

The CATS is a reliable screening instrument for PTSS in culturally diverse refugee youth samples, including its use with the involvement of interpreters, making it a feasible screening tool for professionals working in this field (available at <https://ulmer-onlineklinik.de/course/view.php?id=1701>, accessed on 24 June 2021). Assessments should be followed by a (semi-)structured interview to ascertain clinically relevant symptoms or diagnostic status. From a scientific point of view, these findings should be verified

by means of a validation of the CATS with a gold standard clinical interview. Given the paucity of quantitative research findings on the influence of interpreters on processes in mental health services, which has been emphasized by a variety of research groups [10,20], this study can be understood as a starting point for further rigorous studies, despite the limitations due to the post hoc design.

Supplementary Materials: The following are available online at <https://www.mdpi.com/article/10.3390/ijerph18136803/s1>, Table S1: Characteristics of study sample.

Author Contributions: L.R.F.M. undertook the data collection in Study 1 and was responsible for drafting the manuscript. J.U. was principal investigator in both studies and was responsible for drafting the manuscript and analyzing the data. S.W. undertook the data collection in Study 2 and was responsible for the integration of datasets. R.R. supervised both studies and revised the manuscript. J.K. was involved in all issues with regard to data analysis and manuscript drafting. All authors have read and agreed to the published version of the manuscript.

Funding: This work was supported by the funding program proFor+ of the Catholic University Eichstätt-Ingolstadt (ID: 2316). Publication of this work was supported by the German Research Foundation (DFG) within the funding programme Open Access Publishing.

Institutional Review Board Statement: This is an additional analysis of two pre-studies. The studies were conducted according to the guidelines of the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of the Catholic University Eichstätt-Ingolstadt (protocol code 2016/23 and 2015/02/16).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. Written informed consent has been obtained from all participants to publish this paper.

Data availability statement: The datasets generated and analyzed during this study are not publicly available due to sensitive and potentially identifying participant information but are available from the corresponding author on reasonable request.

Acknowledgments: We would like to thank Margret Lang and Karl Büter and all participants.

Conflicts of Interest: The authors declare no conflict of interest. The sponsors had no role in the design, execution, interpretation, or writing of the study.

Abbreviations

CATS	Child and Adolescent Trauma Screen
CFA	Confirmatory factor analysis
CFI	Comparative fit index
DSM-5	Diagnostic and Statistical Manual for Mental Disorders, 5th edition
NACM	Negative alterations in cognition and mood
RMSEA	Root mean square error of approximation
PTSD	Post-traumatic stress disorder
PTSS	Post-traumatic stress symptoms
SPSS	Statistical Package for the Social Sciences
TLI	Tucker–Lewis index

References

1. Müller, L.R.F.; Büter, K.P.; Rosner, R.; Unterhitzberger, J. Mental health and associated stress factors in accompanied and unaccompanied refugee minors resettled in Germany: A cross-sectional study. *Child Adolesc. Psychiatry Ment. Health* **2019**, *13*, 8. [[CrossRef](#)] [[PubMed](#)]
2. Von Werthern, M.; Grigorakis, G.; Vizard, E. The mental health and wellbeing of Unaccompanied Refugee Minors (URMs). *Child Abus. Negl.* **2019**, *98*, 104146. [[CrossRef](#)] [[PubMed](#)]
3. Rosner, R.; Sachser, C.; Hornfeck, F.; Kilian, R.; Kindler, H.; Mueche, R. Improving mental health care for unaccompanied young refugees through a stepped-care approach versus usual care+: Study protocol of a cluster randomized controlled hybrid effectiveness implementation trial. *Trials* **2020**, *21*, 1–13. [[CrossRef](#)] [[PubMed](#)]
4. Sachser, C.; Berliner, L.; Holt, T.; Jensen, T.K.; Jungbluth, N.; Risch, E. International development and psychometric properties of the Child and Adolescent Trauma Screen (CATS). *J. Affect Disord.* **2017**, *210*, 189–195. [[CrossRef](#)] [[PubMed](#)]

5. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders [DSM-5]*, 5th ed.; American Psychiatric Association: Washington, DC, USA, 2013. [[CrossRef](#)]
6. Unterhitzberger, J.; Wintersohl, S.; Lang, M.; König, J.; Rosner, R. Providing manualized individual trauma-focused CBT to unaccompanied refugee minors with uncertain residence status: A pilot study. *Child Adolesc. Psychiatry Ment. Health* **2019**, *13*, 22. [[CrossRef](#)] [[PubMed](#)]
7. Pfeiffer, E.; Sukale, T.; Müller, L.R.F.; Plener, P.L.; Rosner, R.; Fegert, J.M. The symptom representation of posttraumatic stress disorder in a sample of unaccompanied and accompanied refugee minors in Germany: A network analysis. *Eur. J. Psychotraumatol.* **2019**, *10*, 1675990. [[CrossRef](#)] [[PubMed](#)]
8. Jakobsen, M.; Demott, M.A.M.; Heir, T. Prevalence of psychiatric disorders among unaccompanied asylum-seeking adolescents in Norway. *Clin. Pr. Epidemiol. Ment. Health* **2014**, *10*, 53–58. [[CrossRef](#)] [[PubMed](#)]
9. Gartley, T.; Due, C. The Interpreter Is Not an Invisible Being: A Thematic Analysis of the Impact of Interpreters in Mental Health Service Provision with Refugee Clients. *Aust. Psychol.* **2017**, *52*, 31–40. [[CrossRef](#)]
10. Rousseau, C.; Measham, T.; Moro, M.-R. Working with Interpreters in Child Mental Health. *Child Adolesc. Ment. Health* **2011**, *16*, 55–59. [[CrossRef](#)] [[PubMed](#)]
11. d'Ardenne, P.; Ruaro, L.; Cestari, L.; Fakhoury, W.; Priebe, S. Does Interpreter-Mediated CBT with Traumatized Refugee People Work? A Comparison of Patient Outcomes in East London. *Behav. Cogn. Psychother.* **2007**, *35*, 293–301. [[CrossRef](#)]
12. Sander, R.; Laugesen, H.; Skammeritz, S.; Mortensen, E.L.; Carlsson, J. Interpreter-mediated psychotherapy with trauma-affected refugees—A retrospective cohort study. *Psychiatry Res.* **2019**, *271*, 684–692. [[CrossRef](#)] [[PubMed](#)]
13. Cohen, J.A.; Mannarino, A.P.; Deblinger, E. *Treating Trauma and Traumatic Grief in Children and Adolescents*, 2nd ed.; Guilford Publications: New York, NY, USA, 2017.
14. Diedenhofen, B.; Musch, J. cocron: A Web Interface and R Package for the Statistical Comparison of Cronbach's Alpha Coefficients. *Int. J. Internet Sci.* **2016**, *11*, 51–60.
15. MacCallum, R.C.; Browne, M.W.; Sugawara, H.M. Power analysis and determination of sample size for covariance structure modeling. *Psychol. Methods* **1996**, *1*, 130–149. [[CrossRef](#)]
16. Hu, L.-T.; Bentler, P.M. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Struct. Equ. Model* **1999**, *6*, 1–55. [[CrossRef](#)]
17. Kline, R.B. *Principles and Practice of Structural Equation Modeling*; Guilford Publications: New York, NY, USA, 2005.
18. Ehntholt, K.A.; Yule, W. Practitioner review: Assessment and treatment of refugee children and adolescents who have experienced war-related trauma. *J. Child Psychol. Psychiatry* **2006**, *47*, 1197–1210. [[CrossRef](#)] [[PubMed](#)]
19. Bhui, K.; Mohamud, S.; Warfa, N.; Craig, T.J.; Stansfeld, S.A. Cultural adaptation of mental health measures: Improving the quality of clinical practice and research. *Br. J. Psychiatry* **2003**, *183*, 184–186. [[CrossRef](#)] [[PubMed](#)]
20. Cecchet, S.J.; Calabrese, D. Interpreter-Mediated Therapy for Refugees: A Need for Awareness and Training. *Grad. Stud. J. Psychol.* **2011**, *13*, 12–16.

LIST OF PUBLICATIONS

Original research

(Publications marked “*” are part of the cumulative dissertation)

- *6. **Müller, L. R. F.**, Unterhitzberger, J., Wintersohl, S., Rosner, R. & König, J. (2021b). Screening for posttraumatic stress symptoms in young refugees: Comparison of questionnaire data with and without involvement of an interpreter. *International Journal of Environmental Research and Public Health*, 18(6803), <https://doi.org/10.3390/ijerph18136803>
(Publication 3)
- *5. **Müller, L. R. F.**, Gossmann, K., Schmid, R. F., Rosner, R. & Unterhitzberger, J. (2021a). A pilot study on ecological momentary assessment in asylum-seeking children and adolescents resettled to Germany: Investigating compliance, post-migration factors, and the relation between daily mood, sleep patterns, and mental health. *PLOS One*, 16(2), <https://doi.org/10.1371/journal.pone.0246069>
(Publication 2)
4. Rosner, R., Sachser, C., Hornfeck, F., Kilian, R., Kindler, H., Mueche, R., **Müller, L. R. F.**, Thielemann, J., Waldmann, T., Ziegenhain, U., Unterhitzberger, J. & Pfeiffer, E. (2020). Improving mental health care for unaccompanied young refugees through a stepped-care approach versus usual care+: study protocol of a cluster randomized controlled hybrid effectiveness implementation trial. *Trials*, 21(1013), doi.org/10.1186/s13063-020-04922-x
3. Pfeiffer, E., Sukale, T., **Müller, L. R. F.**, Plener, P. L., Rosner, R., Fegert, J. & Unterhitzberger, J. (2019). The symptom representation of posttraumatic stress disorder in a sample of unaccompanied and accompanied refugee minors in Germany: A network analysis. *European Journal of Psychotraumatology*, 10(1), [doi:10.1080/20008198.2019.1675990](https://doi.org/10.1080/20008198.2019.1675990)
- *2. **Müller, L. R. F.**, Gossmann, K., Hartmann, F., Büter, K. P., Rosner, R. & Unterhitzberger, J. (2019b). 1-year follow-up of the mental health and stress factors in asylum-seeking children and adolescents resettled in Germany. *BMC Public Health*, 19(908), [doi:10.1186/s12889-019-7263-6](https://doi.org/10.1186/s12889-019-7263-6)
(Publication 1)
1. **Müller, L. R. F.**, Büter, K. P., Rosner, R. & Unterhitzberger, J. (2019a). Mental health and associated stress factors in accompanied and unaccompanied refugee minors resettled in Germany: a cross-sectional study. *Child and Adolescent Psychiatry and Mental Health*, 13(8), [doi:10.1186/s13034-019-0268-1](https://doi.org/10.1186/s13034-019-0268-1)

Conference contributions

5. **Müller, L. R. F.**, Goßmann, K., Hartmann, F., Büter, K. P., Rosner, R. & Unterhitzberger, J. (2019). Die psychische Gesundheit und Belastungsfaktoren unbegleiteter und begleiteter minderjähriger Flüchtlinge im Verlauf eines Jahres [The mental health and stress factors of unaccompanied and accompanied refugee minors over the course of one year]. Presentation at the 37th Symposium of the Division of Clinical Psychology and Psychotherapy of the DGPs, Friedrich-Alexander University Nuremberg-Erlangen, May 29 – June 1, 2019.
4. **Müller, L. R. F.**, Goßmann, K., Hartmann, F., Büter, K. P., Rosner, R. & Unterhitzberger, J. (2019). Die psychische Gesundheit und Belastungsfaktoren unbegleiteter und begleiteter minderjähriger Flüchtlinge im Verlauf eines Jahres [The mental health and stress factors of unaccompanied and accompanied minor refugees over the course of one year]. Presentation at the Annual Meeting of the German-Speaking Society for Psychotraumatology, Frankfurt am Main, March 14-16, 2019.
3. **Müller, L. R. F.**, Büter, K. P., Rosner, R. & Unterhitzberger, J. (2018). Psychische Gesundheit und Postmigrationsfaktoren begleiteter und unbegleiteter minderjähriger Flüchtlinge in Bayern [Mental health and post-migration factors of accompanied and unaccompanied minor refugees in Bavaria]. Presentation at the 2nd Conference of the Refugee Research Network, Catholic University Eichstätt-Ingolstadt, October 4-6, 2018.
2. Büter, K. P., **Müller, L. R. F.**, Rosner, R. & Unterhitzberger, J. (2018). Faktorenanalytische Validierung von Postmigrationsfaktoren bei minderjährigen Flüchtlingen [Factor analytic validation of postmigration factors in refugee minors]. Poster presented at the 36th Symposium of the Division of Clinical Psychology and Psychotherapy of the DGPs, University of Koblenz-Landau, May 10-12, 2018.
1. **Müller, L. R. F.**, Büter, K. P., Rosner, R. & Unterhitzberger, J. (2018). Die psychische Gesundheit und Belastungsfaktoren begleiteter und unbegleiteter minderjähriger Flüchtlinge in Bayern [The mental health and stress factors of accompanied and unaccompanied minor refugees in Bavaria]. Poster presented at the 36th Symposium of the Division of Clinical Psychology and Psychotherapy of the DGPs, University of Koblenz-Landau, May 10-12, 2018.

EIDESSTATTLICHE ERKLÄRUNG [STATUTORY DECLARATION]

Ich erkläre an Eides Statt, dass ich die vorliegende Arbeit selbständig, ohne unzulässige Hilfe Dritter und ohne Benutzung anderer als der angegebenen Schriften und Hilfsmittel angefertigt und die den benutzten Werken wörtlich oder inhaltlich entnommenen Stellen kenntlich gemacht habe. Insbesondere habe ich für die Erstellung der Dissertation keine entgeltliche Hilfe von Vermittlungs- beziehungsweise Beratungsdiensten (Promotionsberatern oder anderen Personen) in Anspruch genommen.

[I declare in lieu of an oath that I have prepared this thesis independently, without the unauthorized assistance of third parties and without the use of other writings and aids than those indicated, and that I have identified the passages taken verbatim or in terms of content from the works used. In particular, I have not made use of any paid assistance from intermediary or consulting services (doctoral advisors or other persons) for the preparation of the dissertation.]

.....

(place, date)

.....

(signed)

ERKLÄRUNG ZU FRÜHEREN PROMOTIONS-VORHABEN [DECLARATION ON PREVIOUS DOCTORATE PROCEDURES]

Die unterzeichnete Person versichert hiermit, dass Promotionsversuche bislang nicht unternommen wurden; ein Promotionsverfahren bislang nicht abgeschlossen wurde; die vorliegende Dissertation in gleicher oder anderer Form in einem anderen Prüfungsverfahren nicht vorgelegen hat. Zu einem früheren Prüfungsverfahren mache ich folgende Angaben:

[The person signing hereby affirms that doctoral attempts have not been made to date; a doctoral examination has not been completed to date; the present dissertation has not been submitted in the same or any other form in any other examination procedure. I provide the following information regarding a previous examination procedure:]

University: _____

Time period: _____

Type of examination: _____

Result of the examination: _____

Dissertation topic: _____

.....

.....

(place, date)

(signed)