

Exploring Methods and Guidelines for Child-Computer Interaction Research with Refugee Children

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Abstract. There exist many guidelines and methods on how to do Child-Computer Interaction (CCI) research, but very few focusing specifically on refugee children with a challenging background. The complex situations and multiple changes refugee children undergo, including community, culture, schooling, friendships, language, war, displacement, physical violence and even identity, makes them different from children who are not refugees. They suffer learning disabilities, mental health issues, poor physical health, trust issues and overall developmental disabilities. As there are a large number of refugee children in the world, who are displaced and out of school, it is important to help these children using available technology and assess the effectiveness of the use of technology. This paper presents a literature study on available research guidelines and methods for CCI. The literature has been reviewed for guidelines and evaluation methods, starting from more general research with children, moving to more specific research with refugee children, and finally to identify gaps, present common grounds and directions for research with this specific population. The results from 55 articles reveal that although guidelines and methods for research with children can be used for refugee children, special attention and additional guidelines are needed to address specific needs of this group. Further, the review reveals a lack of CCI research and research methods for refugee children and most adapted/new children-friendly research methods are not fully employed in research with refugee children. The results of this review could serve as a starting point for researchers entering the CCI field to work with refugee children.

Keywords: Research Methods, Research guidelines, Evaluation, Refugee children, Child-computer interaction.

1 Introduction

With the emergence of Child-Computer Interaction (CCI) initiative, researchers have highly acknowledged the importance of children's viewpoint in research. Evaluation of children-friendly products also requires adapted research methods and guidelines due to the difference in children's skills, nature and complexities [1]. United Nations Convention on the Rights of the Child (UNCRC) states: "All Children and Young People who can form their own views, have a right to express those views freely in all matters affecting them, with the views of the child being given due weight in accordance with their age and maturity" [2]. In psychology, research with children is considered more complex compared to adults, since researchers must carefully plan the data collection

process to avoid additional stress, time and effort [3]. Many researchers see the need for distinguishing between research with adults and research with children which introduce additional issues [48]. Further, this research study investigate how research with refugee children distinguish itself in characteristics and context from research with children in general. More specifically, this study investigates if there are special areas you have to take into account when conducting Child-Computer Interaction research with refugee children. Our research goal is to investigate whether research guidelines and methods for refugee children must be different considering the extraordinary circumstances of this vulnerable population. The increasing number of refugees has intensified the interest of research within this population, and a need for new knowledge and understanding of this particular group [6]. This extension of research involves uncovering unique requirements relevant to the design of research protocols and ethics. Therefore, there must be particular attention on methodological and ethical dimensions in research with refugee children [7]. Some researchers have reported that refugee children suffer from high rates of mental health issues such as psychological disturbance, stress, anxiety, and learning difficulties [49-51]. Furthermore, the barriers they encounter, such as diverse traumatic experiences, different languages, parent separation, socio-economic issues, identity issues, and cultural shock, add to the special needs making them different from children without the same experiences [52]. The question here is whether these barriers and special issues infuse the need for additional guidelines and research methods for refugee children. This paper aim to address this failing by exploring guidelines and methods for CCI research, and examining, in a structured process, how it differs from research with refugee children, and by highlighting areas where future work might be required.

The literature study presented in this paper emphasized on how CCI research is carried out focusing on methods and guidelines, and we were especially interested in research where refugee children were involved. Owing to the fact that CCI began with work driven from interest in childrens' technology use within education, further extending to involvement in design and evaluation process[70] and also for this specific group (refugees) there has been a great focus on educational technology which can help these children where many do not have access to school or at least do not have an opportunity to learn to read and write their own mother tongue [21,36,39]. This meant that in addition to searching for literature on Human-Computer Interaction (HCI) and Child-Computer Interaction (CCI), the study also included research on educational technology including educational games. Moreover, as there is limited work on evaluation of CCI involving refugee children, this study also include literature from social science research and evaluation studies with refugee children to compile a list of guidelines and methods used with this population. The results of this review could serve as a starting point for many novice researchers in CCI community to conduct research with refugee children. The remaining paper is structured as follows: Section 2 describes the background, Section 3 explains the methodology used for the review, Section 4 illustrate the results with respect to research methods and guidelines, Section 5 presents discussion and limitations, and finally Section 6 concludes the paper.

2 Background

An increasing interest for children as users of technology has led to efforts to understand these users' impact on the methodology and how this influence evaluation (in terms of guidelines) where children participate [9]. This section introduces a background on research with children, specifically refugee children.

2.1 Research with Children

Samantha [71] investigated seven methodological issues to explain problems in research with children and claim that it is different because children are inherently different from adults. Other researchers highlighted the issues of verbalization and gender differences in children [1,29]. Research with children is considered more complex as compared to adults owing to the strict requirements regarding ethical principles and preparation of environment etc. Although involvement of children in the design and evaluation process of a product is highly encouraged [4], the opinion of young children is difficult to collect and different methods have been explored for this challenging task and many new/adapted methods are devised [3,5,25,26,29].

Many researchers address research involving children with specific focus on guidelines and methods [22-28]. According to Read and Mathilde [70], CCI is a research area within HCI that grew from work mainly driven from interest in the use of educational technology with children and involving them in design and evaluation process. Druin proposed a framework for understanding the children's role in the design and evaluation process of learning technologies [10]. Jenkinson presented the shortcoming of traditional methods to measure the effectiveness of educational technology, identifying a need for more fine-grained research studies taking a flexible approach [18]. Appropriate evaluation methods are required to conduct evaluation with children [22]. Sim and Zaman proposed a method impact assessment framework that can be used by the CCI community as a critical lens for assessing evaluation methods with children [24]. Several researchers highlight methods and guidelines for usability research with children [9, 11-14]. However, research on educational game evaluation goes beyond just usability and includes constructs such as learning, flow and game factors [15]. Playing games is one of the most natural forms of learning. Children learn to talk by playing with sounds, and even learn strategic and collaborative thinking by playing games [20]. Prensky revealed that combining games with educational goals could not only trigger learning motivation but also offer interactive learning opportunities [19], which makes them relevant and important in CCI research.

2.2 Research with Refugee Children

According to the 2016 UNHCR report, the estimated number of refugees is 21 million, and half of them are less than 18 years old [7]. In recent years, refugee children who

have faced experiences of war and violence have been the subject of a number of research studies [16]. The special circumstances of this group demand extra emphasis on research ethics and more careful selection of research methods [7].

What Makes Refugee Children Different? The definition of a refugee is: “A person who has been forced to leave his or her country to escape war, persecution, and natural disaster” [40]. As refugees end up in another country than their own, they face cultural challenges in addition to other problems [40]. Research shows long-lasting effects of pre- and post-displacement risk-factors on refugee children and their caregivers [7]. A number of challenges are associated with the displacement of refugee children such as experiences of trauma in the past, several overlapping transitions, and unfamiliar social setup [7, 40]. Most refugee children have interrupted education, and during their displacement they experience multiple language transitions which affect their learning, their wellbeing, and overall development. Further, many refugee children have experienced psychological and physical violence, threats of harm, separation or disappearance of family members, and have been under combat fire. Moreover, settlement and relocation produce additional stress in their lives, when these families have to compromise their needs in new environments with minimal social support facing experiences such as poverty, food insecurity, accusation, stress and discrimination [7]. These complex situations and multiple changes refugee children undergo, including community, culture, schooling, friendships, language and even identity, makes them different from children who are not refugees [7, 40].

The Role of Human-Computer Interaction (HCI) in Refugee Context? The HCI community has started to give attention to the refugee crisis leading to several initiatives developing technologies to aid refugee and assist them in their camps, and in their new relocated countries and communities [36]. Some of these contributions include: Deana and Rebecca’s work to aid refugee resettlement processes by utilizing asynchronous interactive voice response and setting a translator as a mediator sharing same culture and language as the refugee [37]. Jennifer and her colleagues used field communication tags to help guide refugees through the city by providing information in their preferred language [38]. Some studies highlight that the use of smart phones is common among refugees [36]. A few technology applications have been developed to help refugees, such as “Refugee Info” to help refugees overcome the language difficulties; “Refugees Welcome” which connects refugees looking for accommodation to landlords, and “Hababy” which helps refugees find health services in Europe. However, there is very limited number of HCI studies focusing on research methods and guidelines for the context of refugee children. Reem and her colleagues identified some key deficiencies regarding the role of the HCI community in refugee context and emphasized the need to adapt HCI research methods and guidelines [36]. Most studies within HCI focusing where refugee children are involved are within educational technology and game-based learning and are described in the following section.

Educational Technology and Evaluation with Refugee Children. Some educational technology research projects have been launched for refugee children displaced by conflict, but most of these projects are in initial stages or under development, and little research has yet been published [8]. Two projects with some initial evaluation results include “Learning Sudan” - a computer game that is custom-built and offers supplementary mathematics learning opportunities to out-of-school children in Sudan [21, 36], and “EduApp4Syria” that introduces innovative smartphone educational games to improve Arabic literacy skills for Syrian children [39]. Despite the evident motivational appeal of learning technology and its effectiveness, little evaluation research has been conducted regarding the use of educational games with refugee children [8, 21]. George and his colleagues developed and evaluated a reusable process for the design and evaluation of educational technology for war-affected displaced children [73]. However, most of the evaluation research conducted with refugee children comes from social science researchers exploring the complex humanitarian and political aspects in which these children live, exploring areas to improve their wellbeing, research on education of refugee children and their social and cognitive development [7]. Although it is highly emphasized that methodological dimensions and ethical engagement is crucial in research with refugee children and is identified as a challenging process [7], it has not been sufficiently addressed so far in the CCI community. To the best of our knowledge, no comprehensive research guidelines and methods have been proposed for refugee children by researchers in this field.

3 Methodology

In this study, we performed a systematic review initially with the aim of identifying and compiling research methods and guidelines for educational games evaluation with refugee children. As little CCI research is available for this specific population within the area of interest and also otherwise, we approached this research objective by investigating the extent to which research with refugee children can be regarded as similar, or different from research with children who are not refugees in terms of research methods and guidelines. The research questions include: RQ1 What evaluation methods are used for conducting research with children in CCI and how do they compare to research methods used with refugee children? ; RQ2 What guidelines are used for conducting research with children in CCI and how do they compare to guidelines for research with refugee children? ; and RQ3 Are there specific guidelines and methods for the refugee context in addition to those generally used with children in CCI?

The methodological approach followed the steps mentioned in [53]. The literature search was performed in five digital databases (Google scholar, ACM Digital Library, Science Direct, IEEE Xplore, and Springer Link) for conference papers, journal papers and published reports in the period from December 2017 to January 2018. The search strings used for the literature search included the keywords: “research guidelines”, “children”, “child computer interaction”, “human computer interaction”, “refugee children”, “evaluation”, “research methods”, “evaluation methods”, “educational”, and “games”. The keywords educational and games were included as we knew there were

relevant CCI studies that focused specifically on these areas. Search strings were constructed using the keywords (including synonyms) based on the following criteria: 1) Methods for research with children in CCI or educational game evaluation, 2) Guidelines for research with children in CCI or educational game evaluation, 3) Methods for research with refugee children in CCI or game evaluation, 4) Guidelines for research with refugee children in CCI or educational game evaluation, 5) Methods for research with refugee children in general, and 6) Guidelines for research with children or refugee children in general. Search strings were modified and adapted for the specific syntax of each selected data source.

The article selection process included three cycles: First, an initial search using search strings to examine titles and keywords. Second, the abstracts of the papers were read for relevance, all irrelevant papers were rejected, and duplications were removed, which resulted in 129 articles. Third, the articles were filtered using inclusion/exclusion criteria resulting in 52 articles selected for this review. For an article to be included, it had to focus on one of the six criteria described above and written in the English language. The articles were also excluded if full text was not available. Since almost a year was passed until publication, the search was performed again in same five digital databases following same procedure in December 2018 to add any new relevant articles published during this year. After completing the cycles of selection process, 3 new articles were added, resulting in 55 primary studies for this review.

To ensure the quality of reviewed studies, only the articles providing sufficient information on guidelines and methods were considered. After assessing the quality of the relevant papers, data was extracted from each article and organized using a spreadsheet. The information included methods and guidelines for children/ refugee children concerning RQ1 and RQ2. For RQ3, data from first two questions was further analyzed for differences to highlight specific methods/guidelines for refugee children.

4 Results

This section presents the results from reviewing 55 articles. 36 papers focused on children, and 19 papers focused on refugee children. The selected articles are listed in Table 1. We focused on the approach of investigating the extent to which research with refugee children can be regarded as similar, or different from research with children who are not refugees. After extracting data for methods(RQ1) and guidelines(RQ2) for children and refugee children separately from selected articles (see Table 1), the data was initially grouped into two main categories to initiate comparison: similarity in research methods/guidelines (methods/guidelines that were found common or similar in both corpus of literatures on research with children and refugee children) and difference in research methods/guidelines (methods/guidelines that were found uncommon or different for each corpus of literature on children vs refugee children). The main findings for each research question are summarized in the following subsections.

Table 1. Selected Articles

Category	Research papers
Children Methods and Guidelines	[1, 2, 3, 4, 5, 9, 10, 11, 12, 13, 17, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 47, 54, 55, 56, 57, 58, 67, 68, 69,74,75]
Refugee Children Methods and Guidelines	[7, 16, 21, 40, 41, 42, 43, 44, 45, 46, 59, 60, 61, 62, 63, 64, 65, 66, 73]

4.1 RQ1: Research Methods with Children vs. Refugee Children

This section highlights the methods used in research with children in general as well as research methods used with refugee children. Table 2 provides a summary of methods and recommendation for use. According to the results of this literature review, three categories emerged from the content of data collected for RQ1 using inductive approach during analysis. The categories are: Preferred methods (explicitly mentioned as preferred for each target group), General methods (normally used with any user group regardless of differences), and Specific methods (used or adapted with focus on each target group). Preferred and general methods used with children with and without refugee background were mostly same and come under the category of similarity in research methods, whereas specific methods are different for children and refugee children and come under the category of difference in research methods. Furthermore, recommendations for use of each method with children or refugee children were categorized into 4 categories based on type of results provided by the selected articles regarding method usage. These categories are listed under Table 2.

Similarity in Research Methods Used with Children and Refugee Children in Reviewed Literature. First, in the category “preferred methods” for both children with or without refugee background; the methods found were the mixed method approach, the participatory method and the observation method using an observation form/checklist. However, our study found that details regarding how the methods are used with refugee children slightly differ on areas such as flexibility and the special needs of refugee group (for details see sections 4.2 and 4.3). Furthermore, visual methods are specifically preferred for research with refugee children, as their refugee experiences can make them silent and less expressive, and these techniques help them to speak [60]. Second, there are some “general methods” which are reportedly used with any user group including children with or without refugee background. Further, there are some recommendation found in literature for their use with children. E.g. although questionnaires are used with children, research has found that this method is not recommended as an effective child-friendly method. Quasi-experimental methods are mostly used with children for educational game evaluation employing a mixed methods approach [30, 32, 33]. However, for refugee children specifically, there is a lack in research focusing on applicability or effectiveness of employing these research methods.

Difference in Research Methods Used with Children and Refugee Children in Reviewed Literature. Third, the review results also highlighted some “specific methods” in research with children both with and without refugee background. For children these include think-aloud protocol, co-discovery, active intervention and most of the specific methods for children (see Table 2) are new/adapted methods for research with children: for example, adapted survey techniques (fun sorter, smileyometer, again-again, tangible interface), interview techniques such as contextual laddering (adapted from laddering technique), and techniques such as constructive interaction, peer tutoring and video diary. The specific methods found in literature with refugee children mostly include: clinical evaluations, case study, individual in-depth interviews and self-reports, which typically come from the social science research where focus was more on the social aspects and behaviors rather than the effectiveness of the methods used. There is a lack of research in CCI community for this specific area. Also, there are very few new/adapted research methods for this specific group of refugee children. The review highlighted only three methods: communicative focus groups, social network mapping with group debriefing and self-report with pictorial questionnaire, which were adapted specifically for solving issues concerning research with refugee children [46].

Table 2. Research Methods with Children and Refugee Children

Children			Refugee Children		
Research Methods	Used w/ children	Ref.	Research Methods	Used w/ Refugee children	Ref.
<i>Similarity in Research Methods Used with Children and Refugee Children in Reviewed Literature</i>					
<i>Preferred Methods with Children in CCI</i>			<i>Preferred Methods with Refugee children</i>		
Mixed method/ Multi-methods	Yes	[4, 5, 13, 22, 23,54,55,74]	Mixed method	Yes	[16, 21, 42, 45, 46, 61]
Participatory techniques	Yes	[26, 28, 34, 57, 58]	Participatory method	Yes	[7, 43, 46, 60, 63, 64]
Observation using checklist/observation form	Yes	[22, 55,74]	Observation with observation form	Yes	[45]
			<i>Visual methods</i>	<i>Yes</i>	[46,60,63,64, 73]
<i>General Methods with Children in CCI</i>			<i>General Methods with Refugee children</i>		
Interview (<i>structured</i>)	Yes	[12, 27, 29]	Interview (<i>general /semi structured</i>)	Yes	[16, 41, 42, 44, 45]
Experiment/ Quasi-experimental methods: Pre-Test and post/test with/without experimental and control groups	Yes	[13, 30-33]	Quasi-experimental methods: Pre-post-test with/without experimental and control groups	Yes	[16, 21, 42, 66]
Observation	Yes	[4,13,33, 29]	Observation	Yes!	[21, 44, 46]

Questionnaire	No	[2, 13, 25, 27,74]	Questionnaire	Yes!	[16, 42, 45]
User field test	Yes	[23, 27, 56]	User field test	Yes!	[21, 45]
Data log	Yes	[5]	Logged data	Yes!	[21]
<i>Difference in Research Methods Used with Children and Refugee Children in Reviewed Literature</i>					
<i>Specific Methods with Children in CCI</i>			<i>Specific Methods with Refugee Children</i>		
Think-aloud method	Yes*	[1, 9, 12, 13, 22, 23, 29, 55]	Communicative focus groups	Yes	[46]
Video recording	Yes	[5, 13, 22, 23, 27,74]	Social network mapping with group debriefing	Yes	[46]
Smileyometer	Yes*	[25, 27, 29, 33, 55]	Self-report with pictorial questionnaire	Yes	[42]
Drawings	Yes*	[17, 23, 28, 29,74]	Sticky note activity	Yes	[73]
Again - Again	Yes	[25, 29, 55]	Case reports	Yes!	[16, 44]
User laboratory test	Yes	[13, 27, 56]	Wellbeing survey/ computerized surveys	Yes	[42, 46]
<i>Photographs*</i>	Yes	[47, 67]	Clinical evaluations	Yes!	[16, 44]
Peer tutoring	Yes	[23,69]	Oral test	Yes!	[21]
Contextual laddering	Yes	[4, 22]	Individual in-depth interviews	Yes!	[46]
Fun sorter	Yes	[25, 29]	Self-reports	Yes!	[16, 44]
Active intervention	Yes*	[1, 22]			
Constructive interaction	Yes*	[13, 23]			
Tangible survey/ tangible interface	Yes	[5, 23, 75]			
Video diary	Yes*	[57]			
Picture cards method	Yes	[68]			
Structured/unstructured checklist	Yes	[2]			

** is used with methods that fall under the subcategory (preferred, specific, general) but does not comply with the main category (similarity, difference).*

Yes: used & recommended for children, **Yes*:** used with children but doubt/disagreement among researchers if recommended or not, **Yes!:** used with children but article does not mention whether it was effective or not. **No:** used with children but ineffective and thus not recommended.

4.2 RQ2: Guidelines for Research with Children vs. Refugee Children

To a lesser or greater extent, participation in the research does influence the participants. Likewise, the research methods and the research process itself has the potential to influence the phenomenon being studied [46]. This section presents the guidelines

for conducting research with children in general and specifically for refugee children. Also, for RQ2, three categories emerged from the content of data extracted for guidelines, using inductive approach during analysis. These categories are: ethical, practical and methodological. Table 3 provides a summary of these guidelines. Ethical category comprises of guidelines that focus on “ethical complexities linked with research while protecting research participants and reducing potential harms”; Practical category encompass guidelines focusing on “developing the research processes that maximize the benefits”; and methodological category contain guidelines which focuses on “adapting research methods to enhance their relevance to the specific circumstances of participants’ and heighten their engagement in research.”

Similarity in Research Guidelines Used with Children and Refugee Children in Reviewed Literature. The results show that some guidelines appear both for research with children in general and in refugee context and can be considered as general guidelines for conducting research (in children context). However, deeper analysis reveals that the specific refugee context makes the application of these general guidelines different for this specific group. To illustrate this, consider the issue of obtaining consent from parents which becomes more difficult for refugee children; where the extraordinary circumstances such as separation from parents and their unaccompanied status can make parental consent impossible and further raises issues of obtaining consent from caretakers or social workers responsible, depending on local laws [65]. Similarly, for ensuring confidentiality of data collected from research participants in the case of refugee children, special attention must be paid to the ethnic culture and context, as things considered confidential in the west are public knowledge in many tight-knit communities and cultures and vice versa which might confuse the participant rather than comforting them. For example, in refugee context where many participants are not familiar with the research protocol, sometimes research respondents spontaneously reveal the adverse incidents, such as exploitation, self-harm and abuse which are normal experiences for refugees, in these cases researcher must make clear the limits of confidentiality, especially when researchers have a duty to report based on disciplinary norms [72]. Another example is of collecting video recording, where some conservative refugee societies have reservations and therefore should be further ensured of the opportunity to request destruction of videos in which they appeared [72]. In the same way, obtaining a written signed confidentiality agreement which is normal in western culture might be different in refugee context as in some cultures signing a document is considered dangerous matter and should be avoided [40]. Although the general guidelines look the same, refugee context induce additional details to implementation.

Difference in Research Guidelines Used with Children and Refugee Children in Reviewed Literature. The results of our literature review also brought forth specific guidelines for research with children and refugee children (see Table 3). Difference in specific guidelines for research with children with and without refugee background highlight that needs of refugee children are different from children with normal background. For example, in refugee context wellbeing, trust and respect becomes more of a concern than just emphasizing on fun or creativity. Instead of just focusing on simple

language and limited writing you must focus on additional issues of language barriers, low literacy rates and gaining access. Furthermore, the review also highlighted that specific guidelines for research with refugee children are more focused on ethical category, which is also reflected in practical guidelines being more directed on translating the ethical reflections into practice in the research process. In contrast, specific guidelines with children in CCI have strong emphasis on methodological category in addition to ethical and practical. Whereas, no specific methodological guidelines are found in literature reviewed of refugee children that underline the lack of methodology guidelines for research with refugee children which is in accordance with the results of section 4.1(subheading difference in research methods) emphasizing the need for adapted methods for this specific group (refugee children).

4.3 RQ3: Specific Methods or Guidelines for Refugee Children

According to the review, although participatory, mixed method and observation with checklist are preferred methods generally with children with or without refugee background. However, details on using these methods with refugee children differ with focus on guidelines. Participatory and visual methods are particularly focused by many researchers as useful for refugee context in addressing the issues of power, vulnerability, ethics and language by following guidelines (Table 3) in research process [60]. The visual methods found useful for refugee children included photovoice, fotonovela, digital storytelling and quilting [60,64]. The specific methods for refugee children were mostly found to be the general methods used in social science research with any user group such as case reports, laboratory evaluations and in-depth interviews. Most articles did not provide any details on usefulness of the employed method, which illustrate the lack of research on effectiveness of methods for research with refugee children. Unfortunately, review results did not highlight many new/adapted methods developed for refugee children, which emphasizes the need of methodology research for this specific user group. However, *communicative focus groups*, *social network mapping with group debriefing* and *self-report with pictorial questionnaire* are three specific methods found in the reviewed literature adapted specifically for the context of research with refugee children [46]. The fact that despite there are not many adapted/new methods for this specific group, the methods developed/adapted for children in general are also not yet fully employed for research with refugee children. Future research is required to explore their effectiveness for this specific group. The review highlighted only two methods: sticky note activity that used smiley faces and visual methods including photographs that were employed for refugee children considering their effectiveness as the children friendly methods.

The results highlight that there are some differences in research guidelines for children with and without refugee background (see “specific guidelines” in Table 3). The majority of the differences comes from specific ethical and practical guidelines pertaining to refugee paradigm. For refugee children there is a need for additional guidelines that take into account issues such as language barriers, culture, diverse background (illiteracy or mental health issues), refugee status (more vulnerable due to separation from

family), relocation, and gaining access and reaching out to refugee communities. This review did not highlight any specific methodological guidelines for refugee children, which is in line with the results from Section 4.1. However, the reason for this as deduced from current review, is more inclined towards the scarcity of research in this area than concluding that no additional methodological guidelines or adapted/new methods are needed for refugee children. Most of the studies conducted with refugee children focused on the intervention results sidelining the effectiveness or outcome of methods used for research, and to a greater extent using general research methods without much discussion about method selection or their perceived impact.

Table 3. Guidelines for Research with Children and Refugee Children

Guidelines with child- ren	Ref.	Guidelines with Refugee children	Ref.	
<i>Similarity in Research Guidelines Used with Children and Refugee Children in Reviewed Literature</i>				
<i>General guidelines</i>				
Ethical	Obtain consent from children and parents	[2, 26, 34, 35, 48, 57, 58]	Provide complete explanation and obtain informed consent from both children and parents or caretaker	[40, 46, 65, 73]
	Confidentiality	[2, 35, 57, 58]	Confidentiality (with respect to ethnic culture)	[40, 46, 62, 65]
	Impact of research on child/ Protection from harm	[2, 26, 35, 48, 58]	Protection from harm and distress	[40, 46, 62, 65]
	Build rapport	[26, 28, 48, 57]	Build trust: show interest, empathy and care	[7, 40, 46, 60, 64, 73]
Practical	Present and discuss results with children/ Not inflicting researchers' own perceptions	[2, 26, 28, 48]	Involve children to help researchers to interpret the findings	[64, 65]
			Feedback the research results.	[62, 65]
Methodological	Conduct a pilot study	[21, 24]	Conduct a pilot study	[46, 60]
	Use appropriate methods and tools (age, language, content, gender, capability etc.)	[2, 25, 28, 48]	Use/modify methods and tools appropriate for them instead of universal standard: using standardized research instruments may be invalid when applied to different cultural groups	[40, 46, 62, 65]
	Use participatory approach	[34, 48]	Use Collaborative and participatory research approaches	[46, 59, 62, 65]
	Use more than one evaluation methods	[23, 48]	Use mixed methods to engage young people with refugee background	[46, 61]

Difference in Research Guidelines Used with Children and Refugee Children in Reviewed Literature

<i>Specific Guidelines</i>					
<i>Ethical</i>	Cater children interest and allow them to be creative	[2, 26, 28, 34]	<i>Ethical</i>	Contribute to their wellbeing: Research should add value to the lives of refugee children	[7, 46, 62]
	Payment or gift/reward*	[26, 57, 58]		Don't misinform them or make promises that cannot be kept.	[7]
<i>Practical</i>	Provide assistance	[2, 25]	<i>Practical</i>	Work with them, not on them: Treat them with respect and not just as a source of data	[7, 46]
	Make it Fun	[25, 57]		Recognize, learn and accept their diverse backgrounds (culture, religion, education, experiences etc.)	[40, 59, 60, 62, 64, 73]
	Be nice	[2, 25]		Use oral consent if written form is difficult to obtain (considering certain reservations (distrust) or illiteracy)	[40, 46, 60, 62, 64]
	Limit the writing	[2, 25]		Get approval of all procedures by ethics committee to ensure sensitivity.	[46, 62, 65]
	Create an open and informal atmosphere	[2, 25]		Consider context and surrounding conditions of refugees	[59, 60, 73]
<i>Methodological</i>	Keep it short	[2, 25, 26]	<i>Practical</i>	Debriefing session with children and as well as caretakers after research	[62]
	Use simple language	[2, 25, 28, 57]		Thinking carefully about overall design of the research process for it to be ethical and sensitive to refugee context (research material, approach, schedule, children involvement etc.)	[64, 65, 73]
	Research context and setting (open, stress-free, child friendly environment)	[2,28,48, 57]		Recognize language barriers and need for a translators/ interpreter	[40, 46, 62, 64, 65]
	Work in small groups	[26, 34, 57]		Flexible rather than tightly defined approach: Expand the concept of 'ethical research' by applying both the relational and procedural ethical frameworks. For example, oral consent if written is not possible.	[7, 59, 65]

			Ways of gaining access to refugee communities and children (collaborating with trusted members and leaders of host community).	[59,73]
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5 Discussion and Limitations

According to the review, there are several issues highlighted in CCI that demanded for new/adapted methods for research with children such as verbalization, skills, nature, gender differences, attention span, cognitive load etc. These issues were the driving force for methodology research which not only justified the need for new/adapted methods with children but also made sense to prioritize certain methods over the others. For example, researchers found that think aloud method worked only with children who can verbalize making it a difficult method to apply with children as not many children are naturally talkative [23]. Therefore, many researchers focused on active intervention method and found it effective to elicit verbal comments from children and consequently decided to combine the think-aloud method and the active intervention method which solved this issue to some extent [1]. However, another issue with children is they are more inclined to answer what they feel adults like to hear in order to please them. This explained the reason for preferring a multi-method/ mixed method approach by some researchers when working with children [54], e.g. using observation or recording children's facial expressions and behaviors in addition to other methods used. Often non-verbal communication reveals more information than the verbal communication [1]. While some other researcher advocated the use of participatory or collaborative methods to solve this issue [23] e.g. using drawing intervention method which is considered to elicit extra information as children are involved in doing an activity that they were familiar with and in a large group, so they are more relaxed and feel less conscious when talking; or using Peer Tutoring method which require little input from the researcher and children are engaged in teaching their friends or helping them to carry out the tasks and therefore less conscious about their answers. The same rationale is true regarding the need for changes/adaptations in research guidelines in conducting research with children. For example, the issue of short attention span for children demanded for the short sessions [2,25,26] and the issue that children have not attained the legal right to consent required adaption in research guidelines and justified the need for the new guideline of obtaining consent from parents which has now become a standard in research with children [2, 26, 34,35,48,57,58].

Similarly, concluding from the above discussion where issues were seen as the driving force for changes and adaptations in research with children. The issues in research with refugee children as describe in this paper (section 2.2) goes far beyond the general issues in research with children as a user group [52]. They have faced experiences of war and violence, dislocation, poverty, stress, discrimination, language barrier, loss of family members, difference in culture etc. These special circumstances result in learning disability, mental health issues, insecurity, distrust, physical health issues, access

issues etc. Therefore, these children must be represented as special target group as compared to the general user group of children because it is impossible to ignore these specific issues and unavoidable to control their impact on conducting research with refugee children. Consequently, the above discussion implies that this group demand additional emphasis on research guidelines and ethics, and more careful selection of research methods. The prior is also depicted in the results of this review (see Table 3). For example, the issues of low literacy, distrust and dislocation in refugee context demanded adaption in research guidelines which require more flexible approach of obtaining oral consent [41], approaching them through trusted member of their community to build trust and in case of unaccompanied or separated children, it is required to gain access to local authority social worker or other officials responsible for the child in accordance with the law [65]. However, regarding research methods little has been contributed by researchers in reviewed literature but the need for such effort is highlighted by many [46, 60] which shows a lack of research in this area and a potential direction for future work for CCI community. Some researchers have highlighted the importance of visual and participatory methods in research with refugee children which to some extent solve the issues of trust, language, power and vulnerability [60]. Also, it is argued that in the context of refugee children most of the methodological challenges can be resolved by ethical reflexivity that further supports the results of this review where more focus is on ethical guidelines in research with refugee children [46]. To illustrate this, we mention the example of an adapted research method for refugee children where ethical reflexivity led the adaptation. For example, inclusion of group debriefing with hypothetical example of a social network circle with some gaps (that depicts the case of most participants) in social network mapping method solved the issues of trust and normalizing refugee experiences (missing parents or family members). However, further research is required by focusing on the effectiveness of different research methods when used with ethical reflexivity in refugee context to validate this argument. Conversely, sometimes you cannot solely rely on ethical reflexivity to guide adaptation because methodological approach is essential to solve a particular issue. To illustrate this, we give an example of another adapted research method for refugee children known as communicative focus group. Here focus group method (which resulted in simplistic responses) is adapted to solve the issues of eliciting complex experiences of refugees and addressing ethical risk of inflicting harm (through symbolic violence) by incorporating methodological approach of critical communicative methodology (CCM) and using visual prompts to stimulate discussion on issues of interest [46]. Therefore, we need further research and innovative methods in CCI to conduct research with this specific population of refugee children.

The review also highlighted that research with children focused mostly on design and evaluation of products such as educational games, prototypes, educational toys or children experiences and the constructs/aspects used for research were fun, ease to use, usability, likability, experience, attractive to use. Whereas for refugee children, research focused more on evaluation and effects of interventions, creative programs, psychosocial treatments and just recently on educational games. The constructs/aspects mostly used in research with refugee children included emotional distress, behavioral

problems, learning, knowledge acquisition, wellbeing, settlement experience, perceived difficulty, cooperation, psychosocial wellbeing, mental health care, enjoyment and motivation. This difference in research focus and constructs/aspects is also depicted in the specific methods used with children and refugee children. Where most of the specific methods used with refugee children came from social science.

One of the limitations of this study could be the choice of databases and search strings used for selecting articles. Although we included articles from social science research on refugee children, we might have missed some important work and including other databases and different keywords might result in additional papers.

6 Conclusion

This paper has addressed challenges related to research methods and guidelines for CCI research with children with or without refugee background. Our literature study resulted in three identified categories of research methods: Preferred, General and Specific methods. To a large extent the methods used in research with children with and without refugee background are similar for preferred and general methods, with more variation found for specific methods (RQ1). For research guidelines we found two categories general (similar) and specific (different) guidelines. Our review also showed that even for general guidelines there are some differences in details for research with refugee children that must take additional issues into account (RQ2). Further, guidelines were introduced in the three groups ethical, practical, and methodological. Our study revealed the need to adapt guidelines for research with specific emphasis on the context of refugee children (RQ3). This need comes from specific issues such as language barrier, culture, war traumas, mental health issues, separation, and socio-economic conditions due to relocation of this population. Thus, there is a need to take into account additional ethical, practical and methodological parameters when conducting CCI research with refugee children to make sure the results of introducing technology includes a good understanding of its users. Unfortunately, only three new or adapted research methods were found in review specifically for refugee children, but there are some preferred and specific methods used with this population which we have highlighted and can guide researchers.

The review also highlighted some gaps in current literature: Firstly, there is a lack of research on new/adapted research methods for refugee children and/or effectiveness of general research methods when used in this context. Secondly, most children-friendly research methods are not fully employed in research with refugee children, and existing evaluation methods that work well with children might need to be adopted or tailored before they can be used with refugee children. Thirdly, there is a gap in literature regarding focus on methodological guidelines for the specific group of refugee children which is in line with the scarcity of research on effectiveness of methods for research with this user group. However, this study presents a starting-point to guide researchers and evaluators in the CCI community in conducting research with the spe-

cific population of refugee children and, methods and guidelines identified in this review for working with refugee children might be helpful to guide the adaption of the research process.

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