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Cultural adaptation of internet interventions for refugees: Results from a user experience study in Germany

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ABSTRACT

Background: The estimated number of refugees worldwide resulting from persecution, conflict, violence, or human rights violations reached 25.4 million in 2017. An increased prevalence of mental disorders combined with language and socio-cultural barriers pose a challenge for healthcare systems. Internet-based interventions can help to meet this challenge. For the effective use of such interventions in refugees, cultural adaptations are necessary. The variety of their cultural backgrounds thereby is particularly challenging.
Methods: We conducted this explorative qualitative study in order to identify elements of Internet-based interventions that need cultural adaptation to be suitable for refugees. Six refugees from Syria, Iran, Eritrea, Algeria, and Iraq, and six healthcare providers (two social workers, two psychologists, one physiotherapist, one physician) working with refugees went through an intervention for individuals with sleeping problems (*eSano Sleep-e*). Possible threats to user experience were identified using the Think Aloud method and semi-structured interviews. Statements were analysed based on the grounded theory method.
Results: Results indicate the necessity to adapt the intervention to the specifics of refugees including aspects related to the flight (i.e., past and current stressors) and non-western characteristics (i.e., habits, disease and treatment concepts). Elements of adaptation should include pictures, role models, language, psychoeducational elements, structure of modules, and format of presentation.
Conclusions: Cultural adaptation can be used to facilitate the identification with an intervention, which seems crucial to increase the acceptance among refugees. In spite of their diverse cultural backgrounds, it appears feasible to create interventions that allow identification by refugees from different home countries.

1. Introduction

Worldwide, the number of forcibly displaced people resulting from persecution, conflict, or generalised violence has increased to 68.5 million in 2017, which is, according to the United Nations High Commissioner for Refugees (UNHCR), the highest number yet recorded (UNHCR, 2018). Refugees and asylum seekers form subgroups that are specifically vulnerable for mental disorders, due to burdening and potentially traumatising events in their home countries, during the flight, and in the countries of arrival (Mölsä et al., 2014; Porter and Haslam, 2005; Steel et al., 2017; Steel et al., 2009). Particularly prevalent mental disorders are trauma- and stressor-related disorders, depression, anxiety disorders, and substance use disorders (Fazel et al., 2005; Lamkaddem et al., 2014; Steel et al., 2009; Turrini et al., 2017), often accompanied by sleeping problems (Al-Smadi et al., 2017; Sandahl et al., 2017). An enhanced prevalence of mental disorders can still be shown years after the resettlement (Bogic et al., 2015; Giacco et al., 2018). A major reason for this may be that only a small share of refugees is reached by present mental healthcare services (BAfF Bundesweite Arbeitsgemeinschaft der psychosozialen Zentren für Flüchtlinge und Folteropfer, 2016; Laban et al., 2007). Various barriers are found to hinder refugees from using mental healthcare services (Bajbouj, 2016; Bermejo et al., 2012; Scheppers et al., 2006; Sijbrandij et al., 2017). Barriers are present on an individual level (e.g., cultural and language barriers (Smith et al., 2000), stigmatisation of mental disorders (Slobodin et al., 2018), or a lack of knowledge about mental disorders and treatment possibilities (Wångdahl et al., 2015)), as well as on a structural level (e.g., a lack of treatment resources (Slobodin

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et al., 2018)).

These barriers pose a major challenge to the healthcare systems in the arrival countries (Hassan et al., 2016; Langlois et al., 2016; Lindert et al., 2016), which is why stepped care models are discussed to help overcoming them (Arjadi et al., 2015; Bajbouj et al., 2018; Bockting et al., 2016; Hillebrecht et al., 2018; Schneider et al., 2017; Sijbrandij, 2017; Wagner, 2016). Within stepped care models, low-threshold and scalable Internet-based interventions (Carroll and Rounsaville, 2010; Griffiths et al., 2006; Karyotaki et al., 2018; Moock, 2014) can help to reduce both individual and structural barriers (Hinton and Jalal, 2014; IASC Inter-Agency Standing Committee, 2007). Indeed, with the increasing Internet availability all over the world (ITU International Telecommunication Union, 2018), Internet-based interventions get more and more common (Andersson, 2018) and can reach a broad range of people (Andersson and Titov, 2014). Moreover, their effectiveness has been proven (Andersson et al., 2014; Barak et al., 2008; Carlbring et al., 2018; Cuijpers et al., 2010; Domhardt and Baumeister, 2018; Hedman et al., 2012; Titov et al., 2018).

Unfortunately, Internet-based interventions have been shown to be less effective in ethnic minorities (Karyotaki et al., 2018). Cultural adaptation of Internet-based interventions, however, seems to increase their effectiveness in populations different from the initial target group (Harper Shehadeh et al., 2016) and is suggested to be crucial to delivering Internet-based interventions to culturally diverse groups (Heim et al., 2019). Cultural adaptation can be defined as the consideration of "language, culture, and context in such a way that it is compatible with the client's cultural patterns, meanings, and values" (Bernal et al., 2009, p. 362). In the context of face-to-face therapy, cultural adaptation is found to enhance acceptability, relevance, and fit of interventions for culturally diverse target groups (Barrera et al., 2013) by reducing individual and structural barriers (Gearing et al., 2013). Correspondingly, the effectiveness can be increased by cultural adaptation (Benish et al., 2011; Chowdhary et al., 2014; Griner and Smith, 2006). There are frameworks that systematically guide through the adaptation process of face-to-face interventions, including phases such as gathering information from the target population, stakeholders, and existing literature, establishing a preliminary adaptation, testing and refining this adaptation (Barrera and Castro, 2006; Hwang, 2009; Sidani et al., 2017). Additionally, other frameworks suggest which specific elements of face-to-face treatments should be adapted in order to ensure a cultural fit (Helms, 2015; Kreuter et al., 2003; Resnicow et al., 1999). For example, Bernal et al. (1995) suggested to consider eight dimensions when culturally adapting interventions, including language, content, goals, and context. Generally, the core therapeutic components of an intervention largely remain, whereas treatment delivery and contextualisation are substantially adapted (Chu and Leino, 2017).

Due to limited consensus and systematics in the cultural adaptation process of Internet-based interventions (Abi Ramia et al., 2018; Harper Shehadeh et al., 2016), most research groups have relied on frameworks that were originally developed for the adaptation of face-to-face therapy. It may, however, not be valid to transfer those frameworks to the adaptation of Internet-based interventions (Lal et al., 2018). Only very recently, some studies have described and published the process of culturally adapting their Internet-based interventions for people with a diverging cultural background (Abi Ramia et al., 2018; Arjadi et al., 2018b; Juniar et al., 2019; Lal et al., 2018; Salamanca-Sanabria et al., 2019). Thereby, it seems crucial to ensure relevance and sensitivity for the respective target groups by adapting the delivery methods and language (e.g., quotes), illustrations and pictures, as well as personal stories and example characters (Abi Ramia et al., 2018; Juniar et al., 2019; Salamanca-Sanabria et al., 2019). In former studies, Internet-based interventions have either been adapted for a specific migrant population in western countries (Choi et al., 2012; Kayrouz et al., 2016; Saulsberry et al., 2013; Ünlü Ince et al., 2013), or for (traumatised) people living in low or middle income countries (Abi Ramia et al., 2018; Arjadi et al., 2018a; Knaevelsrud et al., 2015; Salamanca-Sanabria et al., 2019; Wang et al., 2013). At the same time, Muñoz et al. (2018) have emphasised the importance of developing methods to provide Internet-based interventions to a variety of different communities without tailoring every intervention to every community.

This would also be helpful in the context of the broad and specifically vulnerable and indigent group of refugees, due to their diverse cultural backgrounds and situations. However, it is only lately that interest in the usability and user experience of Internet-based interventions for refugees has been drawn (Böge et al., 2019; Burchert et al., 2019; Morina et al., 2017). For example, in a recent study, Burchert et al. (2019) identified barriers of Syrian refugees to using a mental health app such as a low technical literacy, limited language skills, a lack of acceptance (towards mental disorders or their treatment), as well as a lack of trust in the app. These findings correspond to Gearing et al. (2013) and Hinton and Jalal (2014), who highlighted the importance of adapting face-to-face treatments not only culturally, but also contextually, which additionally takes factors into account that may influence refugees' access and acceptability to treatments. Correspondingly, it may be doubted whether refugees have the same needs and concerns regarding Internet-based interventions as non-fled culturally and linguistically diverse people (Bockting et al., 2016).

Therefore, in this study, we aimed to openly explore the need for cultural adaptation of an Internet-based intervention for refugees and to point out specific elements that might need such a cultural adaptation to facilitate an enhanced user experience for refugees. We thereby included both information on adaptations concerning the content of the intervention and on those concerning the usability, needs, and expectations, which are also influenced by the context refugees live in. We investigated this in a culturally diverse group of refugees to explore whether a single adaptation might be viable to fit the context and needs of refugees with various cultural backgrounds, and generated a first model on cultural adaptation on the basis of the acquired data.

2. Methods

This is a qualitative study investigating the user experience perceived by refugees and healthcare providers regarding an Internet-based intervention for sleeping problems using the *Think Aloud* method (Jaspers et al., 2004) and semi-structured interviews.

2.1. Participants and recruitment

Between January and March 2018, six refugees (one female, five male) and six healthcare providers (four female, two male) participated in our study. Participants were recruited via several institutions, such as the municipality migration office or voluntary organisations, as well as by referral from individuals working in the medical or psychosocial care in the area of Freiburg, Germany. We aimed to reach refugees with diverging cultural backgrounds and healthcare providers with diverging professions in order to enhance data diversity. Regarding the refugees, the inclusion criteria were a sufficient knowledge of German or English and a minimum age of 18 years. The participating refugees came from Syria (two), Iran, Iraq, Eritrea, and Algeria, their age ranged from 20 to 52 (M = 38.00, SD = 11.75), they had good Internet literacy, and were or had been suffering from sleeping problems. Regarding the healthcare providers, we only included full-aged individuals who had been working with refugees for a minimum of one year. Two psychologists, two social workers, one physician, and one physiotherapist aged between 27 and 66 (M = 45.67, SD = 14.50) participated in our study. Main reasons for non-participation were an insufficient language knowledge (for the refugees) and a lack of time (for the healthcare providers). Participants' details are outlined in Table 1.

Table 1
Characteristics of participating healthcare providers (hcp) and refugees (ref) included in the qualitative analyses ($N = 12$).

	Participant code	Country of origin	Profession[a]	Age	Gender	Completed modules	Contact with refugees
Healthcare providers	hcp_hm1		Psychologist	46	m	1,2,3	daily
	hcp_cw2		Physiotherapist	57	f	1,2,3	daily
	hcp_am3		Physician	66	m	1,2,3	occasionally
	hcp_sw4		Social worker	27	f	1,2,3	daily
	hcp_mw5		Social worker	45	f	1,2	–
	hcp_aw6		Psychologist	33	f	1,2	several times a week
							Years lived in Germany
Refugees	ref_bbb1	Syria	–	38	m	1	2–3
	ref_lia2	Iran	Student	43	f	1,2,3	5
	ref_nfx4	Eritrea	Soldier, now interpreter	52	m	1,2,3	35
	ref_obi5	Algeria	Baker	29	m	1	2–3
	ref_cvs7	Iraq	Lawyer, now interpreter	46	m	2,3	12–13
	ref_sbm8	Syria	Student	20	m	2,3	2

[a] Concerning refugees: in their home countries; current job, if exists, is named separately.

2.2. Intervention

We used the *eSano Sleep-e* intervention, which is a shortened and unguided version of the *GET.ON Recovery* intervention developed for and evaluated in employees with work-related strain and sleeping problems (Ebert et al., 2015; Thiart et al., 2015). The rationale for choosing an Internet-based intervention for sleeping problems instead of one for other mental disturbances such as depression, anxiety, or post-traumatic stress disorder (PTSD) was, in addition to a high prevalence, the low-threshold and highly structured therapeutic concept. So far, the GET.ON Recovery intervention is the only existing evidence-based German Internet-based intervention delivering cognitive-behavioural therapy for insomnia. We summarised the contents relevant for the treatment of sleeping problems in three modules (Table 2) and created an English parallel version in order to reach various groups of refugees. The modules include text and multimedia components (images, audios, videos), as well as reports from role models and interactive elements such as quizzes, a sleeping diary, and homework. Each module takes about 45 min to complete.

2.3. Procedure

The study was approved by the ethics committee of the University of Freiburg, Germany (no. 507/17).

Data collection was conducted in one on one sessions taking place either at the Institute of Psychology, University of Freiburg, or at a place the participants frequently stayed, such as their working place. All sessions were conducted in German. Sessions with the refugees were performed by JSS, those with the healthcare providers by DW. Both JSS and DW were in their final year of the clinical psychology Master programme and conducted the research as a part of their Master theses, which the participants knew about. After receiving information about data protection and the study procedure, the respective participant signed an informed consent form and completed a demographic questionnaire. The subsequent procedure differed between the refugees and the healthcare providers. The participating refugees went through the intervention in detail, with one module per session (60–90 min). Some of the refugees did not complete all three modules due to language difficulties (ref_bbb1, Syria, ref_obi5, Algeria) or due to balancing the number of processed modules (ref_cvs7, Iraq, ref_sbm8, Syria; details in Table 1). A total of 12 sessions was obtained (four of each module). For each session, the refugees were offered an Amazon voucher (10–15€). According to the Think Aloud method (Jaspers et al., 2004), the refugees were instructed to vocalise all their thoughts while going through the modules. Due to language difficulties, different from the original Think Aloud procedure, the researcher was available to meet any understanding problem or query that arose during the session, and made a query himself if needed. However, there were no specific questions asked by the researcher.

Regarding the healthcare providers, the focus was on a semi-structured interview following the Think Aloud procedure. The interview guideline was developed following the principles of the S^2P^2 system (Kruse, 2014) and adjusted during the study in order to integrate emerging topics. A translated version of the interview guideline can be found in Appendix A. Think Aloud mainly served the experts to get to know the intervention and was carried out in less detail, that is the healthcare providers rather scanned the modules. All modules and the subsequent interview took place in one session (60–90 min).

The Think Aloud sessions and interviews were audio-recorded; additionally, the researchers took notes concerning the participants' behaviour and non-verbal expressions.

2.4. Data analysis

The Think Aloud sessions (all 12 sessions of the refugees, only those sessions of the healthcare providers that deemed relevant) and the interviews were transcribed by using the software f4; a transcription system based on the rules of Kuckartz (2010) was established (JSS, DW). Data was analysed based on the grounded theory approach (Charmaz, 2014; Corbin and Strauss, 2008; Henwood and Pidgeon, 2003). Grounded theory is an inductive method aiming to find a core theme and to develop a new model grounded on the empirical data. By

Table 2
Contents of the used cognitive-behavioural Internet-based intervention eSano sleep-e.

Module	Name	Content
1	My good start for an improved sleep	Introduction; instructions for operating the intervention; reflecting aims of taking part in the intervention; quiz about sleep and sleep promoting behaviour, sleep hygiene rules; pharmaco-therapeutic interventions; sleeping diary
2	Stop rumination and get it under control	Review on last week's content; psychoeducation about rumination; three exercises to deal with rumination (thought of tranquillity; appointment with rumination and worrying; imagination exercise)
3	With new strength into the future	Review on last week's content; reflecting the achievements and further aims in the intervention (planning future exercises); information about problems linked to sleeping problems and corresponding offers to help; farewell video

openly exploring the thoughts and associations of the participants, the grounded theory approach enables an explorative procedure to generate a first and preliminary theory on cultural adaptation without preceding hypotheses. The analysis began as soon as the first records were transcribed; the transcripts were continuously coded. Initial coding was applied by sticking closely to the transcripts. In the proceeding analysis, the codes were categorised and the categories were integrated into a code structure that was iteratively extended and continuously validated by doing comparative analyses. The categories were labelled and organised in the inductively evolving model. During the process, analytic and conceptual memos of emerging ideas or hypotheses concerning the codes or the code structure were made. The latest collected information (third sessions of ref_nfx4 and ref_sbm8; interviews with hcp_mw5 and hcp_aw6) could be integrated in the previously formed categories. Independent from another, DW completed data processing concerning the healthcare providers, whereas JSS completed data processing concerning the refugees. During the process, discussions were held with two further researchers (KS, LS) and a repeatedly held interpretation group. The resulting category systems were reviewed and integrated into one (KS). The participants were not involved in the process of coding and categorising.

3. Results

Elements of an Internet-based intervention that might be worth cultural adaptation for a culturally diverse group of refugees could be identified in this explorative qualitative study. The elements of adaptation appear to base on the consideration of the specificity of refugees' characteristics and problems, and this consideration is expected to enhance the fit of the intervention and, herewith, the identification of refugees with it. This reveals the centrality of the *consideration of the specificity of refugees' characteristics and problems*, which emerged as the core theme in our analysis. We organised our results under this core theme; the revealed specific characteristics of refugees can be grouped in three sub-themes:

1. Problems and stressors of refugees
2. Everyday habits, socialisation, and values of refugees
3. Disease and treatment concepts of refugees

In the following, we will give a detailed description of the three categories.

3.1. Problems and stressors of refugees

The specific stressors of refugees were present in all participants' accounts. For example, two refugees emphasised that *"our problems are very different" (ref_bbb1, Syria)*[1] and that *"everyone has a lot of problems and not only one burdening situation" (ref_cvs7, Iraq)*. Problems included pre-, peri-, as well as postflight stressors, as, for example, a healthcare provider outlined: *"There are various such thoughts those refugees have that keep them from sleeping – concerning their flight, traumata, and their experiences, their family and their security" (hcp_am3)*. The participants emphasised the predominant character and severe background of worries and rumination due to those stressors and their association with sleep disturbances. For example, a refugee stated:

> *"I had a brother […]. Well, he was behind the steering wheel and said 'Can you please go to this shop and –' we needed something, I had to buy it. I went to the shop and – that was a minute or two. Then he was murdered. Shot in his car and I see. Yes, well, that's life, right? And difficult, these things stay, right? In mind."*
>
> *(ref_cvs7, Iraq)*

The participants considered it to be very important to value and appreciate the refugees' burdens and strains, so *"people in their specific situation not [to] offend" (hcp_am3)*. The specific stressors of refugees are relevant to the adaptation of a number of intervention contents.

First, the healthcare providers suggested to explicitly discuss relevant causes for sleeping problems, such as poor living and sleeping conditions, as one refugee said:

> *"I have a lot of stress here in Germany, that's why I cannot – then, I'm also here illegally, then I cannot well. I am not, like, I cannot stay here for sure – no stability, or so. That's why […] I cannot sleep well, because same thoughts."*
>
> *(ref_obi5, Algeria)*

Several refugees emphasised that their sleeping problems could be traced back to other problems as compared to a western population and the mentioned work-related strain in the intervention. For example, a refugee said: *"If you have strong problems – I think it does not matter whether smoking or – you try again to drink, you try a bit of chocolate or snacks – you have to find another solution" (ref_lia2, Iran)*.

Second, also in dealing with rumination, the seriousness of the underlying problems should be respected. Thus, both refugees and healthcare providers found it inappropriate to make an appointment with rumination and worrying or to see the advantages of rumination. For example, a refugee stated: *"I shall turn off my thoughts, shall them – by your order? There is no way. I ruminate every minute. When I ruminate, you cannot give me an order" (ref_nfx4, Eritrea)*. A participant suggested:

> *"One should try to find another way to come along with it so that it does not strain one all day long. Well, one would not try to see their thoughts calmly, but to find a way to simply reformulate them, to live their everyday life a little better, or to have a better everyday life despite such big problems".*
>
> *(hcp_aw6)*

They experienced imagination exercises or other mindfulness exercises that addressed their resources as more appropriate and suggested to increasingly use them: *"The thoughts are free in that moment, beautiful it is […]. Unfortunately, it is too short" (ref_nfx4, Eritrea)*. The healthcare providers especially emphasised the importance of

> *"facilitating the access to the own body […]. Tactually, with techniques that I don't have in stock, in order to create a relaxation also from within […].To concentrate on something that is not directly connected with sleep, because nothing is worse than when you lay in your bed and you say 'Now I want to sleep' ".*
>
> *(hcp_cw2)*

Third, concerning the sleep hygiene rules and similar parts, the refugees' current stressors and living situations should be considered. For example, preparing the bedroom nicely often would not be possible due to the living situation: "*After all, they do not have a bedroom. […] Well, a four-person family has one room, for example" (ref_cvs7, Iraq)*.

Fourth, there should be no images linked in any way to the experiences that refugees might have had before or during their flight, for example of the sea or boats, which are link to a potential route across the Mediterranean Sea: *"This is […] a picture that you should certainly exclude; well, they bear a very different reference to boats" (hcp_am3)*.

Fifth, role models should be

> *"not only white and not such typical German problems, teacher, nurse, but in this case also, for example, a problem of a person who fled, well, for example, 'I cannot stop thinking about the war or about the flight, or whether my family in my country is still alive, or how they are.'"*
>
> *(hcp_mw5)*

[1] All quotations are originally in German. Quoted statements, both in the German original and their English translation, can be found in Appendix B.

3.2. Everyday habits, socialisation, and values of refugees

Furthermore, the participants reported on differences in everyday habits (i.e., eating and drinking, sleeping, leisure activities), such as refugees being *"accompanied by a constantly noisy television" (hcp_cw2)*. Integrating such diverging everyday habits and attributes in the intervention also deemed important to the participants. A refugee emphasised: *"[The intervention] does not say anything about smartphones, all night long – well, they play" (ref_cvs7, Iraq)*. Furthermore, the participants suggested to focus less on time and structure because *"in our culture, there is no clock in every household – not necessarily" (ref_nfx4, Eritrea)* and *"daily structure, that you have plans, that you have a calendar – that is actually something western" (hcp_hm1)*. For example, doing homework (e.g., sleeping diary) was considered as unlikely: *"I do not think that refugees can do [the diary], well, it is made for Germans" (ref_cvs7, Iraq)*.

In addition to diverging everyday habits, the participants stated that the refugees' socialisation would differ. Many refugees had a rather low educational level, and there was a high degree of illiterates, *"especially among Syrians, eight years of war, and there is a whole generation that cannot read and write" (ref_cvs7, Iraq)*. Thus, the healthcare providers proposed to use concrete, clear, and vivid descriptions and to spare elements that require a high capability of abstraction. Generally, the participants suggested using *"pictures, many pictures. And not so much reading" (ref_sbm8, Syria),* because *"they are not in the mood for reading" (ref_lia2, Iran)*. Language itself should be as simple as possible, *"one has to de-academise the terms in the respective language" (hcp_am3)*. Using ambiguous terms and metaphors, sayings, or puns should be avoided. Furthermore, the participants suggested structuring *"everything shorter and more compact […], and also reduced in time" (hcp_aw6)*. Along with that, they noted that a mobile version of the intervention would be preferable. The healthcare providers emphasised that no pressure should be build up throughout the whole intervention: *"there are one or two [quizzes] and I would certainly not do more, because that's also like a pressure […]. And, well, you want everything that's in there rather to motivate to continue and not to demotivate" (hcp_aw6)*. Correspondingly, the refugees perceived the quiz as demotivating due to given negative feedback: *"She asks, then I give my opinion. But here it says 'Unfortunately, this is wrong'" (ref_lia2, Iran)*.

In addition, differences in the refugees' systems of values were emphasised. Religion was generally perceived as very important, as well as their family: *"There is more of a family-thinking, a clan-thinking, a being responsible for others and less for myself" (hcp_cw2)*. This also should be considered in the intervention, for example when introducing role models or speaking about routines (e.g., sleep hygiene rules).

Generally, both participant groups emphasised that refugees were not a homogenous group and that there existed differences between the different countries, but also between refugees who had just arrived in Germany versus those who had left their countries a while ago. They suggested to illustrate diverse people. For example, on pictures, there should be people of different colour and nationality, with diverse names and clothes.

3.3. Disease and treatment concepts of refugees

Other important points were diverging disease and treatment concepts. Generally, *"refugees would [neither] know a lot about these things [i.e., mental health problems]" (ref_cvs7, Iraq),* nor were they interested in such information. Mental health problems were often stigmatised and tabooed:

> *"[Mentally ill people] do not say anything. Because it is a taboo – well, how the publicity and family and friends react to it, well, that someone is mentally ill […]. That is somewhat difficult and not serious anymore – not been taken seriously."*
>
> *(ref_cvs7, Iraq)*

According to the healthcare providers, for most refugees, *"body and soul are closely related" (hcp_hm1)*, and they were often convinced of an influence of religion or spirituality. Furthermore, according to the refugees, some have had bad experiences or *"never had experience with doctors, psychologists, psychiatrists, or neurologists" (ref_nfx4, Eritrea)* or with treatment methods in the arrival countries and could be sceptical towards them. Healthcare providers noted that, along with the higher threshold for going to western physicians or psychologists, refugees rather tried traditional healing methods. Also, they had only little self-efficacy expectations and, correspondingly, *"then they rather take medication. […] Well, really, it really is crazy, well, I rarely came in contact with Ibuprofen as much as I do now in my job since one year, yes" (hcp_sw4)*.

This diverging handling and knowledge of disease should be integrated into the intervention. The healthcare providers said that, on the one hand, refugees' assumptions and traditions regarding mental disorders and their treatment should be appreciated; correspondingly, religious and spiritual elements could be included to some extent. On the other hand, the western handling should be explained in order to help refugees to understand and legitimise it: *"When you explain things, [when you] go into detail, then an understanding of it will be developed and then it will be realised, too" (hcp_sw4)*. Thus, the participants perceived psychoeducational elements as very important components of the intervention, also in order to enhance the refugees' self-efficacy: *"They [the sleep hygiene rules] we have in any case, we want to keep them, they are very important, they are really great" (ref_nfx4, Eritrea)*. The healthcare providers mentioned that, related to this, adequate information on handling and quitting medication should be provided, whereas information about side effects or scientific evidence of medication might not be relevant. Also concerning differences in the understanding of mental disorders, the participants emphasised the importance of providing information about confidentiality and data protection.

4. Discussion

In the present study, the user experience of an Internet-based intervention for refugees with sleeping problems was investigated in an explorative qualitative study with healthcare providers and refugees. With this participative approach (Burchert et al., 2019; IASC Inter-Agency Standing Committee, 2007), we aimed to identify elements of the intervention perceived as unsuitable, as well as to find out whether the intervention could be adapted for the culturally diverse group of refugees or whether various adapted versions were needed. In general, similar to previous results (Burchert et al., 2019; Salamanca-Sanabria et al., 2019), the participants deemed the intervention useful for refugees; however, cultural adaptation would be fundamental in order to enhance the refugees' identification with the intervention, and, herewith, the acceptability and use of the intervention (Castro et al., 2010). According to our participants, the fit and relevance of the intervention for the specific target group could be increased by valuing and integrating (1) the specific problems and stressors that refugees had before, during, or after their flight, (2) their everyday habits, socialisation, and values, and (3) their disease and treatment concepts. We integrated these categories into a model for cultural adaptation of Internet-based interventions for refugees (see Fig. 1). This model may represent a first step towards a systematic process of cultural adaptation of Internet-based interventions (Harper Shehadeh et al., 2016), thereby focusing peculiarities of refugees, similar to face-to-face approaches (Hinton and Jalal, 2014).

Our findings correspond to earlier results that cultural adaptation of an Internet-based intervention should be used to enhance the relevance and sensitivity to the context of culturally diverse people (Abi Ramia et al., 2018). Likewise, in face-to-face approaches, it has been suggested that cultural relevance could be enhanced by creating an understandable content and by enhancing the fit of the intervention to

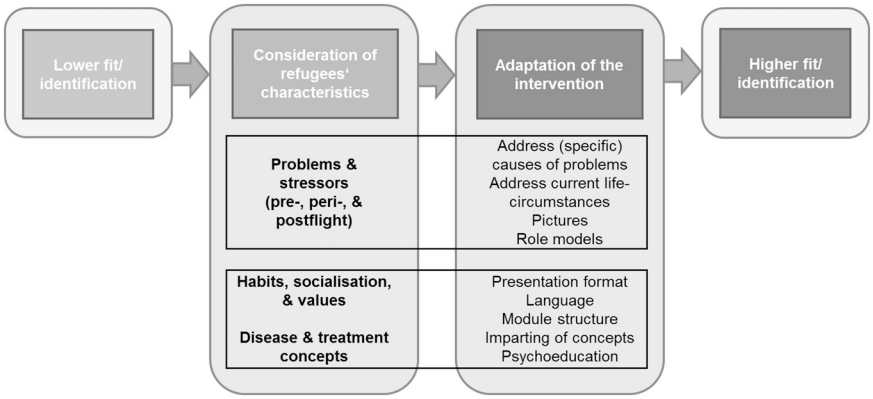

Fig. 1. A preliminary model of cultural adaptation of Internet-based interventions. The black-rimmed boxes illustrate the distinction between two categories of our recommendations: 1) adaptations that base on aspects related to the flight; 2) adaptations that base on aspects related to refugees' differing, non-western cultural backgrounds.

everyday lives (Castro et al., 2010). Such a cultural relevance seems to be necessary to initiate and pursue an intervention. Furthermore, the importance of considering specific characteristics and stressors of refugees (Dow, 2011; Kirmayer et al., 2011) as well as the centrality of acknowledging their trauma story (Hinton and Jalal, 2014; Mollica et al., 2015) in order to enhance the acceptability of the intervention (Gearing et al., 2013; Sidani et al., 2017) has, corresponding to our findings, been emphasised. This also conforms with earlier findings that Internet-based interventions should be sensitive to the respective needs of their users in order to allow for an identification with it (Gerhards et al., 2011; Johansson et al., 2015).

Originating from the named specifics of refugees and associated statements of our participants, we have several recommendations on how to adapt Internet-based interventions for refugees. Our recommendations can be divided into two categories, which is illustrated in Fig. 1: First, adaptations that base on aspects related to the flight, which are similar to aspects recommended in refugee-specific guidelines for a culturally sensitive psychotherapy (Hinton and Jalal, 2014; Mollica et al., 2015). Second, adaptations that base on aspects related to refugees' differing, non-western cultural backgrounds, which closely correspond to aspects named in general cultural adaptation frameworks, e.g., language, persons, metaphors, content, concepts, goals, methods, and context (Bernal et al., 1995). Examples corresponding to each of the following recommendations can be found in Appendix C.

Concerning the flight background, (a) specific causes of refugees' mental disorders and distress (Kirmayer et al., 2011), that is undergone traumatising experiences and associated worries (Hinton et al., 2011), should be considered in the content of the interventions, in addition to other causes. With respect to the intervention in this study, this consideration mainly affects the used methods to cope with rumination. Similar to the results of Hinton et al. (2013), we found mindfulness and acceptance exercises to be useful in the healthcare for refugees with PTSD. (b) Their current life-circumstances, that is their context, should be considered. Regarding the present intervention, this particularly concerns the sleep hygiene rules and homework (e.g., sleeping diary), which can both be used to enhance the participants' autonomy (Mollica et al., 2015). Thus, integrating the sleep hygiene rules and the homework into daily life would be an important aspect, for example by setting reminders. The specific burdens of refugees should also be taken into account (c) when using pictures and (d) when introducing role models. Concerning role models, people with similar burdens, that is with complaints of major concerns to refugees (Hinton and Jalal, 2014), should be used, though focussing on their resources and goals, as highlighted by Kizilhan (2017). Generally, a diversity approach is considered to be useful, so to use diverse persons, rituals, daily activities, etc. rather than only typical western ones (von Lersner and Kizilhan, 2017).

Concerning the non-western background, there are several recommended adaptations along with differences in socialisation and everyday habits of refugees. (e) Audio-visual elements should be preferred over text, which corresponds to earlier research (Abi Ramia et al., 2018; Arjadi et al., 2018b; Patel et al., 2017). (f) In order to make the content more understandable (Juniar et al., 2019; Salamanca-Sanabria et al., 2019), language should be held as simple as possible; metaphors and puns should not be used. (g) The modules should be kept shorter, which was previously suggested (Abi Ramia et al., 2018; Burchert et al., 2019), and (h) providing a mobile version of the intervention might be a better way to reach refugees (Juniar et al., 2019), given the high use of smartphones compared to desktop computers (Emmer et al., 2016). Furthermore, our participants considered it important (i) to promote the refugees' understanding of western disease- and treatment concepts as well as the healthcare systems, similar to previous findings (Arjadi et al., 2018b; Kizilhan, 2017). (k) This highlights the importance of psychoeducational elements and explanations of exercises and their purposes, in order to bridge diverging explanatory models and to increase the positive expectancy (Gearing et al., 2013; Hinton and Jalal, 2014) as well as trust in the programme, which is shown to be specifically difficult for refugees (Majumder et al., 2015).

In addition to the described cultural adaptation concerning the format and content of the intervention itself, an important way to reduce barriers for refugees is to address low-threshold conditions that are rather physically associated and less stigmatised (Major et al., 2017). Similar to recommendations in face-to-face approaches (Liedl et al., 2013; Windthorst et al., 2018), we focused on sleeping problems as a low-threshold and rather psychoeducational approach that are considered suitable for a stepped care approach (Espie, 2009). An intervention for sleeping problems may, in addition to its treatment elements, provide information on the general healthcare system as well as on other mental disorders associated with sleeping problems, such as PTSD, depression, or substance related disorders (Bennett-Levy et al., 2010; Bower and Gilbody, 2005).

Our study has several limitations. First, in spite of the German and English language requirements, language barriers arose during the sessions. In some parts of the intervention, the refugees needed explanations by the present researcher and, generally, the Think Aloud procedure was very demanding for them. Providing interventions translated into various languages would therefore be promising. Second, the requirement of speaking English or German on a considerably high level might have led to a selectivity in terms of the refugees' stay in Germany or their education level, as outlined by Erim and Morawa (2016). Third, the variety of the participating refugees was limited in regard to their countries of origin (focus on Arabic countries) and their gender (focus on male participants), resulting from the limited number of participating refugees and the open recruitment strategy. However, a broader sample composition was not considered as crucial due to the explorative character of this qualitative study aiming to openly explore this underserved and only sparsely investigated population. Nevertheless, this procedure challenges the principle of saturation as part of the grounded theory method, putting into question whether the targeted subject could be fully explored. Furthermore, the limited number of participants did not allow for the consideration of

diverging gender or countries of origin in the data; focusing on potential differences in required adaptations depending on participants' gender or countries could be an important future research topic. Forth, as a result of interviewing only six refugees in this study, individual opinions might have had a substantial influence in addition to culturally influenced opinions. In future studies, conducting focus groups including a greater number of refugees with diverse cultural backgrounds, for example, could help to facilitate identifying culturally influenced opinions. Nevertheless, we interviewed healthcare providers working with refugees from a great variety of home countries. Fifth, we did not explicitly collect information on potential structural barriers for refugees in terms of Internet-based interventions, such as a limited access or limited (technical) literacy (Burchert et al., 2019), which should be considered in future studies.

5. Conclusions

The aim of this study was to identify elements of an Internet-based intervention that might be worth a cultural adaptation for being suitable for refugees. We found several elements that should be culturally adapted to enhance the fit to the specific characteristics of refugees in order to facilitate the identification with the intervention. In accordance with Muñoz et al. (2018), who suggested to not tailor interventions to every specific community, it appears feasible to reach a facilitated identification, in spite of their diverse cultural backgrounds. Next steps are (a) to develop a culturally adapted version of the used intervention and to test its effectiveness in a pilot study, as suggested by Barrera and Castro (2006) and planned, for example, by Böge et al. (2019), and (b) to extend the findings of this trial towards a general model of a refugee-informed Internet-based intervention, similar to the H5 model of refugee trauma and recovery in face-to-face treatments (Lindert et al., 2016; Mollica et al., 2015). This will help to further improve the clinical impact of Internet-based interventions for people with a diverse cultural background.

Abbreviations

BAfF Bundesweite Arbeitsgemeinschaft der psychosozialen Zentren für Flüchtlinge und Folteropfer (Germany-wide association of the psychosocial centres for refugees and victims of torture)
IASC Inter-Agency Standing Committee
ITU International Telecommunication Union
PTSD Post-traumatic stress disorder
UNHCR United Nations High Commissioner for Refugees

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Authors' contributions

KS and LS initiated this study. KS, HB, JB, and LS contributed to the design of this study. DL provided the original intervention GET.ON Recovery. KS, JSS, DW, and LS adapted the intervention content. KS, JSS, and DW largely contributed to the recruitment, data collection, and analyses. DL and HB provided expertise in Internet-based interventions. JB provided expertise in the cultural field. KS wrote the draft of the manuscript. All authors contributed to the further writing of the manuscript and approved the final version of it.

Declaration of Competing Interest

Authors of the manuscript were partly involved in the development of eSano Sleep-e or its predecessor versions. DL is a stakeholder of the GET.ON Institute for Online Health Training, Hamburg, which aims to transfer scientific knowledge related to this field of research into routine mental health care in Germany. This institute is licensed to provide the original German version of the intervention from the Leuphana University, Lüneburg, as part of routine preventive services covered by health insurance companies in Germany. There are no other conflicts of interest.

Ethical standards

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

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Appendix A. Table 1. Interview guideline

After getting to know sleep-e: *Do you have any general comments?* ***In general: In your opinion: What fits and especially: what does not fit for refugees in the online intervention eSano sleep-e?*** - *Language?* - *Structure?* - *Do elements fit?* (e.g. *quiz)* - *During the think aloud, you often mentioned [...]* ➔ *In your opinion, how could that be done better/ simpler?* *In principle, is the online intervention sleep-e and the structure of the intervention compatible with refugees' lives and experiences?* *(Lifestyle: How is their day/evening/night?)*	**First question after think aloud**	What else would you like to tell? And else? And further? Do you have an example for that? In what way? Explain…

Did you notice any concepts in the intervention that you have experienced differently regarding refugees? *What's the role of sleep for those refugees you are in touch with?* *In your opinion, would refugees be open-minded towards sleep-e?* *In your opinion, how would the online intervention sleep-e be received by refugees?* *…and utilised?*	**Applicability/ implementation Regarding refugees' characteristics** ■ In general ■ Concrete	Can you specify [...] a little bit And else? You said that [...]: What in specific do you mean by that? [...] in what way? Do you have any concrete ideas/solutions for [what you have said]?	e.g. noticed that some refugees have a totally different view on sleep and a different disease concept? Differences in dealing with problems? Motivation of refugees for such an online intervention? ➔How to strengthen motivation/to make the benefits accessible? In your opinion, how could you deal with frustrations of refugees? What is a realistic amount of **time needed** for refugees? Is there a need for **guidance by trained staff**?
How do you estimate the applicability of this intervention sleep-e for refugees? *… experience/skills in Internet use of refugees?*	**Applicability Regarding context factors** ■ e-Health	And further? What in specific do you mean by that? You said that [...]: Can you specify this a little bit	Are there any problems regarding the Internet access? (Internet access, privacy, …) Maybe even experiences with Internet Interventions for refugees? Direct or indirect. Expected or possibly experienced difficulties caused by the format of Internet interventions for refugees? **➔ maybe "don'ts" or "must dos"**
Estimation and opinion regarding the Internet intervention sleep-e for refugees: *…benefits, opportunities, concerns, …* *(Fit of the Internet tool?)*	**Individual opinion & critique**		Benefits, utilities, opportunities, concerns regarding the application of sleep-e for refugees? What would such an Internet intervention for refugees improve/ change? (p.r.n. less followup disorders, less post migration risk factors, …) Do you think that an Internet-based intervention ist he right format for refugees? ➔Why?/Why not? ➔What alternatively/additionally? Do you see a need for this intervention among the refugees whom you work with? Which refugees should receive such an Internet intervention? In your opinion, for which other chronic diseases/mental disorders is there a difficult supply and an Internet intervention could be the first step in healthcare supply?
Resumé *"We talked about many interesting aspects: Once again regarding sleep-e: As to that, what are the one or two most important points for you?"*			
Did we forget anything that you would like to address? *And what would you wish us as the research team to do in the future?*	**Open question to exit**	We have talked about […]. Maybe there is something else that you would like to talk about?	

Appendix B. Table 2. Participants' quotations

Quoted statements of the think aloud sessions and the interviews conducted with the participating refugees (ref) and healthcare providers (hcp), both in the German original and their English translation. Quotations are illustrated in the order of appearance in the manuscript.

Participant	Original German quotation	English translation
1) Problems and stressors of refugees		
ref_bbb1, Syria	*unsere Probleme sind ganz anders*	*Our problems are very different*
ref_cvs7, Iraq	*jeder hat also sehr viele Probleme und nicht nur eine belastende Situation*	*Everyone has a lot of problems and not only one burdening situation*
hcp_am3	*Sind ja ganz viele diese Gedanken, die diese geflüchteten Menschen haben, die sie vom schlafen abhalten – haben mit ihrer Flucht, ihren Traumata und ihren Erlebnissen zu tun, die Angehörigen und Sicherheit*	*There are various such thoughts those refugees have that keep them from sleeping – concerning their flight, traumata, and their experiences, their family and their security*
ref_cvs7, Iraq	*Ich hatte einen Bruder […]. Also er war am Lenkrad und hat gesagt 'kannst du bitte zu diesem Laden gehen und –'wir haben was gebraucht, ich musste das kaufen. Ich bin zum Laden gegangen und – das war ein, zwei Minuten und so. Dann wurde er ermordet. Erschossen in seinem Auto und ich sehe so. Ja, also, das ist life, ja? Und schwierig, diese Dinge bleiben, ja? In Gedanken*	*I had a brother […]. Well, he was behind the steering wheel and said 'Can you please go to this shop and – 'we needed something, I had to buy it. I went to the shop and – that was a minute or two. Then he was murdered. Shot in his car and I see. Yes, well, that's life, right? And difficult, these things stay, right? In mind*
hcp_am3	*die Menschen in ihrer spezifischen Lebenssituation nicht [zu] verletzen*	*People in their specific situation not [to] offend*
ref_obi5, Algeria	*Ich habe viel Stress hier in Deutschland, deswegen ich kann nicht – dann bin ich noch illegal hier, dann ich kann nicht gut. Ich bin nicht wie, ich kann nicht sicher hierbleiben, − keine Stabilität oder so. Deswegen […] ich kann nicht gut schlafen, weil gleiche Gedanke*	*I have a lot of stress here in Germany, that's why I cannot – then, I'm also here illegally, then I cannot well. I am not, like, I cannot stay here for sure – no stability, or so. That's why […] I cannot sleep well, because same thoughts*

ref_lia2, Iran	*Wenn man starke Probleme hast – denke immer egal rauchst oder – versucht nochmal trinken, versuch bisschen Schokolade oder Snacks probieren – man muss andere Lösung zu finden*	*If you have strong problems – I think it does not matter whether smoking or – you try again to drink, you try a bit of chocolate or snacks – you have to find another solution*
ref_nfx4, Eritrea	*Ich soll meine Gedanke abschalten soll sie – nach Ihrem Befehl? Das geht gar nicht. Ich grüble jede Minute. Wenn ich grüble, Sie können mir nicht eine Ordnung geben*	*I shall turn off my thoughts, shall them – by your order? There is no way. I ruminate every minute. When I ruminate, you cannot give me an order*
hcp_aw6	*[…] man versuchen sollte, anders damit umzugehen, damit es einen nicht den ganzen Tag belastet. Also dass man nicht versucht, die Gedanken gelassen zu sehen, sondern zu sehen, wie man es einfach ein bisschen umformuliert, wie man besser im Alltag leben kann, oder einen besseren Alltag für sich hat, trotz solcher großen Probleme*	*[…] one should try to find another way to come along with it so that it does not strain one all day long. Well, one would not try to see their thoughts calmly, but to find a way to simply reformulate them, to live their everyday life a little better, or to have a better everyday life despite such big problems*
ref_nfx4, Eritrea	*Die Gedanken sind frei in dem Moment, schön ist es. […] Es ist leider zu kurz*	*The thoughts are free in that moment, beautiful it is […]. Unfortunately, it is too short*
hcp_cw2	*Vermitteln vom Zugang zum eigenen Körper […]. Über Fühlen, über Techniken, die ich jetzt nicht auf Lager habe um da eine Entspannung von innen raus auch zu schaffen […]. Das sich auf was konzentrieren, was nicht direkt mit Schlaf zu tun hat, weil nichts ist schlimmer als wenn man so im Bett liegt und sagt ‚ich will jetzt schlafen'*	*Facilitating the access to the own body […]. Tactually, with techniques that I don't have in stock, in order to create a relaxation also from within […]. To concentrate on something that is not directly connected with sleep, because nothing is worse than when you lay in your bed and you say 'Now I want to sleep'*
ref_cvs7, Iraq	*Die haben doch kein Schlafzimmer. […] Ja also eine vierköpfige Familie haben ein Zimmer zum Beispiel*	*After all, they do not have a bedroom. […] Well, a four-person family has one room, for example*
hcp_am3	*Das ist in […] ein Bild, das man sicherlich weglassen sollte; also, die haben zu Booten einen ganz anderen Bezug*	*This is […] a picture that you should certainly exclude; well, they bear a very different reference to boats*
hcp_mw5	*nicht nur Weiße und nicht so typisch deutsche Probleme, Lehrer, Krankenpflegerin, sondern eben in dem Fall auch, zum Beispiel, ein Problem von jemand, der geflüchtet ist, also zum Beispiel, 'ich muss immer an den Krieg denken oder an die Flucht, oder ob meine Familie noch in dem Land am Leben ist oder wie es denen geht'*	*Not only white and not such typical German problems, teacher, nurse, but in this case also, for example, a problem of a person who fled, well, for example, 'I cannot stop thinking about the war or about the flight, or whether my family in my country is still alive, or how they are'*
2) Everyday habits, socialisation, and values of refugees		
hcp_cw2	*begleitet von einem ewig rauschendem Fernseher*	*Accompanied by a constantly noisy television*
ref_cvs7, Iraq	*Aber steht nicht also mit Smartphone [in der Intervention], die ganze Nacht durch – also spielen*	*[The intervention] does not say anything about smartphones, all night long – well, they play*
ref_nfx4, Eritrea	*in unsere Kultur, in jede Haushalt gibt kein Wecker, kein Uhr – nicht unbedingt*	*In our culture, there is no clock in every household – not necessarily*
hcp_hm1	*Tagesstruktur, dass man Pläne hat, dass man ein Kalender hat – das ist eigentlich etwas Westliches*	*Daily structure, that you have plans, that you have a calendar – that is actually something western*
ref_cvs7, Iraq	*Ich glaube nicht, dass die Flüchtlinge sich [an das Tagebuch] einhalten können, also das ist für Deutschen gemacht*	*I do not think that refugees can do [the diary], well, it is made for Germans*
ref_cvs7, Iraq	*besonders die aus Syrien kommen, acht Jahre Krieg und eine ganze Generation, die nicht schreiben und lesen können dort*	*Especially among Syrians, eight years of war, and there is a whole generation that cannot read and write*
ref_lia2, Iran	*Bilder, viel Bilder. Und nicht so viel lesen*	*pictures, many pictures. And not so much reading*
ref_lia2, Iran	*sie haben keine Lust zum Lesen*	*They are not in the mood for reading*
hcp_am3	*man muss die Begriffe in der jeweiligen Sprache entakademisieren*	*One has to de-academise the terms in the respective language*
hcp_aw6	*alles kürzer und knapper […] und zeitlich auch reduziert*	*everything shorter and more compact […] and also reduced in time*
hcp_aw6	*eins oder zwei sind drin und mehr würde ich auch auf keinen Fall machen, weil das ist dann gleich so wie auch ein Druck […]. Und also man möchte ja alles was man drin hat soll ja eher motivieren weiter zu machen und nicht demotivieren*	*There are one or two [quizzes] and I would certainly not do more, because that's also like a pressure […]. And, well, you want everything that's in there rather to motivate to continue and not to demotivate*
ref_lia2, Iran	*Sie fragt, dann ich gebe meine Meinung. Aber hier steht ‚Das ist leider falsch'*	*She asks, then I give my opinion. But here it says 'Unfortunately, this is wrong'*
hcp_cw2	*Da ist mehr ein Familiendenken, ein Klandenken, ein Verantwortlichsein für andere und weniger nur für sich selber*	*There is more of a family-thinking, a clan-thinking, a being responsible for others and less for myself*
3) Disease and treatment concepts of refugees		
ref_cvs7, Iraq	*Geflüchtete wissen [weder] vieles über diese Dinge [d.h. psychische Probleme]*	*Refugees [neither] know a lot about these things [*i.e. *mental health problems]*
ref_cvs7, Iraq	*Das sagen die [psychisch kranken Menschen] nicht. Weil das ein Tabu ist – also wie die Öffentlichkeit und Verwandten und Freunde darauf reagieren also, dass jemand als psychische krank […]. Das ist bisschen schwierig und nicht mehr ernst – wird nicht ernstgenommen*	*[Mentally ill people] do not say anything. Because it is a taboo – well, how the publicity and family and friends react to it, well, that someone is mentally ill […]. That is somewhat difficult and not serious anymore – not been taken seriously*
hcp_hm1	*Körper und Geist sind eng verbunden*	*Body and soul are closely related*
ref_nfx4, Eritrea	*noch nie Erfahren mit Ärzte haben, Psychologen, dergleichen oder Psychiater, oder Neurologen*	*never had experience with doctors, Psychologists, psychiatrists, or neurologists*
hcp_sw4	*dann nimmt man halt eher Medikamente ein. […] Also wirklich, das ist echt krass, also ich kam selten mit Ibuprufen so arg in Kontakt, wie jetzt bei meiner Arbeit seit einem Jahr, ja*	*Then they rather take medication. […] Well, really, it really is crazy, well, I rarely came in contact with Ibuprofen as much as I do now in my job since one year, yes*
hcp_sw4	*Wenn man Dinge erklärt, ins Detail geht, dann wird ein Verständnis dafür entwickelt und dann wird es auch umgesetzt*	*When you explain things, [when you] go into detail, then an understanding of it will be developed and then it will be realised, too*
ref_nfx4, Eritrea	*Die [Schlafhygieneregeln] haben wir auf jeden Fall, die möchten wir beibehalten, die sind sehr wichtig, die sind sehr toll*	*They [the sleep hygiene rules] we have in any case, we want to keep them, they are very important, they are really great*

Notes. Italicised paragraphs are quotations.

Appendix C. Table 3. Recommendations for cultural adaptation

Recommendations of how to adapt Internet-based interventions for refugees and corresponding examples/explanations, based on conducted interviews with refugees and healthcare providers regarding an Internet-based intervention for sleeping problems.

Element of the intervention	Non-adapted version	Adapted version
(a) Causes of mental illness e.g., rumination exercises	***An appointment with rumination*** *Does bedtime signify the first quiet moment of the day, in which you ruminate about quite everything? Or does constant rumination disturb you during the day in a way that it is hard to concentrate on anything else? With the exercise „Appointment with rumination", you can make provisions. To consciously open up to thoughts and to "sit down at a table" with them may reduce and alleviate rumination.*	Erase similar exercises; enlarge the number of imagination exercises.
(b) Current life-circumstances e.g., sleep hygiene rules	*My bedroom invites me to lay down (a pleasant temperature, light, sounds, the desk is not in sight,* etc.*).*	*I prepare my room in a way that signalises it is bedtime.*
(c) Pictures		
(d) Role models	**Get to know Frank (41), secondary school teacher** *I am Frank, 41, I am married and I have two children.* *I am a secondary school teacher for chemistry and math and am currently teaching in grade 9. I signed up for this programme because my work related strain has increased over the past years, or I have become less resistant.* *Sometimes the days rush by so fast that I do not even notice. And after two weeks, I think: Where did the last two weeks go? I have not consciously taken the time to breathe and distress for ages and I would like to change that now. I would like to recover consciously, and to decelerate my life in general.*	**Get to know John (41)** *I am John, 41, I am married, and I have three children. I am from western Africa. When I came to Germany about 15 months ago, my family and I had to sleep in one room in a refugee accommodation. It was very noisy at night, and I had to sleep on the floor. Often, I could not fall asleep for hours, which is why I signed up for this programme.*
(e) Audio-visual elements	Explanations and introductions mainly in text-format.	Use videos/audios to introduce and explain exercises.
(f) Simple language, no metaphors	*They activate the sympathetic nervous system.*	*They have an activating effect.*
(g) Shorter modules	Three modules, appr. 60 min each.	Spread the content in a greater number of more compact and shorter modules.
(h) Mobile version	Computer-based format.	Mobile-based format that can be used of refugees without the access to computers.
(i) Imparting of western disease-/treatment concepts		*There are several causes of sleeping problems. In [Germany], there are several possibilities to find help for such problems, which you can see in the following. Maybe you would like to try one of these possibilities.*
(j) Psychoeducation		Explain the purposes of exercises, and why doing them can help. Give an idea of actively approaching problems.

Notes. Italicised paragraphs are elements of the Internet-based intervention.

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