Digital Health Intervention to Support Refugees in Switzerland

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Abstract. Experiences of war and persecution often lead to mental health problems, resulting in post-traumatic stress disorders. In this work, we design a digital platform that aims at helping refugees coming to Switzerland by providing exercises for their mental health and information about daily life in Switzerland. In collaboration with the Swiss Red Cross (SRC), we collected requirements and developed a concept for information provision through in this platform. The architecture of a progressive web application (PWA) was identified as to best fulfill the given requirements. Based on the collected requirements mockups were created. In user interviews, we received feedback regarding the future system. We learned that the platform should include an avatar, which guides the user through the entire platform and asks questions. All texts should be accessible by a read-aloud function and exercises should be provided as videos. In summary, we learned that it is essential to involve the future user group in the development process since it is characterized by cultural diversity that has to be considered in the development and design. Enriched by this input, the next step is to realize the application in terms of a prototype.

Keywords. Mental health, mHealth, Progressive web application, Refugees mental health, Mental health care seekers

1. Introduction

In 2019, more than 79.5 million people worldwide were forced to flee their homes in the context of war and persecution [1]. The hardships experienced by those who flee their homes, both before and after, often lead to trauma-related disorders. These include post-traumatic stress disorder, depression, anxiety, and other psychosomatic symptoms [2]. In the incoming country, there is often a lack of adequate psychological services for these people. This leads to a reduced quality of life for those affected and a more difficult social and economic integration. Mental disorders among refugees and asylum seekers occur significantly more often than in the general population. Effective treatment options and cross-cultural, specialized treatment centers exist [7]. However, they tend to be overloaded by their target populations. General outpatient primary health care providers might be able to compensate for the lack of specialized treatment slots, but a study shows that barriers such as lack of funding of interpreters seem to hinder these providers [7].

In addition to the great personal suffering, there is also economic and social damage. This can be significantly reduced by early interventions [3]. The existing approaches to

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address these issues do not allow to support all affected individuals sufficiently due to the lack of resources. Therefore, new and innovative ways are required, for example by using digital psychological and psychosocial support. Nowadays, the smartphone serves as an indispensable tool that fulfills the needs for information provision, orientation, communication, and social contacts during and after the escape from the home country. Andersson et al. show in a review paper that psychosocial care via a digital channel has a promising effect [4]. Several mindfulness and meditation apps (e.g. MindSpace https://www.headspace.com/de) or even systems for online psychotherapy are available (MindDoc, https://www.minddoc.de). Besides the online psychotherapy, the MindDoc app offers exercises and an emotion diary. However, these approaches do not address the specific needs of refugees.

Step-by-Step [9] is a digital health intervention designed for refugees and migrants. It is built on evidence-based cognitive behavioral therapy (CBT) techniques: i) stress management, ii) behavioral activation, iii) positive self-talk, iv) promotion of social support, and v) relapse prevention. Fictional characters tell their story of how they overcame psychological distress. An illustrated doctor provides psychoeducation and introduces the interactive exercises, e.g., a breathing exercise (audio) or planning positive activities using input fields and a calendar [9]. This digital health intervention only addresses the mental health issue, but is not expected to additionally support the process of integration in the new country.

In this work, we aim at designing an internet-based platform that will support refugees in both, in psychological issues and in general questions about integration. It is still unclear which functionalities such an application should provide and which design issues have to be considered. In this work, we will collect requirements towards such application in collaboration with the Swiss Red Cross (SRC). We will generate design examples in form of mockups and collect feedback from refugees. The overall objective behind this effort is to develop in a next step such application achieving excellent user experience.

2. Methods

Requirements regarding the platform were collected in discussions with employees of the Swiss Red Cross (SRC) that are normally concerned by supporting refugees. Based on these requirements a mockup was created using Microsoft Powerpoint. Additionally, we considered best practices reported in literature [11-16]. Required images were selected from Freepik [5]. We also identified a system architecture that fits best with the collected requirements. Following human-centered design principles, interviews with five refugees from Syria were conducted to evaluate the mockup. The aim was to get their feedback on different design types of the mockup and the planned application in general. We conducted the interviews as A/B test, which is a simple controlled experiment. Two versions of the mockup (A and B) are compared. A/B tests are widely considered the simplest form of controlled experiment. They are useful for understanding user engagement and satisfaction regarding features.

Since this study was performed during the COVID-19 pandemic and physical meetings were impossible, interviews were conducted via Skype or Microsoft Teams. Interview partner (5 refugees from Syria that were already living in Switzerland for some time) were confronted with different variants of the mockup and they were asked to

decide and justify, which variant they prefer. Additionally, they were asked to provide their personal ideas.

3. Results

In this section, we summarize the collected requirements and provide an overview on the system architecture and mockup designs. Furthermore, results from the mockup testing are described.

3.1. Requirements

We identified basically 5 main requirements regarding platform functionalities and characteristics in our interviews.

- *Audiovisual presentation of the contents*: Content such as exercises targeting mental health should be presented in an audiovisual manner. It should be examined which form of presentation is best suited for this purpose.
- *Two types of content:* The platform should offer general information on integration of refugees as well as psychological support.
- *Logging status of a user:* A status log is needed to enable a user to continue where he left off when he uses the platform again.
- *Motivation*: The platform should motivate the user to come back and use it regularly.
- *Accessibility for people with low reading skills*: The content of the platform should also be accessible to people with low reading skills.

The application should be accessible by refugees anytime and anywhere via smartphone to provide information and psychological and psychosocial support in a digital manner. The digital health intervention will comprise different modules through which refugees will get support as needed.

3.2. Mockup

In the following, we are describing the different parts of the mockup that form the basis of the user interviews. The application is equipped with an avatar that can be selected by the user when launching the application for the first time. The avatar will guide him through the platform as seen in Figure 1. Additionally, the application provides information regarding integration as content. We created different versions for avatars and content presentations that were assessed by potential future users.

The mockup in Figure 1 shows three different versions of an avatar to find whether the target group is more attracted by avatars depicted as humans, by animals or by personified animals.
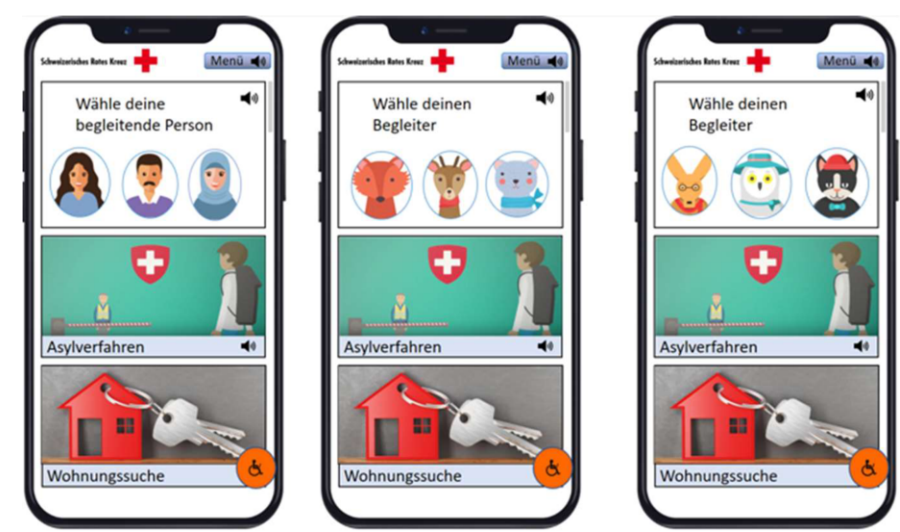
Figure 1 Mockup representing the different avatars.

Figure 2 shows different forms of content presentation. In the mockup, an example exercise provided by the SRC is used to test which way of presenting such content is most appealing to the potential user. There are three options to choose from: Text, audio file or video. Given these options, the requirement "audiovisual presentation of the contents" is considered. In addition, all texts, such as the statements of the avatar, have small loudspeakers that contain a read-aloud function.

Figure 2. Mockup representing different forms of representation of psychological exercises.

According to the requirements, the content of the platform should be accessible and understandable by persons with reduced reading skills. To address this requirement, we integrated the EqualWeb accessibility tool into the mockup. It is accessible by clicking on the wheelchair icon (see Fig. 2). The user interviews will show whether such tool is useful without explanation and introduction how to use it.

3.3. Feedback on the mockups

When selecting the avatar, the interviewees found it positive that the avatars depicted as human beings offer the option of a woman with or without a headscarf. Nevertheless, there were two interviewees who wished for an even broader spectrum regarding the appearance of the avatar. Icons of human beings were perceived as more serious than those of animals. In the case of the animal avatars, there was criticism that this could appear too childish and that users could feel that they were not being taken seriously. Nevertheless, two interviewees found the animals amusing and claimed they would like to choose an animal as avatar.

The fact that the avatar asks if it can address questions to the user was found to be sympathetic. All five interviewees were motivated to continue after an introduction dialog. Opinions were divided on the type of questions. Three persons prefer short and concise questions; the others stated to prefer longer sentences in which the avatar shows his understanding and tells something about himself.

In the case of accessibility, the orange button with the wheelchair pictogram was not entirely understood. One person even felt that such a button was unnecessary, since it would remind people of deficits, for example if they cannot read. In his opinion, the help should be built much more directly into the platform, as it was already done in the mockups with the speaker button indicating the read aloud function for each text.

In part, the functions of the accessibility tool were unclear. One person felt that it is necessary to be able to read Arabic very well to understand the functions. The option to choose the color of the background and the caption was positively evaluated by two people, as they would personally like to use it.

Four of the five interviewees would rather search for information in the beginning, when they were new to Switzerland, and later, when they were already settled, they would use the psychological support on the platform.

All interviewees would prefer to do exercises supported by a video, as they find that most exciting. One person would also use the text describing the exercise, depending on the situation, as they can get distracted by reading. Exercises provided only by audio was considered too boring by all interviewees.

3.4. System architecture

We decided to develop the application as progressive web application (PWA) since it corresponds to the ideas of the SRC and well addresses the requirements. A PWA supports offline mode, can display the content and save user data without internet connection. Furthermore, a PWA has a better performance than a common web application and therefore the loading time is short even with a slow internet connection. It can also send push notifications to the user to attract his attention to newly added content. However, the disadvantage of a PWA is that its functionalities depend on the browser and the operating system. Push notifications are for example currently unavailable for iOS systems [6].

A PWA comprises 4 main components:

- Web App Manifest: Allows the PWA to be added to the home screen and behave like a native application. The manifest contains data such as the name of the application, icons or default language.
- Application Shell: Is the so-called "skeleton" of the application. It is the part that does not have to be reloaded or, in other words, it displays the minimum required content that should be shown immediately when the application is started. The application shell contains only static content. As soon as this is shown, the dynamic content can be loaded. This component is not absolutely necessary for the implementation of a PWA, but it shortens the loading times. The prerequisite is that static and dynamic data are clearly separated in the application.
- IndexedDB: Is a JavaScript-based object-oriented database for structured data. Data that is needed for offline use is stored in this database as objects. However, large files such as videos are problematic to store. Not all platforms support the storage of video data objects. In addition, large files have an impact on the performance of the application that should not be underestimated.
- Service Worker: Is an intermediary between the application and the internet. The main task of the Service Worker is to use the browser API to preload content and display it to the user. It runs under a separate browser thread and enables additional functions that are normally known in native applications. This refers to functions such as push notifications, the offline function and caching of data.

4. Discussion

The characteristics of a PWA best meet the SRC's requirements for realizing the platform for refugees. Above all, offline operation is an important feature since refugees do not have a continuous internet connection. When implementing the PWA, it is important to ensure that only features that are supported by all browsers, or at least the most common browsers, are implemented. Another difficulty is the offline support for videos, since videos contain large amounts of data that can overload the storage capacity and slow down the application.

The interviews with the refugees from Syria showed that for such a project a close cooperation with the people concerned, i.e., the future users of the platform, is of great importance. A similar conclusion was drawn by Goodman et al. They collaborated with refugee populations, placed them at the center of the design process for digital mental health interventions, and in this way developed the most useful tools for this target group [8].

In the interviews with the participants, it became clear that addressing different cultures can be challenging. This was especially an issue in the selection of the avatar. It is essential to select an avatar as guide through the app that appeals to a large group of people, regardless of their cultural background. Offering a selection of personified avatars and animal avatars would probably be the solution that would pick up the most users. Cultural diversity of refugees impact also on what kind of support is needed and in which way the support can be provided best. This will impact on the design of digital

health interventions targeting this particular user group [8]. For this reason, there are first attempts to consider cultural diversity in digital health interventions [10].

Providing a platform that offers digital support to refugees in Switzerland has great potential. The interviews showed that the refugees are very interested and are always available for further interviews or usability tests. Furthermore, the feedback has shown that they are more motivated to obtain information and perform mental health exercises with this solution than if this only happens by means of text on paper. We developed our app designs by user-centered design, i.e. involving the user group in the development process. Similar developments confirmed that user-centered design is useful when developing applications for this particular user group [17].

It should be noted, however, that the people interviewed do not belong to the actual target group, as they have already been in Switzerland for a longer period and have already found an apartment and a job. Even if this does not rule out psychological problems, they have a certain stability in life that could have an influence on the assessment of the app. Whether refugees who have just arrived in Switzerland are just as responsive to it cannot be confirmed with certainty after these tests. Nevertheless, the people interviewed are very close to the target group and provided very helpful feedback.

5. Conclusion

In this paper, we described the design of an internet-based platform for refugees that provides support in psychological issues and in general questions about integration. We learned that adaptability is required in such application; interactive elements such as a guided interaction by an avatar or provision of video content helps in increasing user experience. Complexity of language should be adaptable as well. Since migration and integration of refugees is a time-consuming process, a digital intervention should provide support depending on the individual situation of the refugee or migrant.

In a next step, we will develop a prototype of the application, again in collaboration with the SRC and refugees to ensure that the application is useful and useable for the target user group.

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