



## User experience research in the development of digital health products: Research letter

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### ABSTRACT

**Background:** Digital health solutions are facing an increasing impact on healthcare. The current scientific focus is mainly set on clinical studies providing efficacy for different indications. In contrast to pharmaceutical therapy, user experience plays a major role in digital health. However, fundamental scientific knowledge about patient engagement, adoption and qualitative user experience of digital health solutions is missing.

**Objective:** To perform user experience design research for the development of a disease management platform for fibromyalgia-like post-COVID19 syndrome. To discuss relevant user experience and its current status in digital health products development.

**Methods:** A literature review on PubMed and interviews with digital health stakeholders were performed. German registered digital health applications (DiGAs) for musculoskeletal indications were reviewed in terms of front-end design and navigation. An online user experience design survey about Patient Reported Outcomes (PROs) collection was sent to patients from a Swiss post-COVID19 patient association.

**Results:** The literature documenting patient experience aspects in digital health is poor despite all stakeholders agreed on its importance, potentially also influencing efficacy of the therapies. Currently available DiGAs have a heterogeneous front-end design without clear user interface design or navigation strategy, respectively. Patient online surveys have shown to be easily feasible and effective tools for qualitative user experience research. Basic user experience research provided helpful guidelines for choices in design features for the purpose of the development of a digital health product.

**Conclusions:** User experience research as a tool in the patient-centric development of a digital health product provides valuable data. This data has the potential to help increase adoption and efficacy of the product. Further research studies are needed to clarify the role of user experience in digital therapies.

### Introduction

#### *The challenge of adoption in digital health products development*

Digital health solutions are an emerging and promising type of care delivery. It could potentially change the spectrum of chronic diseases healthcare [1]. On one side, solutions that have proven efficacy are being regulated. More of these tools are being developed thanks to changing legislations, for example in Germany [2].

On the other side, there is a plethora of non-regulated health applications available. Nevertheless, the adoption of these solutions by patients and clinicians remains limited. This is mainly due to difficulties in distinguishing validated therapies from lifestyle solutions and the misperception of the therapeutic value [3]. Therefore, the adoption of

digital health solutions has become a major challenge for developers.

#### *User experience*

User experience research aims to continuously improve the usability and ergonomics of a product. These parameters are assessed either in a qualitative or quantitative way. Those are key indicators for usability, satisfaction and adoption of a product [4]. To ensure products with greater adoption and a patient-centric design, the developers of digital health solutions should focus more on the interaction of the end-user with the device or software.

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### Patient-centric development to overcome adoption barriers

While the focus in digital health products development is usually set on the assessment of the therapeutic value through clinical studies or randomized control trials, there are very few efforts made to improve patient's engagement. However, incorporating end-user feedback and considerations throughout the development process can lead to increased adoption and success of the final product [5].

While traditional medication is often not sufficient for chronic disease patients, digital health solutions are very promising. Moreover, they have the potential to empower the patients and involve them in the therapeutic process. However, in chronic conditions like rheumatoid arthritis, adherence to treatment is a major issue, even with traditional medication. Studies showed that barriers to adherence were mostly fear of side effects, misperception of therapeutic value, forgetfulness, costs and poor patient-physician interaction [6]. To overcome these barriers and reach promising patient engagement levels, user experience should be investigated. Furthermore, empowering features like educational and interactive content should be tested and implemented in order to maintain the engagement of the patients.

Patients' adherence to treatment is already a serious issue with pills. This makes the challenge even more demanding for digital therapies, since they require greater efforts from the patients compared to traditional therapeutics. No matter how effective a treatment is, it can be useless, if patients do not take the task seriously. It is therefore essential to investigate the behavior of target patients and involve them during the development of digital health products. Digital health solutions certainly have immense potential in all medical fields, and to make the most of this potential and optimize the therapeutic impact, user experience research is key.

In this perspective, this letter documents the collection and interpretation of patients' preference data guiding the development of a platform for the management of the fibromyalgia-like post-COVID19 syndrome [7].

### Aim

In order to guide the development of a self-management platform for the fibromyalgia-like post-COVID19 syndrome in a patient-centric way, we will perform user experience research, in particular by collecting patient preference data.

### Methods

The combination of a literature research, interviews with digital health stakeholders, a patient preference survey made among post-COVID19 patients and an analysis of the design features of four existing digital health products has been made to identify guidelines for the development of the platform.

#### Literature research

PubMed literature research has been made among articles documenting user experience in digital health products development [8].

#### Online user experience survey

An online survey with 10 user experience related questions has been set up and sent to participants among post-COVID19 syndrome patients from Lausanne University Hospital and a Swiss post-COVID19 syndrome patient association (Long Covid Schweiz [9]). 51 answers have been collected during April 2022.

#### DiGAs' user experience features analysis

A screening has been made among the registered DiGAs (see DiGAs

**Table 1**

Selected DiGAs with musculoskeletal disease indication.

DiGA name	Therapeutic scope
Companion Patella [10]	Knee and patella pain
Mawendo [11]	Post-operative rehabilitation
HelloBetter [12]	Chronic pain
Vivira [13]	Back pain

**Table 2**

User experience design features of existing DiGAs with musculoskeletal indications.

DiGA	App type	Interaction	Navigation menu
Companion Patella	Web	Chatbot	Training, Training Statistics, Library
Mawendo	Web	Chatbot	Overview, Disease Profile, Therapeutic Program, Exercises
HelloBetter	Web	Onboarding redirection to appropriate program	Home, Training, Progress, Profile
Vivira	Mobile	Feedback system after each exercise	Today, Activity, Progress, Profile

register: <https://diga.bfarm.de/de/verzeichnis>) to identify 4 of them which are of interest for musculoskeletal diseases care (Table 1). Mockups from their web landing pages have been analyzed.

### Results

#### Literature research

There are still few articles documenting user experience approaches for the development of digital health products. However, more and more of them are appearing and the need for patient-centric approaches is increasingly mentioned in recent literature [14–16].

#### Online user experience survey: patient reported outcomes

Participants were asked about the PROs design they would prefer between a symptoms list with intensity scales from 1 to 10 or a chatbot asking for the symptoms (Fig. 2). 46 out of 51 (90.2%) post-COVID19 syndrome patients who answered the survey found that the symptoms list (Fig. 2, A) was more appropriate according to their conditions.

When asked about the number of symptoms-related questions they would like to answer on a regular basis, 70% of the participants answered "between 5 and 10", 28% "more than 10" and 2% "less than 5".

#### DiGAs' user experience design features

User experience design features such as the type of application, the way the system interacts with the patients and the navigation menu composition are shown in Table 2.

While Companion Patella has a much simpler interface compared to the others, only Vivira is a mobile based application. Half of the apps uses a chatbot to collect data from the patients, and the other half uses questionnaires. Each app has its own way to interact with users, no standardized navigation aspects have been observed.

### Discussion

Based on the literature research, user experience aspects seem to be often neglected in literature documenting the development of digital health products. However, stakeholders all seem to agree that user experience is key for a patient-centric development. The lack of

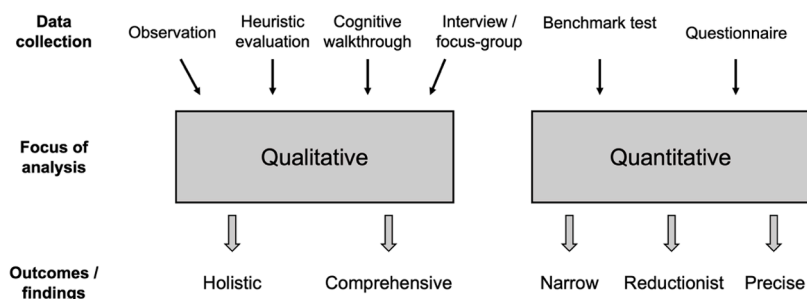


Fig. 1. Overview of user experience analysis [4].

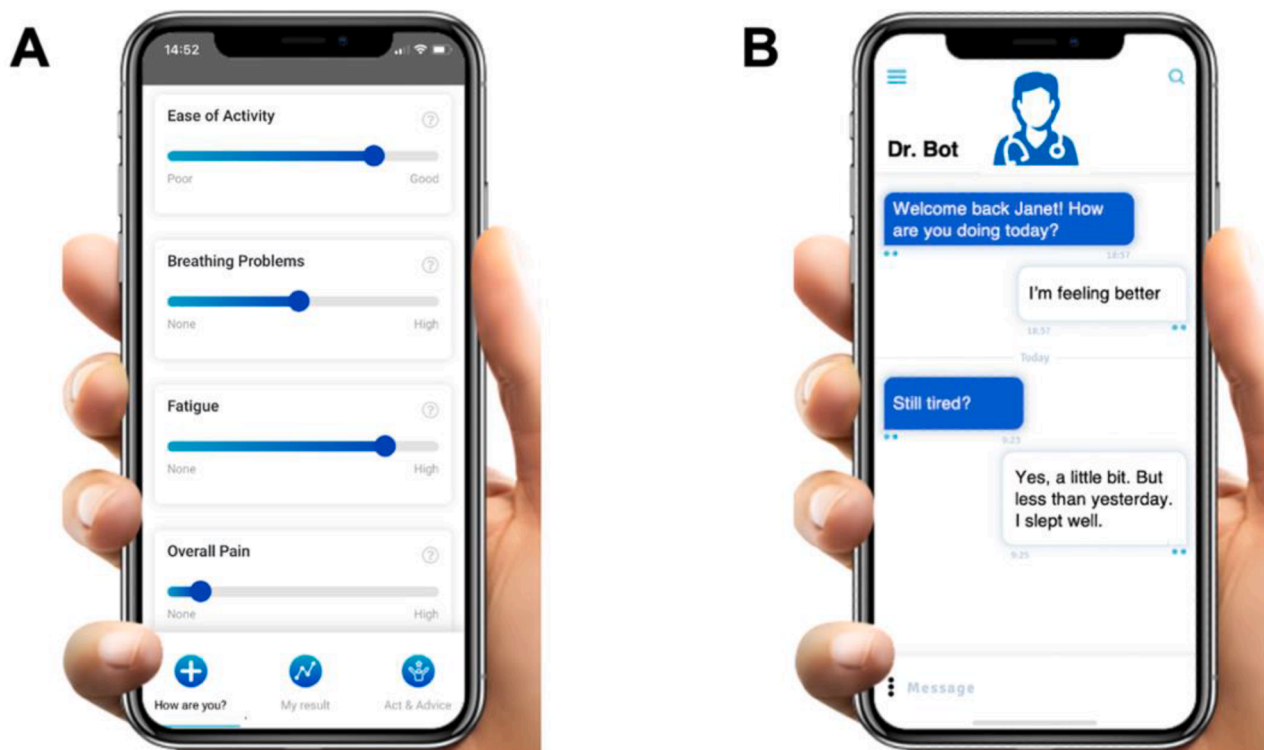


Fig. 2. PROs proposed designs. A: Symptoms list with sliders and intensity scales from 1 to 10. B: Virtual chatbot regularly asking the user for symptoms entry through text.

knowledge and data in this field is one of the main barriers in digital health products adoption.

Our experiments showed that very basic user experience research and observations allow the identification of useful guidelines for the development of a digital health product, such as the way to collect data (Fig. 2) or the navigation and interaction options to integrate (Table 2).

The PROs design results strongly suggest that a symptoms list design with 5 to 10 questions to answer on a regular basis is optimal for post-COVID19 syndrome patients. Moreover, a feature allowing users to answer more questions could be considered since almost one third of the participants would answer more than 10 questions.

Observations made from existing DiGAs should be considered and the analysis of features and usability could be extended by subscribing to the programs and accessing the full product. The heterogeneity observed in the designs supports the observations made in the literature about the lack of standards in the development approaches (Table 2).

The results provided here are parts of an ongoing user experience study and are very limited in terms of number of participants, but are still interesting indicators that should be considered for further investigations, like user satisfaction and usability tests or focus groups

interviews. For the purpose of the fibromyalgia-like post-COVID19 syndrome platform development, further user experience analyses are ongoing and an upcoming scientific publication is planned.

**Conclusion**

User experience considerations, which are key in the development of digital health products to improve adoption, are still usually neglected. Literature lacks data about patient preference in this field, and therefore, there is a lack of standard approaches for patient-centric design development.

Very basic research like surveying patients and reviewing existing products can provide relevant and useful guidelines for the patient-centric development of a digital health product. Encouragingly, methods actively involving patient preference during this process are increasingly studied and documented [14,15]. Since patient adherence to treatment is central in chronic diseases care, these patient experience studies and collected data are essential for the adoption and success of future digital health solutions (Fig. 1).

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**Ethical approval**

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**Patient consent**

Not required

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**Declaration Competing Interest**

None declared

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