



Mobile Application Therapy Support for Psychological Disorders: Chances and Challenges

Masterarbeit

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1. Introduction

1.1 Motivation and Relevance

Mental disorders belong to the most common diseases worldwide. In 2019, one in eight people was affected by a mental illness (cf. WHO 2022c: 37). Thereby, the most common mental disorders are depression and anxiety disorders (cf. *ibid.*: 40). Moreover, an immense increase in the prevalence of mental disorders can be observed in recent years (cf. WHO 2022b: 1). On top there is the fact that especially as a result of cardiac diseases, mental disorders like depression, anxiety, adjustment, and panic disorders arise (cf. Olsson et al. 2021: 1-9). According to a study, 28.4% of patients with cardiological diseases in an emergency department in Berlin developed psychological problems (cf. Figura et al. 2021: 1262). A study conducted by the Hannover Medical School (MHH) shows that more than one-third of patients diagnosed with Pulmonary Arterial Hypertension (PAH) also had psychological problems such as depression or panic disorder (cf. Olsson et al. 2021: 3). Due to the additional psychological burden, the quality of life (QoL) of cardiac patients significantly worsens (cf. *ibid.*: 5-6). Mental and cardiovascular diseases are two of the three most common disorders leading to "burden of disease" (cf. WHO 2019: 2), which is an extremely stressful situation for both the affected patients and their relatives (cf. Müller-Rörich et al. 2007: 164). Studies indicate that the risk of mortality is higher (2.25 times) in cardiac patients with mental disorders, like depression (cf. Meijer et al. 2011: 214).

These facts illustrate how urgent the need for providing treatments for these diseases is. Above all, it is important to intervene before mental disorders develop and worsen. However, the treatment rate is low. One reason for this is the rejection of mental health treatment due to the increasing stigmatization of mental disorders and their treatments (cf. Martinengo et al. 2022: 2). Moreover, treatments cannot be offered for all patients because of the low capacity of clinics and hospitals. Although medical care is comparatively better provided in Europe, there are about 50 medical personnel available for 100,000 inhabitants (cf. WHO 2019: 3). Due to a lack of time and personnel, doctors do not have enough time for patients. Consequently, long waiting times result. In Germany, patients have to wait approximately 5.7 weeks to get a consultation appointment (cf. DGPPN 2022: 2). For therapy appointments, this time takes around 19.9 weeks (cf. BPtK 2018). Additionally, mental disorders are often chronic and treatments are associated with high costs (cf. König/Friemel 2006: 55). Nevertheless, is there a way to make therapy accessible to all patients in order to improve their mental situation? The digitalization of a therapy which has proven itself in face-to-face treatment, can be a way out and offer a solution.

1.2 Aim and Structure of the Thesis

For the purpose of filling this research gap, the web app "LeA"¹ is developed. The global use of mobile applications is increasing (cf. Jia et al. 2018: 92), so mobile apps can help patients to receive and accept a treatment (cf. Wu et al. 2022: 1). Patients can integrate the therapy contents into their daily lives by using LeA. They can perform exercises through this training app to improve their mental state and well-being. By facilitating access to the treatment, the treatment rate can be increased as well. But developing an app that has outstanding efficiency and effectiveness is fraught with difficulties and challenges. There are many mobile applications for therapy support of mental disorders, but the quality and effectiveness are not sufficiently confirmed. Multiple studies show that many mental health apps include problems that interfere with the continuous use of the app, which can be seen especially in the high dropout (attrition) rates (cf. Balaskas et al. 2021: 2). Thus, it becomes imperative to develop a mobile app which contains evidence-based content and is effective.

For this reason, an existing treatment currently used at MHH is digitalized. This treatment is based on Metacognitive Therapy (MCT) according to Wells. In this thesis, the whole process from the requirements analysis and the development of a tool to the applicability check (which includes a testing by healthy probands) is explained in detail. Methodologically, the approach of Action Design Research (ADR) is used. ADR is a scientifically based approach whose goal is besides the development of an artefact a problem solution (cf. Sein et al. 2011: 40). In total, the alpha version of LeA is tested by 20 probands (n = 20). Ten of the testers have prior technical knowledge and five have medical knowledge. Among them, there is an expert (software developer). Thus, the goal of this paper is to derive findings and conclusions from the development and evaluation process. The evaluation results are intended for the assessment of LeA and can later be used for the further development of LeA and enable the identification of important theses concerning quality and effectiveness. Moreover, the functions and requirements which need to be present as well as special aspects which need to be taken into account in order to ensure efficient and continuous use are identified. The identified success factors, chances, problems and challenges from the literature reviews, the app development and applicability check can be reference points for the development of further mobile applications for therapy support in case of mental health problems. Furthermore, the generalization of the findings can contribute to their success. The approach and recommendations can be used as a "best practice". At this point, the research questions of this thesis are as followed:

¹ Acronym for "Learn Attention"

RQ1: How can mobile applications support therapies for psychological disorders?

RQ2: How can these mobile applications be developed on the basis of the requirements and functionalities?

For the purpose of answering the research questions, this thesis is structured as shown in the following overview. First, in the second Chapter, fundamental technical and medical knowledge are presented. Resulting from the interface of technology and medicine, DiGAs are explained. Subsequently, results of studies on existing apps are elaborated. In Chapter 3, the methodology of this thesis is presented. In Chapter 4, the problem is defined in more detail and a requirements analysis is performed. Then, in Chapter 5, LeA is developed based on the conducted requirements analysis. The sixth Chapter deals with the testing results of LeA. These results are discussed in the seventh Chapter and findings are concluded. Chapter 8 presents limitations and possibilities for further research. Finally, this thesis ends with a conclusion and outlook.

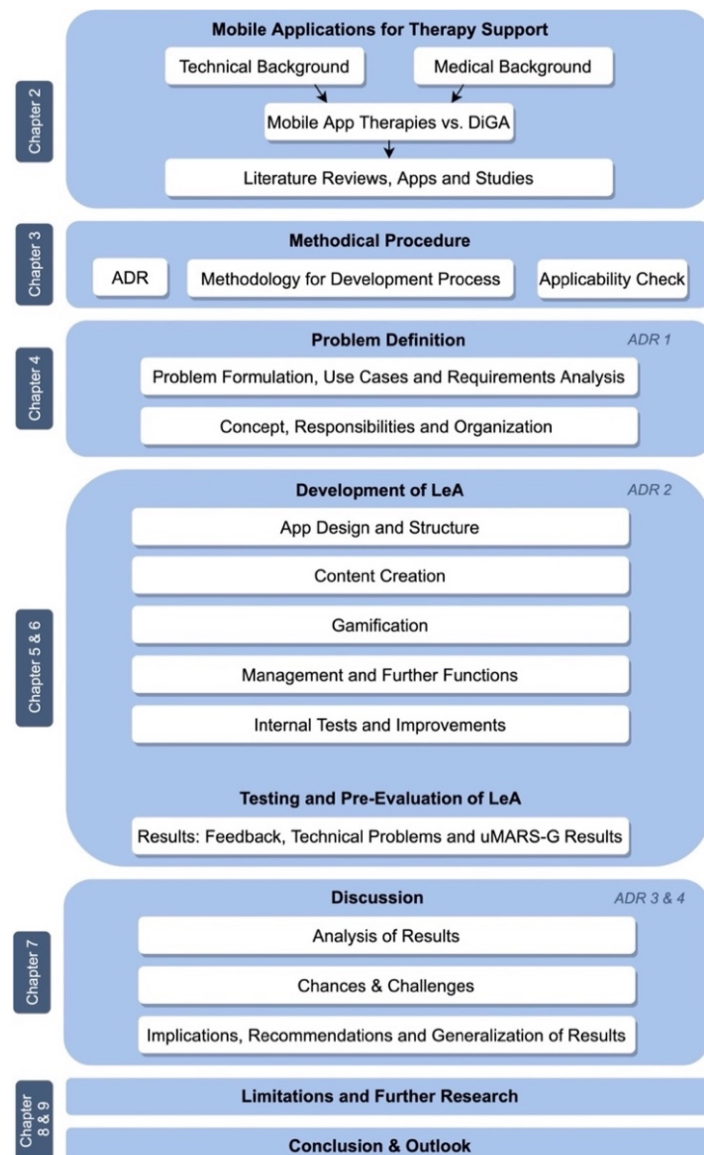


Figure 1: Structure of the Thesis, Source: Own illustration

9. Conclusion and Outlook

Providing treatments for psychological disorders is of high importance and mobile application therapy support can offer a solution at this point. The goal of this thesis was to investigate how mobile applications can support therapies for mental disorders. In addition, an optimal development based on requirements and functions aimed to be determined. For this purpose, the web app LeA is developed, and a subsequent applicability check is performed. The findings obtained from the development and evaluation process of LeA and the elaboration of studies on existing apps can be used for the further development of LeA and provide valuable knowledge for the development of other mobile applications for therapy support in case of mental disorders. The methodology of ADR is used since it enables the generation of knowledge through the development and evaluation process of an artefact. (cf. Sein et al. 2011: 40). Moreover, ADR generates a generalization of problem solution for further problems.

The web app LeA is developed in a stepwise manner through continuous correction loops, following essential approaches of software development. LeA was tested by healthy probands and rated using u-MARS-G questionnaires. The results (uMARS-G results and feedbacks) are analyzed regarding the development and the defined requirements. Problems, chances and challenges are identified and recommendations are given.

The requirements determined in the requirements analysis are met in LeA. Since LeA is web based and is developed through a website building tool, the creation is associated with some limitations, nonetheless, according to the probands, no major problems were encountered when using the web app. Indeed, the results of the assessment of LeA indicate that LeA is a useful and effective web app. Especially in terms of functionality, LeA received high ratings from users. Positive feedbacks further indicate that the app is well received by users. The section Engagement is rated slightly lower compared to the other main sections. The app can be optimized and enhanced by improving some of its functions. More customization, interactivity and consistency can increase engagement and reduce uncertainty. In order to meet the wishes of many users, the degree of gamification must be individually adjustable. However, the app can only be used with an Internet connection and a compatible browser because it is web based.

Based on the results and development, some essential requirements and functions for mobile application therapy support for mental problems are identified. The requirements and functions that are indispensable include customization, ease of use, member management gamification, consistency, appropriate price, implementing different file formats, reminder function, data protection, support (medical, technical) and evidence-based content. Studies confirm the need for these issues as well.

Mobile application support offers opportunities, but also challenges and risks that need to be considered. Above all, attention must be paid to data protection and data privacy in this context (cf. Martinengo et al. 2021: 1).

Furthermore, the aim of this work was not only to identify problems and recommend functions for development, in addition, this work also illustrated a structured approach. For this reason, software development methodologies are used. To find a problem solution for other problems, the methodology from Chapter 3 and the recommendations for the procedure from Chapter 7.3 of this work offer a structured basis. Agile software development approaches are suitable when requirements undergo changes and offer a possibility for a fast and flexible reaction (cf. Sandhaus et al. 2014: 44).

Future research may implement additional functions to increase engagement, for example, reminder and personalization features. In a further study, the acceptance and usability of the web app LeA by patients can be investigated. Such a study can generate important theses in terms of usability by patients and efficiency of treatment. A study by Wells shows that MCT is also widely accepted by patients who made a Home MCT (cf. Wells 2022: 5-6). Over 70 percent of patients performed at least two-thirds of the modules (cf. *ibid.*: 5). This demonstrates that MCT can certainly be done at home as a home-based intervention. Thus, LeA can provide the potential to digitalize therapy content and thereby support the treatment. Since LeA has proven to be a valuable web app that is technically confirmed and provides evidence-based content, its further development is recommended. Expanding the app to cover other diseases may entirely reduce the burden of the healthcare sector and reduce costs.