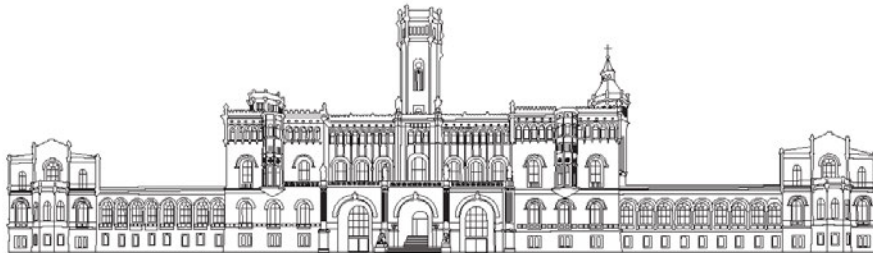




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# A Critical Success Factor Analysis of Depression Applications

## Masterarbeit

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## 1. Introduction and motivation

Psychological health issues are no longer a rarity, partly due to the fast pace of life and the hectic and stressful high workload in today's world. Depression, anxiety and stress belong according to the WHO to the most common mental disorder which is a major burden for the health systems. According to the WHO, 5% of all adults worldwide suffer from depression, which affects around 280 million people. The Covid pandemic has also fueled these figures (WHO, 2024; Priya et al., 2020, pp.1258). 970 million people worldwide were living with a mental disorder in 2019. Due to the COVID-19 pandemic beginning in 2020, the number of people affected with anxiety and depressive disorders increased considerably. In just one year, the individuals with anxiety and major depressive disorders increased at 26% and 28%. Another problem is that most people with mental disorders do not have access to effective care and are confronted with stigma, discrimination and violations of human rights (WHO, 2024). Depression is a complex illness due to the difficulty of accurate diagnosis and also the challenge of timely and effective treatment. The corona pandemic has also increased awareness and the importance of digital health (Richardson et al., 2022, p.1, Seiferth et al., 2023, p.542).

4.7 billion people out of 8 billion people worldwide own a smartphone. In Germany alone, there are 67.6 million people, who own one, approx. 80% out of 84.6 million inhabitants (Statista, 2024, Statistisches Bundesamt). However, there are also many so-called health apps (mHealth apps) but the quality varies greatly (Seiferth et al., 2023). Solely for mental health there are more than 10,000 apps in the app stores (Torous, Roberts, 2017). But there are no uniform quality criteria, although there is the DiGa certification in Germany (Verbraucherzentrale, 2024). Health apps for improving symptoms of depression are evidently efficient, but there is still a lack of user engagement (Marwaha et al., 2022). Nowadays, there is almost no area that has not come into contact with digitalization. This is also the case in medicine, especially in the field of mental health and the indication of depression. In the medical field, there are now digital consultation hours and apps designed to support patients with their illness. This can also relieve the pressure on doctors' offices, bridge the long waiting time for a therapy slot and appointment with a psychologist and also reduce high healthcare expenditures (Chakraborty et al., 2023, p.1, Paganini et al., 2018). To assist psychologists in the evaluation of a depression, computer-aided technologies can be a suitable method, there are also more health-tech start-ups (He, Cao, 2018, p.109). Since October 2020 in Germany, health apps can be prescribed as a DiGA by recipe as a result of the Digital Healthcare Act that came into force (Verbraucherzentrale, 2024). There are currently 26 certified health apps, also known as digital health applications (DiGA) in the area of mental health, out of a total of 55 certified apps (DiGA

directory, 2024). DiGAs are tested and certified by the Federal Ministry for Drugs and Medical Devices (BfArM).

### Research Gap and motivation

There are many mobile health applications (mHealth Apps), so-called "depression apps" and mental health apps in the app and play store and the amount can be overwhelming. Many apps are not certified and for the user the range of depression apps and health apps is large, but not necessarily good or effective. The question remains open what a depression app needs to be successful for the patient and user. To this end, it is necessary to specify what successful actually means. There is a need to identify critical success factors when developing and implementing depression apps. Critical success factors should be identified in this work in order to determine important aspects of depression apps. It is questionable what makes an app good, what are critical characteristics and what must an app have in order to be effective and efficient. This is to be determined in this paper with the help of a literature review of previous studies on success factors for depression apps, a survey with ~700 patients questioning desired features and contents for depression apps and ultimately interviews with two psychiatrists, five app developers and three patients. It is expected that the obtained results can be used by researchers to conduct more studies and also by practitioners developing new mHealth apps. Especially due to the literature and data of the comprehensive survey, results are meant to be found concerning the app characteristics and contents and which of them are important to the users, supported by statements out of the interviews gaining a specific perspective.

Success factors should be defined that specifically mean success for a depression app for everyone involved such as patients, app developers and psychiatrists, apart from an obvious first success such as download figures. App content and features will be specifically considered in this work. It has been found that depression apps can help efficiently with depression through possible complementary or subsidiary approaches to traditional face-to-face interventions and also to bridge the gap of waiting time (Firth et al., 2017). Moreover, there is an independence of geographic constraints and time and a more guaranteed anonymity. Low delivery costs and less stigmatizing treatment options are two more reasons for health apps (Wasil et al., 2019). Furthermore, the app usage is flexible, cost-effective and a positive attitude towards technology-based interventions has been found (Stear, 2021). People have the possibility to seek information and help online in the event of a mental disorder or emotional distress (Bakker, 2018). Internet-based interventions have been effective for a variety of mental health conditions and recent meta-analyses suggest that interventions delivered via smartphones can help treat depression (Wasil et al., 2019). Health care professionals

tend to view digital interventions more suitable for mild to moderate than severe depression (Kerst et al. 2020). However, questions remain unanswered, such as generally low rates of usage and what happens with older age people and a potential digital exclusion. As mentioned, apps are not always scientific and for patients it can be hard to differ between high quality apps and those with lower quality.

The first step is to work out from the literature what exists so far about success factors for depression apps and to form the basis for working out the final critical success factors. Then, results from the akzeptD project survey will be evaluated and compared with the results from the literature analysis. In turn, various interviews with app developers, psychiatrist and patients will be used to generate findings that underpin and support the results from the literature and survey. The survey includes questions on app features, content, willingness to pay, usage and personal assessment of the app. The sample size of the survey comprises 703 participants. The procedure is first to form results from the literature and the survey, which success factors result from these sources. Then an interim conclusion is to be drawn. Subsequently, the interviews with app developers, psychiatrist and patients will be included. Topics such as potential app content and requirements, possible opportunities and challenges in use were also addressed here in order to finally be able to form success factors for depression apps.

## Relevance

Due to the increased attention that mental health is now receiving and the high prevalence of mental illness, this work is relevant to the extent to which depression apps can support psychotherapy. It can be a lengthy process to wait for a therapy place and supervised psychological treatment. During this time, mental health apps can be used, for example. Smartphones are an essential part of everyone's life and these smartphone apps have become indispensable. Many people around the world have a smartphone and therefore have more or less direct access to many apps. As in every other area, there are also apps to support mental health. These are called depression apps, which will be examined in this paper. Depression apps could contribute to relieving the burden on the healthcare system, as apps could take over the bridging and waiting time, provide support during psychotherapeutic measures or even provide follow-up care for the patient after a hospital stay. The World Health Organization (WHO) defines e-health as “the use of information and communication technology (ICT) for health” (2024). Among many other definitions, Razmak et al. define e-health as a rising field at the crossing point of medical informatics, public health and business relating to health services and information that are provided or improved (2018, pp.62). E-health systems are useful for monitoring the patient's health and collecting medical records (Wiśniewska, Różycka, 2021, 3647–3656).

A central research question that was developed to answer in this work is:

**What are critical success factors for depression apps?**

This should be answered at the end of this paper. Other potential thoughts in the search process for a research question were "Do success factors match from the patient's point of view with the view of app developers and physicians?" However, the aim of this thesis is to concentrate on one central research question in order to ensure a focused approach with only one research question. It turns out to be difficult to include the different points of view of patients, physicians and app developers in this one paper with a limited scope. In this work, a translator tool (DeepL) was used for support. No whole texts were written using assistive technology.

## 6. Conclusion

The study begins with the introduction of the theoretical basis of depression, application development and critical success factors and following the research methodology to systematically collect relevant publications, followed by a literature overview, the concept of the survey and interview and their analysis and results. Most identified CSFs in literature, survey and interviews are summarized and discussed. Finally, potential research possibilities are proposed. This study has been an attempt to evaluate and compare results of critical success factors of depression applications out of the literature review, the survey and the interview. Several factors out of the different sources were collected, evaluated and categorized. The study enriches the body of theoretical knowledge on CSFs of depression apps which is important to new application developers in helping them emerge essential critical success factors and develop future research in this area. Besides, the digital mental health sector is still in the initial stage with rapid development especially in application development. The topic is getting much attention through the rising awareness of mental health and the further development in digitalization in using apps for many purposes. Mobile applications for supporting patients on their mental health journey can be a great addition or completion to medical and psychological treatment. Struggling consequences can be the gap between app developers and the app users due to varying ideas and perceptions of the app. Therefore, this paper elaborates crucial factors leading to success both for the ones who introduce the software and the ones who will use it. The survey examined the point of view of patients who use depression apps. The interviews purpose was to show the perspectives of app developers, psychiatrists and patients as well. The results of this paper provide useful information and practical guidance for app developers, practitioners and for instance health insurances.

Pharmacological and cognitive behavioral therapy are the first increments in depression treatment but there are limitations like the shortage of trained therapist and psychiatrists, concerns about taking medications and the general stigma concerning mental health treatment. Additionally, there are restrictions to see a therapist such as the travel and time commitment and also the impact of associated costs. Especially in this point mHealth applications can support patients as a stand-alone app, for bridging the waiting time for a therapy or as a therapy follow-up. On the other hand, they can also support during a therapy and work together with the therapist and assist them. Depression apps and smartphone interventions have shown significant results in improving symptoms of depression. These mobile applications open up the possibility to have access to a tool fighting depression free of time and place. There is the opportunity to do recommended exercises by the app, get psychological education and

get reminders by the app and train the mental health without a therapist. Especially repetitive exercises and embedded behavioral components are key for treatment success. The evidence for efficacy is proven, but the low rates of use have raised questions and the need for critical success factors. The resulting CSFs will guide companies and app developers in developing depression apps and identify needs of patients and their psychiatrists. Further, the level of personalization will increase with machine learning and dynamic tailoring. Concluding, digital technologies have a potential to support the human therapeutic process by providing interactive psychoeducation, monitoring material and motivational app functions rather than replacing health professionals.

### 6.1 Implications for research and practice

Based on this work, clear recommendations for the development of depression apps can be given. It is advisable for app developers to work together with mental health professionals and patients themselves to develop clinically and evidence-based app content such as psychological education, CBT and treatment related content that benefits both the patients and the therapist. The app should also develop in a direction that is desired by the patients, by involving their feedback and helping and motivating them to use the app and improve thus symptoms of depression. It is important for the app developer to find out about the target group of the app at first to develop the appropriate app contents and functions. It is recommended to have a user-friendly design, easy usage and a clearly arranged menu, guarantying a satisfying user experience, interface and usability to increase the success of the application. Further, therapists need an app training to include the app appropriately in their work and therapy and get in the best-case access to their patient's app data to get an insight in their patients' situation. However, a free trial access for both the therapist and the patient would be important. Also, helpful would be the prescription of a depression app by the therapist and get a cost reimbursement by the health insurances. That would make the cost aspect easier for the patients. Nevertheless, an appropriate price must be guaranteed even if the health insurance companies pay for the applications. If the app is downloaded by patients on their own, an adequate price ensures the success for both the app developer and for the patient. App functions such as selectable content focuses, app tailoring, a reminder function, mood tracking and meditation exercises should be included in the app by the developers. Besides, ethical considerations have to be made such as securing both the data privacy and security. Concerning the app certification, it will become clear how it will develop with the DiGA certification in Germany and if other certifications are needed in the future. Finally, the above-mentioned factors were the most important ones for the success of depression apps.



App developers should be aware of that and include those in their application development.

## 6.2 Limitations

Although an attempt was made to include all facets in this work, certain limitations exist within the research design. More literature could have been found, also through the search terms, restriction of the year of publication and the language papers were excluded, which could have been helpful. It is also possible that important papers may have been overlooked. One could have gone into even more detail, not only in the literature review, but also in the evaluation of the survey. But many evaluations were made and the capacity of this work was limited due to the time and extent. The data from the survey and the interview were not collected personally, but were made available for this work as they already existed. More interviews and perspectives could have been included in the interviews, not just from patients, psychiatrists and developers, but also from practitioners, health insurance companies. Another point in the interviews is that the developers often were from companies which did not develop a mobile app, but a web application. The mediation of the application also differed in this situation, as only one mobile app was available via the app store, and the rest of the applications which are web applications are mediated e.g. via therapists, doctors' offices and clinics. As this work evaluates critical success factors for depression apps it differs but as it is about how successfully an application is received by the user regarding characteristics and contents whether as a web application or a mobile app. One challenge in the research of the illness depression was the heterogeneity and diagnosis found of proposed solutions, efficacy and availability of treatments, due to the diversity of the disease. That it is difficult in detail, for example, to determine success factors for a depression app if depression is not a uniform, clear clinical picture. Also, stand-alone apps and the ones which are blended into therapy were not further differentiated regarding success factors. This could limit the generalizability of the findings as individual differences such as symptom severity and comorbidities may have an influence on the success factors. Therefore, it could also be that patients sometimes gave inconsistent answers in the survey as it concerns self-reported data, maybe also due to the depression and symptoms of it such as lack of enthusiasm, motivation and energy. Self-reported data could therefore be distorted, may have limitations in terms of validity and reliability and differ from other measurements or clinical outcomes. Additionally, participants of the survey were on average rather older (50-59 years) and could have lower technical understanding and motivation regarding using technology regarding their health treatment. But the sample of the survey was indeed big enough to be representative, objective and outliers have been removed in the process for preparing the data for the analysis. However, this work's findings may

be influenced by specific papers and app features or functionalities in the literature at the time of the data collection but may develop further in the future.

### 6.3 Outlook and Further Research Needs

Several critical success factors for depression apps were found and evaluated in this work. More research needs to be done in the efficiency and implementation of depression apps concerning most important characteristics in the application for patients, psychiatrists and app developers. More investigations are needed on relationships between the CSFs and larger, representative long-term studies with patients testing depression apps and maximizing efficiency and user-engagement sustainably over time, as well as long-term benefits of mental health apps. Besides, different types of depression apps respectively with different focuses should be compared and evaluated, also regarding comorbidities and different symptoms. Implications for therapists and working conditions with the app should also be looked at more closely minimizing their additional workload and investigating in the future therapeutic relationship. Further, more investigations are needed about the influence of cultural and socio-economic factors using and adopting health apps across diverse populations. Additionally, AI would be a great opportunity to use in depression apps, when using it for emotional recognition for example. Moreover, the topic about the price of depression apps needs to be discussed further, how to certificate apps and guarantee cost reimbursement by health insurances. Regarding the demographic development and the capacity and workload of practitioners, therapists and psychiatrists, telemedicine and tele healthcare will receive more importance. To relief therapists etc. depression apps can be a huge opportunity. Another reason for this is the increased attention and awareness for the importance of mental health and depression in new generations. More research is needed in digital health, which will expand as there can be found already now thousands of health apps in the app stores. Precisely for this reason app certifications will gain importance. Integrating apps into usual treatment will be a great way to exploit all the potential of digital health not only regarding depression, but also other conditions. Still remains the importance and possibility of the prescription by the clinician to guarantee quality. However, most important is the continued research in understanding the success factors for depression apps, improving their effectiveness in supporting individuals with depression and the collaboration between mental health professionals and app developers to unfold the huge potential of mHealth apps.