THE DIFFERENCE BETWEEN MOTIVATION AND VOLITION MATTERS! – A QUALITATIVE STUDY ON MOBILE HEALTH APPLICATION ADOPTION

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THE DIFFERENCE BETWEEN MOTIVATION AND VOLITION MATTERS! – A QUALITATIVE STUDY ON MOBILE HEALTH APPLICATION ADOPTION

Research Paper

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Abstract

Designing technologies that users are interested in, use and continue to use has long been a challenge. In the health sector, the issue of technology adoption is even more critical, as the potential insistence of technologies can lead to patients refusing to try them out at all. Developers and researchers need to consider this issue when designing and evaluating new health technologies and at the various stages of the users’ journey. We conducted expert interviews with physicians to determine what their older patients may need to try out mobile health applications and integrate them into their daily routines. We want to understand how social-cognitive behavioural processes are structured from a health psychology perspective and which factors influence the motivation and volition of seniors. Our findings illustrate the importance of considering the acceptance of technology as a staged process with adapted measurement methods for each stage.

Keywords: mhealth apps, Health Action Process Approach (HAPA), adherence, doctor-patient relationship
1 Introduction

The global ageing of the population is a phenomenon that is associated with an increased prevalence of chronic diseases. This growing population of senior citizens leads to increased demand from health systems for costly services and requires significant resources (Desa, 2019). Chronic diseases are the most common cause of inpatient stays. Their treatment is costly and time-consuming and has an enormous impact on the lives of those affected (Gabe and Monaghan, 2013).

The current COVID-19 crisis has further catalysed this problem. Older adults represent a population group with a higher risk of dying from severe acute respiratory syndrome associated with coronavirus, which requires social distancing (Goethals et al., 2020). Similarly, COVID-19 may have long-term effects on people with pre-existing chronic diseases. In this context, telemedical services such as video consultation, electronic prescriptions, and telemonitoring were introduced as soon as possible. Without completely replacing physical doctor-patient contact, these can help make care routes friendlier and avoid unnecessary travel, especially for older people who are often less mobile. Besides, the ‘Law for the Improvement of Care through Digitization and Innovation (DVG)’ created the conditions for medical apps in Germany to be prescribed by physicians in the future and to be financed by statutory health insurance companies (Federal Ministry for Family Affairs, 2020, Federal Ministry of Health, 2020).

Although several studies contribute to mobile health applications' acceptance and the benefits and risks associated with their use, the results are generally heterogeneous and inadequate for the health sector (Pheeraphuttharangkoon et al., 2014, Vichitvanichphong et al., 2017, Nadal et al., 2020). Differences according to age have rarely been the focus of relevant research (Taherdoost, 2018). It is noticeable that in all studies and evaluations, the medical benefit and cost-effectiveness are the main factors that are assessed (McKay et al., 2018). Socio-psychological aspects are strongly underrepresented in the overall study situation. The Health Action Process Approach (HAPA) integrates the tried and tested components of the technology diffusion models (Schwarzer, 1992). Besides, this model considers continuously linear model assumptions and integrates stage theoretical assumptions, in which it differentiates between motivational and volitional phases. HAPA includes further factors such as self-efficacy in different aspects and represents a process model that explains psychological changes from unintended to preventive health behavior to actual preventive health behavior. Several studies have shown that this approach successfully predicts changes in health behavior (Lippke and Renneberg, 2006, Presseau et al., 2017, Schwarzer et al., 2018).

However, to increase the preventive health behavior of older patients with mhealth apps and address changes in health behavior, we need to adopt physicians' perspectives and understand the intention of prescribing or recommending mhealth apps in the first place. The physician thus represents a gatekeeper: If the doctor does not prescribe the app, no change in the patient's app usage, and therefore no health behaviour founded on the app can be achieved at all. As a basis, the known technology diffusion models were compared with the HAPA. As the relationship between doctor and patient is changing increasingly due to digital possibilities and shared access to medical information, the study also considers the relationship between doctor and patient and the adherence constructs (Mesko and Györfy, 2019).

Therefore, we aim to understand the factors that improve older patients' preventive health behavior by providing the following research question: What determines the use of mhealth applications by the elderly from the treating physician's perspective?

We conducted semi-structured expert interviews with twenty German physicians from various disciplines. Specifically, we report findings on the pattern of use of mhealth technologies by seniors for self-monitoring from the physician's perspective. We identified that the linear model assumption cannot be used in a generalizable way and that the concept of adherence presents an essential role in technology adoption research. The paper is structured as follows: We take a look at the relevant literature and derive our research proposals from it. We focus on the acceptance of technology and an introduction to the Health Action Process Approach, the role of the doctor-patient relationship, and the concept of adherence as a starting point. We present our research model and discuss the methodology with background information on data collection and analysis. After presenting our results, we review their
Adoption of mhealth apps

theoretical and practical implications, our study's limitations, and possibilities for further research. This paper closes with a conclusion.

2 Theoretical Background

The research on technology adoption developed several models and frameworks to explain the acceptance of new technologies by users. These models introduce factors that can influence user acceptance. The most prominent theories used are the technology adoption model, the diffusion of technology, and the unified theory of acceptance and use of technology (Taherdoost, 2018). With few exceptions, such as Venkatesh (2000), technology acceptance models use predictors that are exclusively cognitive and relate the adoption and actual behaviour of new technology to attitudes, beliefs, and perceptions (Ajzen, 1991, Davis, 1989, Davis et al., 1992, Rogers, 1995). However, most IS researchers do not distinguish between the affective component of attitudes and the cognitive component or beliefs. Perlusz (2004) argues that both cognitive processes and emotional and affective elements influence behaviour. Accordingly, the author found that technology adoption models and theories have so far primarily neglected feelings and emotions. Moreover, IS and analytics health research often focuses on the introduction and use of health information technology (HIT) and the impact of HIT on the quality of care, efficiency, and financial performance (Agarwal et al., 2010). Mueller et al. (2019) indicate that healthcare is the context for research, focusing on developing or testing generalizable IS theories.

It is not surprising that health psychology is strongly dependent on the cognitive paradigm in social and clinical psychology. Many models used in health psychology, such as the Health Believe Model (Becker et al., 1977, Janz and Becker, 1984) and the Protection Motivation Theory (Rogers, 1975), are based on the paradigmatic assumptions of social cognition. It is the close connection of health psychology with the paradigm of social cognition, which means that fundamental challenges for the latter will also have implications for research practice in health psychology.

In this study, we want to observe the process after the intention has been formulated more precisely with experts. We want to understand why an action was taken or the intention abandoned. For this purpose, we look at a social-cognitive process model of health behaviour that distinguishes between motivational and intentional processes; the Health Action Process Approach by Schwarzer (1992). Furthermore, we want to examine the concept of adherence and the impact of the doctor-patient relationship, which has only been validated in medicine. Following an exploratory approach (Schutt, 2018), we generated propositions to understand the relevant aspects better.

2.1 Health Action Process Approach (HAPA)

The social-cognitive process model of health behaviour (Health Action Process Approach - HAPA), developed by Schwarzer (1992), is a model for explaining and predicting health-promoting or -damaging behaviour with a focus on various self-efficacy beliefs (social-cognitive theory). It explains why people often do not translate their intentions or behavioural intentions into actual behaviour, thus filling the gap between intentions and behaviour in the theory of planned behaviour. For this purpose, it integrates the constructs of other behavioural change theories, relates them to each other, and differentiates them in some areas. According to the model, two phases must be passed to change behaviour: the motivation phase and the will or volition phase.

In the first phase of motivation, three constructs act on the intention to be developed, which people have formed as a target intention at the end of this first phase: Risk perception based on the subjective assessment of one's own vulnerability and its severity (Health Belief Model); The action-outcome expectation expresses the fact that for a behaviour change the prerequisite must exist to be able to recognise alternatives and positive outcomes. Here the arguments for or against alternative behaviour are weighed up (Transtheoretical model: Balance of decisions); The expectation of self-efficacy concerning behaviour (social-cognitive theory) refers to the subjective conviction that specific actions can be carried out based on one's own competence. The result of these three influences' interaction cumulates in the intention that binds a person to the goal. The strength of the intention shows whether a
Adoption of mhealth apps

behaviour change is implemented. According to Schwarzer (1992), intentions make up an average of 20 to 30 per cent of the probability of behaviour change.

In the volitional, the second phase, the psychological volition processes occur, during which people set themselves a concrete goal for action. Here different self-efficacy assessments are necessary, depending on whether a behaviour is consciously planned, whether it was started on the initiative, whether it is maintained or resumed after a failure. According to the model, it is essential to develop functionally different self-efficacy expectations for planning, initialisation, maintenance, and recovery and adapt them to the respective requirements. Figure 1 visualizes the HAPA:

Figure 1. Health Action Process Approach (Schwarzer, 1992).

In summary, the model postulates that self-efficacy expectations should be considered necessary in all phases and took into account for health-promoting measures. From a health psychology perspective, HAPA is an integrative or hybrid model (Lippke and Renneberg, 2006) because it explicitly combines motivational, linear, and stage assumptions. It offers a wide range of starting points, especially for further research, but also sees itself as an evidence-based, theory-based orientation for promoting health behaviour. There are now numerous studies showing that goal setting can be predicted by the three postulated social-cognitive variables self-efficacy expectation (or behaviour control), outcome expectation (or pros and cons), and risk perception (including vulnerability and severity), and that moreover, the planning process is a key factor in the successful translation of aims into behaviour (Schwarzer, 2004, Zhou et al., 2015). HAPA was used to control behavioral interventions aimed at changing individuals (Lippke et al., 2010) or several constructs from the HAPA (Duan et al., 2017). The predictors of an intention towards health-conscious behavior were applied in various health contexts such as medication adherence (Presseau et al., 2017), physical exercise (Scholz et al., 2005), and also nutrition (Scholz et al., 2009). However, to the best of our knowledge, little is known about including the HAPA to spur behavioral change with mhealth-app-based interventions (Lee et al., 2019).

Therefore, we postulate:

Proposition 1: The difference between the motivation phase and the volition phase positively affects behaviour change.

Proposition 2: The planning phase has a positive effect on the successful adoption and use of mhealth applications.

2.2 Parson's doctor-patient relationship

The doctor-patient relationship in Parson's (1958) sense is a social system characterised by symmetry or complementarity of the doctor-patient role structure (Gerhardt, 1991). Gerhardt (1991) defines the cornerstones of the doctor-patient relationship as follows: "The systemic character of the doctor-patient relationship is based on the double parallelism of the doctor role and the patient role. Both form interlinked rights and obligations structures, and both contain the same orientation patterns of universalism, performance, affective neutrality, functional specificity, and collective reference" (Gerhardt, 1991). Thus, it is a relationship of trust with particular rights, duties, and expectation patterns, which is usually limited in time and only applies for the duration of the illness. As an essential feature of the doctor-patient relationship, Parsons emphasises the collectivity-orientation: From the doctor's point of view, collectivity-orientation means, in contrast to the subjectivity orientation of most other
Adoption of mhealth apps

professional groups, that the well-being of the patient is placed above the doctor's own interests and profit orientation is excluded from the medical system (Parsons, 1991). Concerning the patient, collectivity-orientation means a collaborative process of doctor and patient, characterised by the reciprocity of action and expectations. In this respect, doctor and patient interests coincide, doctors and patients pursue a common task. While the patient's well-being guides the doctor, the patient must do their part of the duty by following the doctor's advice as closely as possible and ‘cooperating’ in his or her recovery (Parsons, 1991). Through the collectivity-orientation, it is possible to include the aspect of authority in the doctor-patient relationship, which "cannot be legitimised without reciprocal collectivity-orientation in the relationship" (Parsons, 1991). The interaction between doctor and patient is thus patterned and has certain regularities. Also, the doctor-patient relationship is asymmetrical because the doctor needs a certain amount of influence to influence the patient's behaviour and contribute to restoring health. On the one hand, the doctor is given authority in the individual situation, but on the other hand the patient is and makes himself dependent on the doctor (Bloom and Wilson, 1972).

Riedl and Schüßler (2017) presented a systematic review that showed both persuasion effects for different doctor-patient relationships and aspects of communication on various objective and subjective health parameters. It was shown that the doctor-patient relationship is not only the highest predictor of patient satisfaction but also influences the subjective symptom burden (Little et al., 2001). A stronger doctor-patient relationship was also associated with the improved interpersonal exchange and patient activation (Alexander et al., 2012), which had a positive influence on adherence (Van Ganse et al., 2003), and led to a reduction in patient uncertainty (Kuzari et al., 2013). An empathic atmosphere during treatments could even increase the placebo response (Kelley et al., 2009). However, additional evidence was presented about the direct influence of the doctor-patient relationship on health status: Cooper et al. (2011) reported more positive communication but found no direct influence on health status. In contrast, Auerbach et al. (2002) found that a better doctor-patient relationship is associated with improved disease-related behaviour and a better state of health.

Based on our study's physician perspective, we also question the effects of the physician-patient relationship on the patient's health behaviour and want to find out whether it has a decisive influence on the use of health applications. For this purpose, we establish the following propositions:

*Proposition 3:* A positive doctor-patient relationship can influence patient activation toward better health behaviour.

*Proposition 4:* A confidential doctor-patient relationship has a positive effect on adherence.

### 2.3 Adherence

Adherence defines the extent to which a person's behaviour in terms of medication, dietary adherence, or lifestyle changes is in line with a medical practitioner (WHO, 2003). Accordingly, the basis of successful treatment is to take into account the individual needs of the patient as well as the factors that make it difficult for the patient to achieve the treatment goal. Positive adherence corresponds to consistently following the treatment plan agreed with the physician or therapist. We consider adherence to be particularly important in chronically ill patients with regard to taking medication, following a diet, or changing lifestyle. In this way, preventive health behaviour can be achieved in patients with chronic diseases and older age groups.

Approximately 50% of the general population require long-term medication, while for the elderly (> 65), it is probably over 90%. It has long been known that drug adherence is inadequate: about 50% of all people with chronic diseases do not take long-term medication as prescribed; among the elderly and very elderly, the figures vary between 40 - 80% (Morin et al., 2017, Osterberg and Blaschke, 2005).

Over the last decades, a differentiated ‘bio-psycho-social’ model of causes of non-adherence has been developed, which is generally valid for adults: a simple therapy scheme has a positive effect on drug adherence, and on the patient side, a high degree of motivation, good understanding of the therapy, high therapy satisfaction, and good social support. Typically, the abovementioned aspects are achieved in good medical care with equally motivating and comprehensible doctor-patient communication and regular follow-up appointments. Risk factors for drug non-adherence are a complicated therapy...
Adoption of mhealth apps

Schedule, poor understanding of therapy, the experience of side effects and fear of them, concomitant mental illnesses, especially depression, low social support, and low educational level (Osterberg and Blaschke, 2005). Besides, further factors have been identified specifically for older and significantly older adults, which can in some cases multiply the risk of non-adherence: Male gender, multimorbidity, general frailty, limitations in vision, hearing, and touch, and, most importantly, cognitive limitations up to dementia (El-Saifi et al., 2018, Yap et al., 2016). In addition to ‘intentional’ factors for non-adherence, mainly not motivated for therapy, fear of side effects, ‘non-intentional’ factors like not understood, not retained, not able to implement often come to the fore in older people.

We believe that successful adherence goes hand in hand with a positive link to the intention, planning, and subsequent change in health behaviour and the use of health technologies. This leads us to the following propositions:

Proposition 5: Adherence has a positive influence on Action Planning during the volition phase of HAPA.

3 Contextual information: mhealth on prescription

Recent innovations for mobile technologies combined with the widespread use of mobile devices, a new perspective for healthcare applications has opened up: mhealth apps. In addition to numerous fitness and nutrition apps, there are medical apps, i.e., programs with a medical purpose, which can be used for diseases ranging from diabetes to tinnitus (Nussbaum et al., 2019). Since the beginning of October 2020, medical apps, which were tested in an official procedure, are now available in Germany on prescription. Doctors can prescribe mhealth apps; health insurance companies cover the costs (Federal Ministry for Family Affairs, 2020, Federal Ministry of Health, 2020).

There are different types of health apps: First, so-called lifestyle apps, e.g., fitness trackers, nutrition, and exercise apps: they can help to support health-conscious behaviour. Second, more service-oriented apps remind people to take medication, remind people to have early detection tests and to make doctor’s appointments, or serve as a diary for monitoring symptoms or the course of an illness. Third in addition, there are medical apps that serve the diagnosis and therapy of a disease, such as the evaluation of blood sugar values (Nussbaum et al., 2019). Medical apps must be approved as medical devices and bear the CE mark. However, the CE mark does not say anything about the health benefit. More apps now qualify as medical devices due to legal regulations and must meet higher requirements (Olla and Shimskey, 2015).

With the entry into force of the Digital Care Act (DVG), certain health or medical apps can become a health insurance benefit for those with statutory health insurance (Federal Ministry of Health, 2020). These digital health applications (DiGA) are listed in a separate directory (Federal Institute for Drugs and Medical Devices, 2020). The first applications listed in the DiGA directory offer help with tinnitus and certain anxiety disorders, but apps for back pain, depression, apps to help with medication, digital diaries for diabetics or supporting apps for migraines and pregnancies are also possible. Generally speaking, apps that help to recognise, prevent, relieve or treat illness, injury or disability are also listed. Initial orientation is provided by the DiGA directory of the German Federal Institute for Drugs and Medical Devices and a directory of the Bertelsmann Foundation, which evaluates digital health applications (Federal Institute for Drugs and Medical Devices, 2020, Federal Ministry of Health, 2020).

Rasche et al. (2018) conducted a study among older Germans in which experts answered various questions about the use of apps and health apps, including frequency of use and number of installed apps, demographic factors and health status. Of the 576 experts, 16.5% used health apps, while 37.5% said they only used general apps and 46.0% said they did not use any apps at all. The most frequently mentioned types of health apps were exercise or training related. People using health apps were younger (mean = 66.6) and had higher technical readiness compared to other experts.
4 Research Method

In the middle of 2020, we recruited 20 physicians via telephone enquiry from an urban physicians' network in Germany to provide expert opinions in a qualitative data collection. The professional experience of the experts ranged from assistant to senior. We deliberately selected specialists from various specialist areas in order to gain an overarching and extensive impression. They showed different backgrounds in terms of IT affinity as well as prior experience with mhealth applications. In connection with the possibility of prescribing mhealth apps, we decided first to consider the physician as a gatekeeper and examine his perspective on adopting and using mhealth apps. Furthermore, through this perspective, we were able to understand the behavior, needs, and wishes of older patients. We would then like to interview the patient directly and compare both perspectives with one another in a further step.

We conducted semi-structured expert interviews to answer our research questions. An expert is someone who has privileged and deep knowledge about a special theme (Meuser and Nagel, 1991). Here, the experts are healthcare professionals, predominantly physicians, with privileged knowledge about health technologies and the characteristics of patients, especially senior patients. We talked to people in different roles and responsibilities to find out how health technology processes and patient views are interpreted and how the adoption concept could foster continuous innovation.

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<td>General practitioner and pain therapist</td>
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Table 1. Sample characteristics.

The semi-structured interviews were supported by a guideline and a list of questions or general topics that the interviewers wanted to touch upon. The propositions provided support for the preparation of the interview guidelines and assisted in the questioning process. In terms of the exploratory approach (Schutt, 2018), we were able to pre-test the propositions with the experts. In a future study we want to validate these propositions in hypotheses of a quantitative study.

The questions were mainly open-ended, giving the interviewees the possibility to explore their experience and views. The interview guideline helped to keep the interaction focused as data collection proceeded. It ensured comparability of data across individuals, settings, and researchers. Though the interview process was systematic and comprehensive, the interviewer had a high degree of freedom to probe and explore the guideline. Consequently, questions were adjusted during the interviews to gain more in-depth knowledge for each interview. The interviews were divided into three main parts: In the first part, the expert has been introduced into the topic, and the purpose of the interview and general demographic data of the expert was collected including the expert’s specialties and experiences in the field of geriatric. In the second part, questions related to known mhealth applications in general and their own use of mhealth apps, medical apps and the opportunity of prescription were asked. Finally, in the third part, the researcher asked questions concerning strategies that are applied to solve health-related behavioural challenges. Each interview lasted about 30–60 minutes and was conducted through face-to-face meetings or by telephone. The interviews were held in German. Every interview was recorded and transcribed (Flick, 2018). Statements were translated into English for further analysis.

For the coding process, we followed the guidelines approach presented by existing literature and used the software NVivo10. Then we triangulated the data following the recommendation of Miles et al.
Adoption of mhealth apps

During our data analysis, we wanted to examine the relationships and concepts between expected patient's self-efficacy and risk perception of experts in relation to mhealth applications. The related literature was helpful for guiding our examination. The research was carried out with an Interpretative phenomenological analysis - IPA (Smith, 1996). The aim of IPA is to investigate the participant's world perspective and, as far as possible, to adopt an ‘insider perspective’ (Conrad, 1987) of the phenomenon under study. Simultaneously, IPA also recognises that research is a dynamic process. In the first round, we scanned and coded the data-parallel to data collection. The coding led to the three topics of benefits and limitations, the impact on different roles and the expectation of action results from a behavioural perspective as the main areas related to mhealth apps. In a second round of analysis, the codes from the individual interviews were correlated (Miles et al., 2014). The goal was to understand the specific characteristics of these areas and the influence of these factors in the context of mhealth application adoption.

5 Findings

Based on our theoretical perspective, we identified different supporting factors regarding the use of mHealth apps. First, we give a general idea of the use and interest of the experts in mhealth apps. Subsequently, we deal with the individual key theories, starting with HAPA and the doctor-patient relationship and adherence concepts. Lastly, we consider these aspects with the well-known diffusion theory models' constructs and visualize the findings in summary.

In General, the survey showed that prescription mhealth apps are currently not yet known across the board and are not used. Few physicians were informed about the possibilities of prescribing a mhealth app. The DVG was also only marginally noticed. None of the experts surveyed knew where to look for prescription apps, and only a few knew general health apps available for their respective specialties. According to half of all respondents, the prescription of health applications should be linked to CE certification. 60% of the interviewees demanded the involvement of other actors and the Federal Ministry of Health, which could decide on health apps' reimbursability. The experts stated that mhealth apps could help patients, particularly those who actively searched for medical information and were interested in their health. 90% of the experts regularly use health apps in their professional and private life. Most physicians use a medical encyclopaedia via an app. However, only four of the experts said that they had recommended the use of a mhealth app. Overall, it seems essential to improve communication and awareness. There is a need to develop strategies to improve existing health technologies and encourage physicians and other health professionals to communicate these options.

5.1 Perceived benefits and limitations of patient-focused apps based on HAPA

The experts perceived that an immense benefit of mobile health apps was their potential to support patients in keeping records of their health and conditions. Even so, doctors found that very few patients generally monitor their health. For example, the few who monitor their blood sugar or keep a pain diary do this by hand using paper notes. Technological methods, such as spreadsheets or even mobile apps, were not preferably used. According to the experts, patients whom the physician assists in creating plans are more likely to achieve their goals than those who are not making plans. The experts describe that patients first have to set and plan a goal. First of all, it is about the formation of intentions and the concrete translation of the intention into action plans. “For example, suppose I take an 85-year-old after an implanted hip operation, increase the walking distance by ten meters every day after two weeks. In that case, this patient can walk 300 meters with a rollator after 14 days, safely and without having to stop or wobble. That would have an enormous consequence on the treatment's success, and that would be quite pragmatic” (E8).

The expert's perceived apps to provide patients with a valuable education that could improve patient knowledge about a condition and save time for the treatment. “Some of the people are already IT-savvy, but far less than we would like. The vast majority are very conservative, they come with paper” (E4).
Adoption of mhealth apps

“I tell the same thing a thousand times a day about preventing skin cancer, but no more than half of everything will get stuck. It would be nice if you could always read up the key points” (E7).

According to the doctor's statements, the prevalence of chronic conditions was significantly higher among the elderly group, which necessitates close monitoring and management of their health and conditions. Therefore, it is essential to leverage existing technologies that can support their health and wellbeing needs in the community and potentially connect them with caregivers and healthcare providers. This is particularly relevant to mhealth apps that allow users to store and monitor health-related data. Prior research discussed the critical role of technology in supporting the ability of the elderly to remain at home, improve their quality of life and health outcomes, and enhance family caregiver's and health care professional's access to relevant information (Czaja, 2016, Khosravi and Ghapanchi, 2016). This is in line with this study's findings that showed a high satisfaction rate with mhealth technologies and favourable conditions for their use. “The incentive would perhaps be more for caring relatives. They might then say: “If that were a really straightforward, well-organised service,” then caring relatives might say, “Hey, I can tell right away: That day we have to measure blood sugar at such and such a time”(E11).

“The keyword is moving away from inpatient care: That is a lofty goal, that is not that easy, but here, of course, video communication can help so that the patient has security at home, if he has a question, that he can really communicate again” (E4).

Although the experts were generally positive about health apps, several limitations about their use were raised. Experts reported that technical difficulties, such as patients not being able to open apps due to technical faults or apps that required an Internet connection to access features, were deterrents for maintaining app use. “So they are totally overwhelmed, at least most of them. There are certainly exceptions, but most of them are totally overwhelmed with a bare tablet, with a smartphone, because the interest would not even be there because they never had it in their hands” (E11).

5.2 The impact of using mhealth apps on the doctor-patient relationship and adherence and vice versa

The experts said that while health apps have not changed how they deliver care to their patients, apps were valuable and complementary to their role as medical practitioners. In particular, they saw apps as a source of medical information about their patients and information about medications. On the one hand, for example, when patients collect or track medical results on an app, this would enable the doctors to avoid double exams. On the other hand, doctors have also reported that a personal exam is essential to the doctor-patient relationship, significantly impacting adherence. “I use every day, repeatedly the yellow list, the IFAP. This is basically the compendium of currently common medications” (E8).

“It would also avoid double examinations; if I could already see the blood count of colleague XY with the patient's consent, I would no longer need to do one myself” (E6).

“That is my understanding of family medicine. She lives from the personal relationship, doctor-patient where something else has little business to do” (E10).

The experts stated that mobile health apps were the way of the future for health care, with one expert saying, “So for me, every technological progress is a very, very, very important thing in medicine” (E3).

As an area in which health insurance could be expanded, more regular promotion of health apps for patients was suggested, also to reduce negative prejudices. One doctor explained: “It is about minimising costs. That is why health insurance companies are also interested in it”(E10).

In addition, most doctors said they could review data entered into a mobile health app by patients or other doctors during medical consultations more easily, regularly, and quickly. “The next step would be to put all of the medication on this chip because it is just much safer. Unfortunately, we have many doctor-hoppers who go from one doctor to the next” (E6).

Nevertheless, they would need more professionally trained staff who are familiar with the respective health apps and have to be paid. Furthermore, the business side has to be recognised, as well. The acquired technical equipment must be economically justifiable. One doctor stated: “As an economist, you also have to look: What does such a system cost? And how quickly does it pay for itself?” (E7).
However, most experts said that helping a patient set up an app during consultations would be too time-consuming. When asked if they want independent access to patient information stored in health apps, doctors responded consistently. They cited data protection and a lack of legal powers as obstacles to independent access to health app data. The use of an app to improve compliance with appointments, even between several doctors, was discussed. Most doctors were convinced that an app could help patients organise their appointments.

5.3 **Known technology acceptance factors**

The data analysis confirmed that the physician's expectations of mhealth apps are strongly related to *ease of use, perceived usefulness*, and *user satisfaction*. Therefore, it is critical to adequately manage seniors' initial expectations to ensure greater *adherence* and usage of mhealth apps. These initial expectations may be considered the anchor for senior's subsequent behaviour and their acceptance and use of these technologies and may be shaped by the environment in which they live. Caregivers and family members, peers, and health care providers can play a significant role in shaping these initial expectations and the subsequent benefit that seniors may reap from using these technologies.

Interestingly, in some cases, the doctors were more interested in technology and had better technical equipment than others. Besides, no valid evidence regarding the age or the specification of the doctors could be made. However, it can be assumed that this may have implications for elderly patients treated by these doctors who are surrounded by a medical team heavily immersed in technology and which may have expectations concerning the role of mhealth technologies in the care for their elderly.

5.4 **In Summary**

Here, we summarize the findings and provides an overview of the identified factors:

![Figure 2. Interview Findings related to the Health Action Process Approach.](image)

According to the experts' statements, it is necessary to differentiate between different phases, especially in the health sector. It is important to make concrete plans to stick to health context intentions, especially in difficult situations. The specific scheduling of changes or obstacles eventually helps to deal with them. The patient's trust and a good relationship with the physician are vital, especially when creating treatment plans. Without open communication and a positive relationship, the doctor can hardly convince and motivate his patient about preventive health behaviour.

6 **Discussion**

Obtaining doctor's perspectives on patient use of mobile health apps is vital in understanding these electronic tools' long-term feasibility for patient's self-management. This survey in physician's specialty shows that the majority of respondents have a fundamental interest in the subject of digitisation. Nevertheless, the demands on healthcare apps are high, and the regulatory grey area that currently exists in mhealth apps is incalculable, while the sentiment may also be influenced by data security concerns (Albrecht and Pramann, 2018). Most doctors were receptive to the idea of patients using mobile apps, viewing apps as complementary to their role in patient management. However, apps are yet to become a standard component of routine health care delivery in primary care. This study provides that 90% of
Adoption of mhealth apps

the experts claimed to use their smartphones for medical searches regularly, but about half of respondents felt that the apps currently on offer reduce their workload only marginally and assess their regular use as unsatisfactory.

In this study, doctors reported that patients with a vested interest are rarely interested in actively monitoring their health. Therefore, doctors are likely to only promote apps to patients presenting with a particular need, such as a chronic condition that could be assisted by the ‘prescription’ of a health app. In addition to app promotion, doctors postulated that regular review of ‘patient-entered’ app data during medical consultations and tracking patients through a remote portal outside clinic visits were potential ways for future growth in health app interactions. However, doctors explained that they do not have much time in general; therefore, incorporating additional app-related tasks into their workflow would be challenging. Potential involvement of allied health practitioners such as practice nurses, especially those trained in chronic disease management and pharmacists, in-app promotion, and helping patients set up apps needs to be investigated. The potential for data linkage between patient apps and medical record systems was viewed positively by doctors in this study. In this study, some physicians were amenable to an app, feeding back patient data through digital technologies. A possible example is the linking of data entered into a health app with electronic patient records. In patients with chronic diseases, health apps can record medical information, such as symptoms and pathology results between visits. However, it should be noted that security issues surrounding confidential patient data could arise (Albrecht et al., 2017).

Despite its innovative character, the DVG also involves risks. It remains unclear to what extent the so far only legal basis worldwide for app development remuneration will also lead to a sustainable establishment of health applications in everyday clinical practice. The high scalability of app concepts could cause a straw fire of health apps, which will never lead to ‘positive health effects’. It must also be argued that manufacturers cannot dominate the quantity and quality of the range of health applications on offer but that the medical profession should influence them.

This research contributes to the new body of mobile health apps literature and aims to understand better how people are willing to engage in this technology. The qualitative approach was used to understand better patient's perceptions from the perspective of the treating doctors. In the following, we outline the theoretical and practicable contributions.

6.1 Implications for Research

In line with the literature, this study shows that older people use digital health services less if they consider their competence in using digital technologies to be low. The expected benefits of digital applications and the expected costs of use are also important factors influencing the uptake of digital health technologies and services in the health sector. Accordingly, health applications should be easily accessible and usable; data transmission should be secure, trustworthy, and reliable. Moreover, this study also offers clear new contributions to scientific research.

First, this research shows that the HAPA model offers many starting points for further research and evidence-based, theoretically guided orientation to promote health behaviour (Schwarzer, 1992). In IS Research, the willingness to use technology and user behaviour is prioritised and questioned through acceptance models or linear health models (Renneberg and Hammelstein, 2006). This means that so far, theories and models have been described, which, on the one hand, only examine technology-based factors or assume that people follow a continuous, linear process of behaviour change. According to these models, the change process consists of increasing the target behaviour or its likelihood (Renneberg and Hammelstein, 2006). The stronger the threat and the better the coping skills that a person perceives, the higher the intention to change behaviour, and the more the target behaviour should be implemented. The HAPA model complements the motivational theories, integrates the proven model components, and adds stage theory assumptions. The benefit of volitional models such as HAPA is primarily that they close the gap between intention and behaviour (Schwarzer, 2004).

Second, this study shows that only a doctor who has a strong relationship of trust with his patient can increase his motivation and influence his decisions. The patient's competence assessment is a significant
factor for changing risk behaviour or adopting health behaviour. Whether and to what extent a person trusts himself or herself to be able to maintain a specific behaviour even when difficulties arise determines to a large extent whether this person starts treatment at all, how much effort he or she invests, and how quickly he or she gives up (Schwarzer, 1992). A positive assessment of one's competence concerning a specific behaviour is, therefore, one of the most essential prerequisites for a patient to consistently implement a health measure (Bandura, 1977). The attending doctor can support the patient's expectation of self-efficacy. According to the empirical findings discussed so far, older people, in particular, often show limited competence behaviour. Older people are often not aware of their strengths and weaknesses or do not want to admit them at all. Many chronic diseases are still associated negatively with society. As a result, the most vulnerable people, the elderly, show an increased fear of many chronic diseases and defence mechanisms. Dissimulation in medicine describes the deliberate concealment of symptoms in order to be considered healthy. It is the counter term to simulation, where signs of illness are deliberately and intentionally faked (Peters, 1971). Both defence mechanisms have a typical social moment that is called a gain in illness in the case of simulation. In the case of pretence, the sick person usually tries to maintain their self-image. This must be distinguished from anosognosia, which refers to the pathological non-recognition of disorders. The patient does not deliberately hide symptoms but does not recognise them (Peters, 1971). Several studies show that the intention to do something is mainly influenced by self-efficacy, outcome expectations, and risk perception, while implementing the intention requires right action and coping plans (Renneberg and Hammelstein, 2006). Therefore, it is worth distinguishing whether a patient is still thinking about a particular treatment or behavioural change or whether he or she has decided to do so but is not implementing it. Nevertheless, some factors seem to be necessary regardless of the event's stage, as HAPA shows. This is particularly true of attitude, in the sense of beliefs about the behaviour in question, and self-efficacy expectations (Renneberg and Hammelstein, 2006). Personal beliefs, such as expectations of results and self-efficacy expectations, are among the most critical variables in terms of intention formation and bridging the gap between intention and behaviour (Rudy et al., 2009, Sirur et al., 2009, Wong, 2009). These results suggest that it is always worth investigating a patient's beliefs and subjective theories, regardless of the patient's behavioural change stage. In line with the literature, this study confirms that the doctor-patient relationship has an enormous impact on the patient's behaviour regarding their health behaviour.

Third, this paper introduces the concept of adherence, which has only been established in medicine. Adherence refers to active cooperation between doctor and patient in joint decision-making and agreement on therapy goals. If there is a high degree of trust between them, the doctor can be sure that the patient discusses all relevant health issues. This confirms the assumption that the stronger the doctor-patient relationship is, the more effective it is to achieve positive adherence and thus actively improve health behaviour. If there is no adversarial relationship, the patient shares their health history, present symptoms, and sense of illness. The doctor assumes a supporting, treating, and informative role. If, on the other hand, the relationship is negative, the doctor does not have access to the patient's emotions and perceptions, fears, and disabilities. The patient hides his symptoms or does not find his way to the practice at all. As a result, diseases cannot be diagnosed, preventive measures and constant monitoring of the disease's course are impossible. Non-adherence means the patient does not adhere or adheres only incompletely to the treatment arrangements previously agreed with the practitioner. Through a perfect doctor-patient relationship and thus increased adherence, the doctor also increases his patient's influence. Recommendations in the sense of health education reach the patient and are implemented or discussed further openly in case of obstacles. Thus it can also be assumed that the patient has a positive attitude towards a change in behaviour towards the use and acceptance of mhealth apps.

In summary, this paper provides an overview and believes that different theories and models should be considered in combination to gain a better understanding of technology acceptance and use behaviour. Our study considers a significant contribution by looking at the role relationships of adherence and the social-cognitive process model coherently. The combination of technological, social-cognitive, and medical concepts for examining health behaviour concerning technology adoption seems essential for future research.
6.2 Implications for Practice

The use of mhealth apps in older people's lives is generally associated with the hope that it will increase the autonomy, independence, and well-being. In this way, apps should facilitate the independent performance of daily living activities and promote emotional experience. However, digital technologies often touch on several ethical principles that may conflict with each other. For example, the sensitive use of mhealth apps in-home care can strengthen self-efficacy and participation of both people in need of care and their caring relatives. A mhealth app's design should not unnecessarily accentuate existing support needs and should not create deficit-oriented images of old age in older people and in their caregivers and contacts. Apps should be designed so that older people can use and maintain their existing skills and experience themselves as competent in dealing with technology. They must adopt digital technologies to their needs and, if necessary, switch them off. These requirements make it clear that considerations of conflicting goals must be included in developing technologies from the very beginning. Therefore, potential users should sufficiently be involved in the development and optimisation of technology. Irrespective of this, ethical reflections should also be emphasised in the training of engineers, precisely because they often do not meet users directly. Co-development can improve longer-term app utilisation and effectiveness, with user-centred design employed to develop mobile health apps that are effective in chronic self-management of diabetes, asthma, and cardiovascular disease (Matthew-Maich et al., 2016, Schnall et al., 2016, Woods et al., 2017).

Furthermore, it has shown that the doctor-patient relationship influences adherence. Vice versa, non-adherence also affects the relationship. About the burden of non-adherence on both patient and practitioner, it seems necessary to develop effective interventions that do not require an elaborate program but can be used in any medical consultation. Forms of communication must be found, which, on the one hand, allows the integration of the patient's fears and needs and, on the other hand, takes into account the tight time frame and the already high demands on doctors.

7 Limitations and Further Research

This research has several limitations. Firstly, due to the qualitative approach in the study, we cannot make precise statements about the strength of the influences on adoption or long-term use behaviour. With a sample of 20 Experts, generalisability is limited, but the interviews provided deep insights into the individual's perception. Additionally, the study is based on a convenience sample from Germany. Further studies are necessary to investigate how mhealth apps can improve health care and patient communication in medicine, obtain evidence for transparent evaluation processes, and assess whether apps have an objective ‘positive health effect’. The information collected from patients in their mhealth app should improve patient-doctor communication and provide an additional data source. There is also a need to understand how apps could complement and improve the doctor's role in patient management.

8 Conclusion

The study showed that many German doctors who responded are not familiar with the contents of the DVG, despite a fundamentally positive interest in digitisation, and that there is currently scepticism about apps on prescription, health apps in general, and possible unforeseeable risks. The results showed that many health professionals still work very little with mhealth apps or recommend them to their patients. Doctors call for further training opportunities for medical staff, and appropriate funding is a high priority for the medical profession. Despite the limitations, benefits could be identified, and recommendations for influencing older people's health behaviour regarding the use of mhealth apps could be given. The recent COVID 19 crisis has led to a rapid spread of virtual care in Germany, catalysed both by the urgent need for remote care of a vulnerable population and a facilitated reimbursement approach. Despite this agile adaptation during the crisis, it is crucial to develop longer-term plans to use mhealth technologies.
Adoption of mhealth apps

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Adoption of mhealth apps


Adoption of mHealth apps


Adoption of mhealth apps


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