UNIVERSITY OF TWENTE.

The motives of young adults to make use of mental health related apps in their daily lives

– a qualitative interview study

Master's Thesis
Maria Jebbink, s1809466
Behavioural Management and Social Sciences
Department of Positive Clinical Psychology and Technology
1st Supervisor: Dr. Tessa Dekkers
2nd Supervisor: Dr. Jorinde Spook
26th of February 2021

Abstract

Background. Currently, problems with young adults' mental health are increasing. In this context, the health care system is strained since there is an increased need for professionals to provide mental health care. Thus, more self-management by young adults is needed to improve their mental health problems themselves. One opportunity to improve self-management in young adults are mental health related applications (apps). These apps are often designed based on experts' perspective and little is known what makes them attractive to the users. This study used the self-determination theory and the agency model of customization as theoretical frameworks to investigate young adults' motivations to use mental health related apps in their daily lives. **Methods.** 7 semi-structured interviews with young adults between the age of 19 to 25 living in Germany, Australia, Argentina and Spain were conducted via an online communication platform. During the interviews the participants' perceptions of the determinants from the SDT (intrinsic and extrinsic motivations, competence, relatedness and autonomy) and the determinants from the agency model (perceived, involvement, control and identity) were discussed. The interviews were transcribed and analyzed with Atlas.ti using both an inductive and deductive approach. **Results.** The results showed that participants are motivated by all components from both theories when using the app. However, intrinsic reasons, competence and perceptions of involvement were discussed most. Specifically, control over emotions and the ability to resolve stress were important motivators for the participants. Extrinsic motivations and perceptions of identity have shown to get less attention. All in all, the motives to use these apps are rooted in intrinsic reasons like competence, autonomy and involvement rather than in extrinsic ones. **Discussion.** Main findings from the results were that some perceptions and conceptualizations differ from the conceptualization the authors have whereas others match these. Literature suggests that autonomy has a major influence on motivation whereas the participants from this study see perceptions of control and competence as most influential. Moreover, relatedness is perceived as self-relatedness. Lastly, identity has shown to be less relevant whereas the authors suggest that it is equally important. Future research should replicate the study with a broader sample, a different population (e.g. older adults) and different apps in order to see whether different perceptions of the theories arise.

Keywords: young adults, mental health. MHapps, self-management, self-determination, agency

The number of young adults with mental health related problems grows constantly. Bovier, Chamot and Perneger (2004) suggested that one of the main health related threats to young adults are symptoms of mental health disorders, including symptoms of depression and anxiety. Specifically, the World Health Organization (WHO) estimated that one in six young adults suffers from these symptoms, as young adults are exposed to a need for autonomy or pressure to conform (WHO, 2020). Research proposes that young adults' mental health problems arise from a lack in self-esteem, mastery of activities and social support (Bovier, Chamot, Perneger, 2004). Changing life circumstances force them to enter into learning processes and acquiring these skills. Consequently, the development of coping and problem-solving skills in context with their emotional and social behavior are important to improve their mental health (Bovier, Chamot, Perneger, 2004).

A skill especially important in context with mental health is the skill of self-management. The development of effective self-management occurs over time and therefore needs assistance and supportive strategies provided by professionals (Bendixen, Fairman, Karavolis, Sullivan & Parmanto, 2017). However, due to the growing number of young adults with mental health problems the general health care system is strained. Specifically, pressure for professionals grows to offer mental health care (Grady & Gough, 2014). Moreover, the health care system is constantly expected to become more efficient so that better care is provided with less effort (Pearson, Goulart-Fischer, Lee, 1995). Thus, more self-management by young adults is needed to take away the burden for the health care system and also for the benefit of young adults to manage their mental health problems themselves.

One outstanding possibility to help patients manage their own mental health are supportive electronic health (eHealth) interventions such as mental health information websites, online social support networks, mental health education programs and mobile health devices (Noar & Harrington, 2012). Technological innovations open doors for a new way to communicate and deliver mental health related content to people (Noar & Harrington, 2012). Additionally, these technologies can reduce health care errors such as a delay in treatment or wrong medication, create room for an increased collaboration between experts and the society, and they encourage the adoption of healthy behaviors (Kreps & Neuhauser, 2010). Particularly, self-management through apps has shown to be highly beneficial when it comes to daily life and mental well-being since apps are easily accessible (Whitehead & Seaton, 2016).

A specific field of mobile health (mHealth) apps concerns mental health related apps (MHapps). To illustrate, an example of such an app is Moodkit (Thriveport, 2020) which was designed to help user apply mood-enhancing tasks independently through 200 exercises based on Cognitive Behavior Therapy. Studies in this domain found evidence for a reduction of anxiety or depression symptoms and an increase in management of these symptoms when using MHapps (Whitehead & Seaton, 2016; Bakker & Rickard, 2018). Moreover, research provided evidence that MHapps increase the users' mood and improve their overall well-being (Bakker, Kazantzis, Rickwood & Rickard, 2018). Particularly, mindfulness training decreases depression or anxiety (Flet et al., 2018). Thus, MHapps appear to provide an effective solution for the improvement of public mental health (Torous, Nicholas, Larsen, Firth, & Christensen, 2018).

However, many mental health related apps are designed on the basis of existing health care system constructs and less attention is put on the needs of people that use the app (Schnall et al., 2016). According to Schnall and colleagues (2016), when end-users are involved in the design process, the resulting apps are easier to use and perceived as more useful, which in turn makes them more effective (Schnall et al., 2016). A study by Peng, Kanthawala, Yuan and Hussain (2016) investigated how adults perceive health apps and found several motivational reasons which were identified by the participants of their study. Specifically, social competition, intangible rewards (e.g. acquisition of levels) and hedonic feelings after using the app are motivators for adults (Peng et al., 2016). Moreover, another study found that digital health interventions for people with mental health problems empower the users to have control about their own recovery which motivates them (Berry, Lobban & Bucci, 2019).

An important aspect in context with motivation is the user engagement since a high user engagement increases the effectiveness of MHapps for the person. Specifically, user engagement in the context of mental health related apps means that people understand the usage of the app as well as the aims, that they accept it and that they are motivated to use it (Lehmann, Lalmas, Yom-Tov & Dupret, 2012). Specifically, these perceptions give them control and therefore increases their motivation (Lehmann et al., 2012). A study by Venkatesh (2000) proposed that perceived control over an app supports the engagement which motivates people to continually use it (Venkatesh, 2000). Moreover, Comello et al. suggested that game-inspired mechanisms e.g. counting the minutes spent on a meditation in Headspace (Headspace, 2020) can improve user engagement and the understanding of the app.

In context with user engagement, the general usage behavior is also important. A distinction needs to be made between initial usage and continued usage. As suggested by literature many adult MHapp users start using an app being motivated to use it but lose this motivation since no human guidance is provided (Baumel, Muench, Edan & Kane, 2019). Thus, they are motivated to initially use the app but then stop. Conversely, other studies suggested that adult users develop habits which influences their motivations to continually use it after the initial motivation to start. Particularly the development of automatic behavior change (habit) motivates people to use an app and increases the likelihood of continued usage (Yuan et al., 2015). Moreover, research on health apps in context with self-care of adults found that automation of app functioning and convenience are appreciated by users. Thus, ease of use motivates adults to continually use health apps (Anderson, Burford & Emmerton, 2016). All in all, research provides evidence for motivational reasons to continually use MHapps, however mainly in context with adults. Therefore, this study focuses on young adults' motivations to use MHapps.

Theoretical framework on motivation

The Self-Determination Theory (SDT) and Agency Model of Customization are proposed to explain motivations to use MHapps. The SDT explains a person's internal growth tendencies as well as psychological needs which serve as basis of self-determination and therefore motivational acts. These motivational decisions can be divided into intrinsic and extrinsic motivation. Intrinsic motivation displays a person's seek for challenges and change to make use of own capacities. Extrinsic motivations display external rewards which influence a person's actions. Moreover, Ryan and Deci (2000) introduce three components which need to be satisfied so that people engage in decisions and behaviors: Competence, relatedness, and autonomy. Competence demonstrate a person's feelings of control over a situation or action. Autonomy focuses on a person's feeling of being the causal reason for one's own decisions. Relatedness manifests the interactions people have with others and their environment.

A study by Shroff and Vogel (2009) investigated intrinsic motivations of students to use technology supported face-to-face discussions and found that specific areas of self-determination and curiosity increase users' motivation. As suggested by Tee and Kazantzis (2011) principles from Ryan and Deci's self-determination theory (SDT) (2000) ranging from intrinsic motivations to extrinsic motivations are found in successful client engagement and therapeutic outcomes. Furthermore, a study by Gillson, Rouse, Standage, Sebire and Ryan (2019) found that particularly perceptions of autonomy as part of self-determination display a strong intrinsic motivation since autonomous motivation is the most efficient way towards

self-directed behavior change. Thus, autonomy manifests an important determinant in MHapps to make the users engage in behavior change to improve their mental health (Gillson et al., 2019). On the contrary, Choi, Noh and Park (2014) suggested that (smoking cessation) apps satisfy all three basic needs from the SDT which might explain that these apps do not sufficiently stimulate autonomous motivation. All in all, research has been done on SDT presenting important findings for motivation in context with technology which will be further investigated in this study.

Second, the agency model of customization by Kang and Sundar (2016) is used since user engagement was found to have an influence on peoples' motivations. The model proposes that a customized device e.g. an app makes the user the source of the information which is processed (self-as-source) increases motivation. Specifically, media customization describes user-initiated activities which serve as information for the medium to modify itself towards the user and therefore result in an increased motivation to use the eHealth intervention. A person can for example decide to only be offered a specific type of e.g. meditation exercises which will increase the fit with the person's needs and therefore increase the motivation to use it (Kang & Sundar, 2016).

The agency model proposes that interactivity, modality and navigability of customizable technologies enhance the user's sense of agency and therefore the motivation to use it. Particularly, the users' perceived involvement, their perceived control and their perceived identity in context with the MHapp stand in relation with a user's motivation (Kang & Sundar, 2016). Perceived involvement manifests a person's conscious experiences, connections or personal references the user makes between his own life and the app. Perceived control manifests as the experience of a user to actively control the app by means of predictability. If a user can predict what happens in the application, he/she will perceive a high level of control which enhances the motivation to use it (Kang & Sundar, 2016). Lastly, the perceived identity enables the user to build and transfer their identity to the app which also serves as motivational factor (Kang & Sundar, 2016). Together the STD and the self-as-source theory provide a theoretical framework for motivations to use mental health related apps.

The current study

Research showed that there are high numbers of young adults with mental health related problems. Subsequently, the general health care system is strained since professionals are expected to be more efficient and similarly provide better care for people. Therefore, an increasing need for young adults to work against their mental health problems independently

arises which will alleviate the burden of professionals and the general health care system. Research showed that apps offer an efficient way to deliver health related content to adults. Specifically, studies demonstrated that they have to fit with users' needs in order to be efficient for the users. Particularly, MHapps have been investigated but mainly in context with adult users. Therefore, this study focuses on young adults' perceptions of determinants from the SDT as possible motives to use mental health related apps in their daily life.

For the purpose of this study, a qualitative interview study is applied which will broaden the knowledge in the field of MHapps. Specifically, this research investigates motivational reasons to use MHapps with the research question '*How do intrinsic and extrinsic motivations as well as autonomy, relatedness and competence influence young adults' motivation to use mental health related applications in their daily life?'*.

Since research proposes that personified offers and user engagement in MHapps are relevant for motives to use these, the components from the agency model will also be taken into account. These aspects will be investigated by the sub question '*How do involvement, control and identity influence young adults' motivation to use MHapps in their daily life?'*.

Methods

Design

This study used an empirical qualitative research approach. Specifically, semi-structured interviews were conducted with young adults who currently use or have used mobile applications to improve their mental health. The study was ethically approved by the University of Twente (approval number: 201177).

Participants

The researcher of this study is a 23-year-old psychology-master student from the University of Twente. The researcher already used the methodology of interviews in her bachelor's thesis as part of her undergraduate training. Additionally, guidance is provided by a supervisor. The researcher is educated about the field of mental health and technology in context with mental health. Since the researcher herself has been using the MHapp Headspace (Headspace, 2020) the conversations about concepts were facilitated e.g. when an exercise was explained to the researcher. Moreover, specific aspects of the app the participants mentioned were directly understood by the researcher because of her background knowledge.

Participants were recruited through convenience sampling since it is used often used in this kind of clinical research (Asharya, Prakash, Saxen & Nigam, 2013). For recruiting the participants, the researcher searched in her direct environment as well as online. Specifically,

the researcher wrote a recruitment message and used social network groups to collect the participants for this study. Next to this, four groups on Facebook on specific mental health apps (Calms, Headspace, Replika and 7MindMediation) were used to recruit participants since this way provided the opportunity to reach a large amount of people. The recruitment message can be found in the appendix (Appendix A).

The participants needed to fulfill the following inclusion criteria to be part in the study: a) participants needed to possess a smartphone, b) use or have used a mental health related app, c) have access to the internet d) be in the age range from 18 to 25 and e) speak fluently English or German. In total, seven participants were recruited. Specific data on these participants can be found in the results section.

Materials

The materials for this study concerned an interview scheme (Appendix B). The interview consisted of a general introduction, 36 questions on general information, motivation, customization and agency and an ending. First, four demographic questions with regard to nationality, age, gender and employment were asked. The second section of the interview covered the mental health state of the participant and the type of app they (had) used. This was followed by questions with regard to the participants' general motivation to use MHapps and a section where they were asked about their behavior in context with customization. Specifically, this section investigated if participants had already made use of customization and if they think they would use an application without this possibility[1].

Afterwards, questions with regard to the participants' decisions and their agency in context with mental health related apps were covered. In particular, these questions concerned perceived competence, relatedness and autonomy of the participants as well as perceived involvement, control and identity. The remaining questions were follow-up questions for the researcher to have the opportunity to probe deeper into a specific topic e.g. 'Can you explain your answer further?'. In case participants wanted to have the interview in Germans, the interview scheme was translated. Research suggest that pilot tests increase reliability and validity of a study (Gani, Rathakrishnan & Krishnasamy, 2020). Thus, a pilot study was conducted with a lay person in order to check whether the questions and definitions are understandable and clear for a person with no background in psychology, no changes needed to be conducted after this.

Procedure

[1] Customization has been excluded in the final study as determinant due to a changed rationale.

After the study was approved by the ethical committee the data collection started the 14th of October and ended on 5th of November 2020. Prior to the interview, the participants were provided with information about the nature and purpose of the study and the duration of the interview. It was offered to meet the participants in a location of their choice or do the interviews online (using a telecommunication program of their choice) due to the COVID-19 guidelines. The researcher provided the participants the opportunity to get into contact with her before the interviews in case there were any questions.

Participants were asked for their preferred language and the appropriate interview scheme was applied. A fitting platform to conduct the interview was chosen or the interview was taken face to face in a specific place. The interviewer explained the purpose of this study and the content of the informed consent (Appendix C). Particularly, the researcher stressed the confidentiality of the study, the possibility to opt out at any time and the fact that participant will not experience any harm by taking part. Moreover, the researcher asked whether the interview could be recorded, took verbal consent from the participants, and clarified that the interview would take between 35 to 70 minutes. During the interview only the researcher and the participant were present. After the interview, the participant was thanked and room for further questions was provided.

Analysis

The data was analyzed using the qualitative research program Atlas.ti version 8.4.5. Research suggest that including different researchers in the analysis can improve the validity of a study (Maxwell, 1992). This study was only coded by one researcher; thus, no interrater reliability was calculated. Instead validity was improved in discussing the coding scheme with the research team in multiple meetings. The data from the interviews was verbatim transcribed by the researcher. The entire transcript was the unit of analysis for this research since this sets the data in context and it can be analyzed as a whole, as supposed by Granheim and Lundman (2004). Specifically, sentences were the main unit of analysis. Demographic information (gender, age, type pf app etc.) was extracted from the transcripts. Additionally, the researcher removed all personal data i.e. places and names. A deductive coding scheme was developed based on the self-determination theory (Ryan & Deci, 2000) and the agency model of customization (Kang & Sundar, 2016) which can be found in the appendix (Appendix D). Specifically, this coding scheme included the determinants of the SDT and the determinants of the agency model as well as the code of customization.

Next, an individually created deductive-inductive coding scheme was developed as final coding scheme for the analyses based on the perceptions of the participants. This coding

scheme included eight main codes and 34 sub-codes. The coding scheme consisted of two levels of coding with codes which were deductive and new inductive codes reflecting the participants perspective. A final coding scheme including the codes, definitions and example quotes can be found in the results section as well as a visual representation of the results (Figure 1). The data was coded until no new topics emerged and no further codes were developed. Thus, inductive thematic saturation was achieved. Additionally, both theoretical frameworks were fully represented by the data which also ensured theoretical saturation. Therefore, data saturation was also achieved, and the researcher stopped the data collection as suggested by Saunders et al. (2018).

The deductive codes were taken from the theories. The inductive codes were derived from the participants' experiences and perceptions. Specifically, the inductive codes emerged from grouping and combining different themes into codes. These themes were mapped to the deductive codes since participants mentioned these aspects in context with the different determinants of the SDT or agency model. The determinants are presented according to their frequency of coding since the more frequent a determinant was discussed, the more it emerged as diverse motivational determinant. Specifically, research suggest that presenting frequency indicates how widespread data can be concerning one code which also implies significance for this code (Elliott, 2018). Within each determinant the topics which were associated by all participants and therefore have a high importance in context with the determinant are discussed. Additionally, unique as well as differences with regard to the perceptions of the different components are presented which provides a coherent and plausible picture of participants' perceptions as suggested by Mays and Pope (1995).

Results

Inductive-deductive coding scheme

Description of codes deductive, inductive, related example quotes, possible remarks

Deductive	Definition	Inductive	Definition	Example Quote	Variation/ Remarks
Intrinsic Motives	Participants' need to make a change for themselves and test for themselves how to improve their mental health	Control over emotions	The ability to structure emotions and understand them.	*'I actually wanted to structure my thoughts. I wanted to bring clarity and calmness in my daily life'*	-
		Resolve Stress	Using the MHapp to diminish the tensed state and therefore reduce stress levels.	*'I think what encouraged me the most was just to turn off my thoughts in a way'*	-
		Curiosity	Curiosity participants experienced in trying something new for their mental health.	*'I just was informed about this, and my main motivation was that I was simply curious'*	Only four participants mentioned curiosity.
		Getting to know oneself better	The opportunity to understand own characteristics better because of a better focus.	*'Okay most important to get to know yourself better. You just understand yourself and your characteristics, you just understand how you think'*	Only mentioned by two participants
Competence	Participants are able to make use of the app as they intended to	Control over exercise	The ability to manifest the type and the duration of the exercise within the app	*'You don't need to take anything; you do not even need to take meditation.*	-

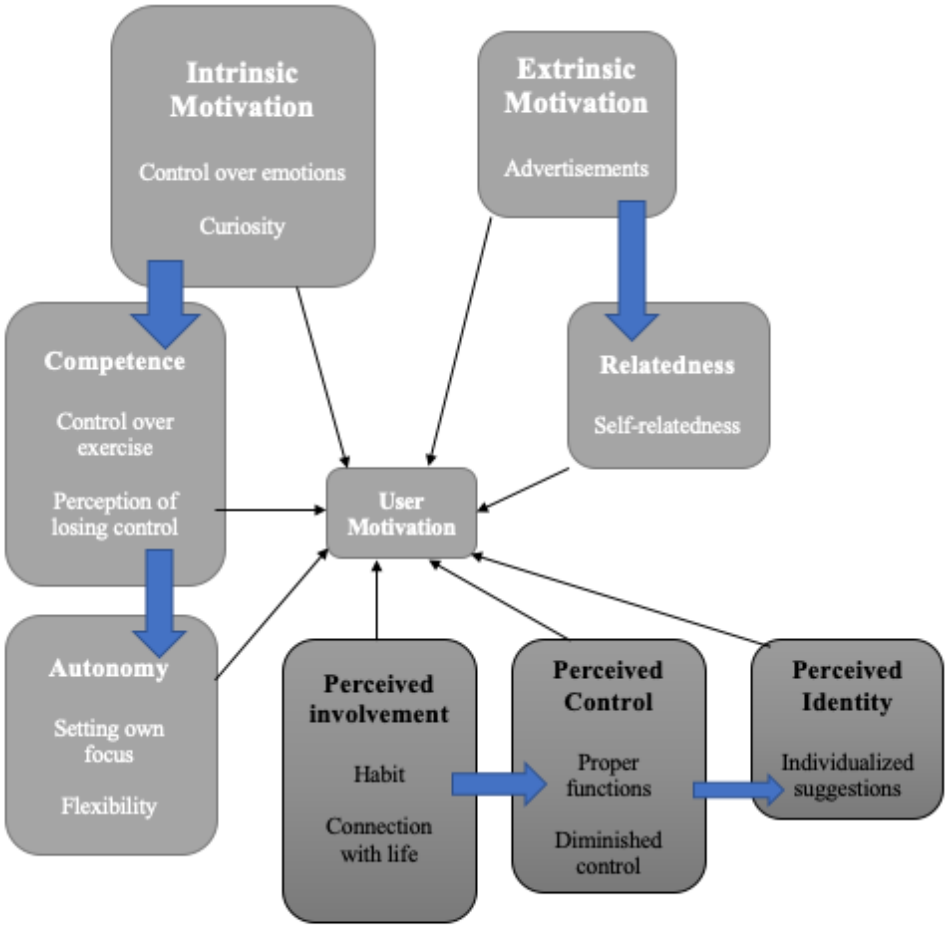
				You can just decide on the exercise you want to do'	
		Not feeling forced	Participants did not want to feel forced to use the app	*'I want to do it freely; I want to do it for me not for the app'*	
		Not feeling control/ Letting go of control	Participants wanted to let go of their control in order to completely relax	*'Hm I would say no because you actually give away your control since you believe that the app can give you something. It would not be important to have this control'*	Four of the participants experienced that not feeling control was the aim of the app whereas the other half wanted to have control
Autonomy	Participants are able to decide on a specific offer and use this offer to improve their mental health	Setting own focus	The participants' needs to decide on the exercises on their own	*'I mean yeah I chose on what I want to put a focus on, with the meditations. I think that having it fit my needs is the main reason I use it regularly'*	-
		Big offer of exercises	The ability to choose from a lot of different exercises to do the most fitting one	*'It was a pretty general offer, which was also visible in the meditation exercises. It was just practical for everyone and not targeted'*	-
		Flexibility	The possibility to use the app at any time	*'I don't really see this as a program but more like demand when I want it I do it'*	-

Relatedness	Participants experience a relation to others, themselves or the app while using the app	Companion in daily life	The app is there for the participants when they need the app	*'I see it more like a support, to get myself started. To just get into it every day'*	-
		Self-Relatedness	The relatedness towards the self and the conscious perception of the body	*'When you finish a meditation and shortly stays in the position, you feel your body and it feels lighter'*	-
Extrinsic Motives	Advertisements and advice for usage	Simplicity of the app	A simple design of the app with matching colors and not too many options visible	*'It directly works. It is clear how it works, and it is simple'*	-
		Advertisements	Advertisements participants got through the internet when googling for improvement of mental health	*'For one it was definitely the advertisements I received because of the google algorithms'*	Two participants mentioned that they had a recommendation of a friend or therapist
Perceived involvement	Participants are able to regularly fulfill their needs when using the app to improve their mental health.	Fit with life/ Connection with life	The integration of the app in the participants' daily life regardless of time or place	*'In my opinion you do not use the app in between just in a rush. It is important that you focus on the exercises even if they are small and this was possible'*	This code was the most frequent one in general
		Habit/ Regular usage	Making the app a habit so there is no extra effort to make use of it	*'Just the routine from which it just went on. Now it is just really ambivalent, just different times'*	-
		Being calm	The ability to reach a calm state after using the app by slowing down thoughts	*'I really enjoy the silence and the calmness in the*	-

				moment, that is pretty beautiful'	
Perceived control	Participants are able to use the application's options as expected by them	Proper functions	The functions and options from the app are clear and can be understood with former knowledge about apps	*'It directly functions, it is clear how the options work. There is nothing complicated about it'*	-
		Stopping negative thoughts	The ability to stop negative thoughts	*'When you use something like that you try to come into a different state, I would say you are then able to tackle anxiety thoughts or whatsoever'*	-
		Diminished control	The control which was lost because not all parts of the app could be used	*'I had no possibility to skip the meditation. Therefore, I had some moments where I did not like a meditation, then I thought I would actually like to do the next one'*	Two participants only had the free version of the application
Perceived identity	Participants have the possibility to incorporate their identity into the application	Individualized suggestions	The suggestions in the app where customized towards the participants' needs	*'And I do feel even if it is just to a small extent, a small detail it just tailors the app towards myself and towards my identity'*	-
		Entering name	Typing in the participants' name in the application and save it	*'Yes, for example in the app that I used in the past months, I open the app and they say Hello […] welcome back or something like that'*	This was the code least important for the participants

Figure 1

Model of young adults' motivations



Notes: White-letter boxes demonstrate components of the Self-Determination Theory, black-letter boxes demonstrate components of the Agency Model of Customization. The black arrows represent influence on users' motivations. Blue arrows represent the connections between the different components of the SDT and the agency model, the size of boxes demonstrates the relevance, the size of the error indicates the importance of connection.

Participants characteristics

A general section was included to give an overview of the participants and the application they are using. Seven participants participated in the study, all were full-time students (19-25) and working next to their studies. Four of the participants were living in Germany and the other three participants came from Spain, Australia and Argentina. Two participants were diagnosed with depression and anxiety, and all other participants suffered from self-reported depression and anxiety symptoms, expect for one.

Due to the convenience sampling, all participants used mental health related apps to improve their mood and tackle mental disorder related symptoms. The main apps this target group was using were meditation apps. Specifically, the participants used Headspace, a

meditation app which offers different types of guided meditations which focus on managing anxiety and stress, sleep focus, mind and body health to become more mindful in the everyday life (Headspace.com, 2020). Three participants also used mood trackers which were mind journals where different moods of the day can be noted down and therefore tracked. All participants used the app on a daily or weekly basis. The topics which emerged reflect the participants' perceptions of the theoretical components in context with the apps. Specifically, individual perceptions of the different components are presented in the results section. Sometimes these perceptions were shared, however individual and unique perceptions are also presented.

Motivation in context with self-determination theory

Intrinsic motivation

The main topic which was found as intrinsic motivator was 'Control over emotions'. All participants mentioned that they used the app to gain control over their emotions and change the level of intensity of the emotion. *'I use that as a really important tool to deal with my emotions and also channel them'* (Participant 5). Characteristically, the participants searched for self-regulation of their feelings to be more balanced in their lives. *'You just can control your thoughts better; I mean you have these thoughts and then you can distance yourself from these. This is what is happening when I am meditating'* (Participant 2). Thus, self-regulation seemed to help the participants to manage their emotions and therefore be more rational in their daily life which intrinsically motivates them.

Secondly, 'Curiosity' was found as unexpected representation of motivation to use a mental health related app. Two participants wanted to try something new to tackle their mental health and therefore decided to use the app *'I think…I would say I always consider myself as a quite curious person and therefore I would say the main reason was curiosity and this sort of interest'* (Participant 5). They discussed curiosity in terms of initial use. Next to this, one participant who used the app every day had an interest in getting to know herself better *'I thought this apps would help me feed this curiosity and getting to know myself better, understand my emotions and my mind.'* (Participant 7). Additionally, a participant who used Headspace to improve anxiety problems mentioned that he used the app to make his thoughts of anxiety clearer *'Okay most important to get to know yourself better. You just understand yourself and your characteristics, you just understand how you think'* (Participant 3).

Competence

The most often discussed topic in context with competence was 'Control over exercises'. By this, participants explained that they had a need to decide the duration and kind

of the exercise so that the exercise fits with their current needs. They felt that such decisions increased their ability to act against their mental health struggles and this created a feeling of competence *'Yes indeed, so when I use the app I can decide where to put the focus on'* (Participant 3). Additionally one participant who used the app on a weekly basis sees the apps' definitions as helpful for feeling competent since one has the chance to pick the best fitting exercise and therefore can achieve goals *'When you do courses you have the opportunity to pick between three, five and ten minutes, you can decide this every time that is nice.'* (Participant 6).

Additionally, the code 'Not feeling forced' was found. All participants did not want to feel forced by the app by getting reminders to use it. They saw the reminders as a factor which decreases their possibility to achieve their goals on their own and feel less competent and in control. Participants referred to continued use when they talked about this *'[…] So that you receive message that remind you, but I did not do that because I don't want that, it then becomes just another pressure factor in my life I want to do it out of free will.'* (Participant 1).

On the other hand, the code 'Letting go of control' was found as almost equally important topic as the code 'Not feeling forced'. Half of the participants saw losing control as a special aspect about using meditation apps *'You actually give away your control since you believe that the app can give you something* [Improved mental state]*. It would not be important to have this control by myself.'* (Participant 2). The participants perceived that they did not actively think and therefore did not feel in control. Besides, one participant mentioned that losing the control over his thoughts is using the app the right way and therefore having the control over the app. Specifically, a meditation app aims at brining a person in a relaxed state which is also what the participant aimed at and therefore he perceived the greatest control when he achieved this state '*When I am feeling this control, this is when I actually am not at all in control or I am losing this control'* (Participant 5). Hence, present and absent control appears to have an fluence on the continued use for the participants.

Autonomy

Thirdly, perceptions of autonomy emerged as motivational aspects. Participants saw the ability to set their own focus as the main representation of autonomy. Therefore, the code 'Setting own focus' emerged. Participants wanted to decide for exercises on their own and therefore fulfill their own needs so that they experienced freedom *'You can still decide everything on your own, that's also what I did. You can freely choose your type of exercise and most important you can freely choose from an offer of exercises.'* (Participant 1).

Particularly, this offer provided the opportunity to use the app in many different situations *'So yeah, having it fit my needs is the only way I think, the only reason why I started it and continued.'* (Participant 4). Thus, own focus seems to represent autonomy for the participants when they continually used the app. Another code which was found in relation to setting one's own focus was 'Big offer of exercise'. Participants mentioned that they enjoyed having a big offer which is not tailored towards a certain group: *'It was a pretty general offer, which was also visible in the meditation exercises. It was just practical for everyone and not targeted.'* (Participant 2).

Moreover, the topic of 'Flexibility' emerged as perception of autonomy. Participants who were occupied with a study program and mentioned in this context that the opportunity to use the app whenever they wanted and this increased their autonomy *'I don't know, I use when I have time for it. When I feel like doing a meditation or another exercise, I can just open the app and do it.'* (Participant 6). Additionally, they had the ability to use everything they wanted freely, regardless of the order of exercises which increased their autonomy *'So you also can-do things which would actually be at the fourth day, but it is right now the third of the week meditation.'* (Participant 1).

Relatedness

Participants in general did not see relatedness as a major motivation. The main perception of relatedness was 'Companion in daily life'. All participants saw the app as a companion in their life in order to tackle their mental health issues. The app helped them to achieve a better state *'So this was not the ultimate thing to get me out of this dark hole. It was more of a companion* [the app]*, it was good for that definitely, but I am glad that it was just a part of the whole process.'* (Participant 1). One participants saw the app as important part but not as only way to tackle his mental health problems for them, he himself was the main source the app was just a helping tool *'I look at these apps not to deal with my mental health so to solve my problems but I do think that these apps can help in developing a habit when it comes to things you can do such as mindfulness or meditation and so on, to work on improving your mental health.'* (Participant 5). Hence, the app as companion therefore appears to have an influence on participants continued use.

Surprisingly, participants described self-relatedness, which was another code. This sense of being aware of oneself emerged when the participants practiced body scans or mindfulness exercises: *'So many meditations and voice messages where connected to body mindfulness like a body scan. So that you just feel all parts of your body and you kind of go through these parts. You focus on every part of your body and feel yourself.'* (Participant 6).

Thus, perceptions of relatedness seem to be focused on internal rather than external relatedness.

Extrinsic motivations

Extrinsic motivations were seen the least influential to use the app. The code found most often in this area was 'Simplicity of the app'. This code included the participants' perceptions of a structured overview within the app. One participant, who used the app on a daily basis, mentioned that he especially sought simplicity in all apps that he uses '*When it comes to mental health related apps and mental health related topics, I personally seek simplicity and positivity.'* (Participant 5). Thus, the well-structured layout of the app increased the participants' extrinsic motivation since it simplified the use.

Lastly, the code 'Advertisement' was found as extrinsic motivator. All participants received an advertisement which made them use the app in the first place '*For one it was definitely the advertisements I received because of the google algorithms.'* (Participant 3). As a result, external motives appear to be rather focused on the initial use.

Motivation in context with the agency model

Perceived involvement

The most important perception of involvement was 'Fit with life/ Connection with life'. In this context two participants -who used the app every day saw the option to use 7-day exercises as a simpler way to integrate it in their lives which motivates them '*I did the seven day program and it was really nice, I woke up with this in the morning and I had a way more positive start in the day I really experienced this in a good way.'* (Participant 1). Next to this, participants enjoyed the possibility to set different time frames (e.g. 3, 5 or 10 minute meditation) since it enabled them to incorporate the app in their lives in more situations '*I guess it is just practical, if there is only a 20 minutes meditation and I have ten minutes before I need to go back to work, I am not going to sit down with the app that often but luckily this is not the case.'* (Participant 4). Lastly, two participants who suffered from anxiety symptoms mentioned that they liked that the app offered SOS meditation or exercises which you can access anywhere '*Definitely, in headspace there is this super popular section called SOS meditation or emergency meditation, when you are feeling super stressed out […] you can access the app, or reach out for the app and to maybe help yourself and resolve something directly.'* (Participant 5). Hence, a good fit with the participants' lives seems to have increased their motivation to continually use it.

In addition, the topic of habits emerged as perception of involvement: 'Habit/ Regular Usage'. For participants who used the app on a daily basis habit was more important as a

preventative motivation and for the participants who used it irregularly more to establish this habit in general '*It was not always just the stress, I actually wanted to also do it on a regular basis. Therefore, sometimes it was indeed stressful and on other days I was just relaxed.'* (Participant 2).

Another important perception of involvement was "Visible Progress'. In this context participants liked how it is visible what they have achieved so far. Hence, self-development towards a calmer state in general motivated them *'So if you have already done two days or so, it welcomes you on the third day with something like, welcome on the third day or whatever. You can still also do different exercises and they always show where you at.'* (Participant 1). A participant who tried to use the app every day enjoyed that the progress was wrapped up and visible '*It was a bit focused on my person but not completely, mainly because the progress and the many different steps were visible, you just saw how you went through it.'* (Participant 2). Thus, overviews of acquired skills suggest a representation of involvement for the participants.

Perceived control

The most frequently named topic for this domain was 'Proper Functions' which was represented accurately in Headspace *'I would say that it always worked as I expected it. Headspace actually names the course, so you know what to expect.'* (Participant 7). Proper functions made the participants feel more secure which the participants perceived as important with mental health related topics *'I think it is really intuitive and simple, and it behaves the way I expect it to behave, I think that especially in a mental health related app, which can be triggering and sensitive topic, you want it to be an app where things happen as they were intended and expected.'* (Participant 5). Hence, predictability can be assumed to represent control according for the participants.

The next code for this domain was 'Stopping negative thoughts'. While using the app, participants with anxiety symptoms wanted to learn to resolve their negative thoughts *'My head was working all the time, I was not able to sleep well or to even fall asleep well. I was tensed like literally all the time. That's why I used the app as well.'* (Participant 1). Specifically, Headspace provided the possibility to actively resolve negative thoughts which increased participants' perception of control over their mental state. *'I have a lot of issues going to sleep at night (...) I have tried, I think it is called calm. But this was not for me, Headspace works better for me.'* (Participant 4).

An interesting topic which was found was 'Diminished Control due to free version of an app'. Specifically, participants felt a diminished control over the app since they only had

the free version which restricts them to use all features *'I had no possibility to skip the meditation. Therefore, I had some moments where I did not like a meditation, then I thought I would actually like to do the next one.'* (Participant 2). Moreover, they mentioned that they sometimes had pre-assigned exercises which also decreased their sense of control *'I can turn on the sleep cast but I cannot pick what I want, which sometimes really annoys me but that is the only time where I can think of.'* (Participant 7).

Perceived identity

All the participants mentioned that in context with MHapps they did not feel a need for an elaborately represented identity. However, 'Individualized Suggestions' had an influence on participants' motivation. Participants appreciated the suggestions because they were based on an expertise opinion or system *'I think that there is always an algorithm behind such an app, and sometimes the suggestions are really fitting. So, I think that these suggestions are done by a professional.'* (Participant 2). Other participants who used the app on a weekly basis mentioned that they actually would like to have more individualized suggestions in their app, however it was not as important as other factors *'I guess one thing that would be nice is if they had more suggestions or packs for me. But that is just an idea. I have an idea about what I am struggling with mentally so this would be nice.'* (Participant 4). This participant saw individualized suggestions as a nice side effect but not generally important since headspace already has a lot of options.

Discussion

Main findings

The purpose of this study was to investigate young adults' intrinsic and extrinsic motives and perceptions of competence, relatedness and autonomy as possible motivations to use MHapps. Specifically, intrinsic motives like control over emotions and curiosity were found as well as closely connected perceptions of competence like control over exercises and losing control. Relatedness was perceived as self-relatedness and extrinsic motives in form of advertisements. With regard to the sub-question perceptions of involvement were found to manifest themselves in development of a habit and a connection between the app and the young adults' life. Moreover, control was perceived in terms of competence: Knowing how to use the app. Identity was perceived in form of individualized suggestions. The findings are based on the participants' perceptions of components of the SDT and the agency model. Participants referred mainly to continued use and engagement when discussing the determinants and the MHapps, initial use was only discussed in context with extrinsic motives.

One major finding from the current study was that interviewees experienced control over their emotions as intrinsic motivator, regardless of whether they had a diagnosed mental health disorder, suffered from symptoms of mental health disorders or had no mental health disorder symptoms at all. Precisely, this control was perceived as emotion regulation by the young adults. As suggested by Ryan and Deci (1985) intrinsic motivation describes an inborn seek to search for challenges and change to make use of own capacities. Likewise, young adults from this study perceive control and change over their emotions and therefore improved well-being as internal motivation and form of user engagement. Multiple studies proposed that mental health related interventions in the online setting provide opportunities for self-management and can contribute to the independence of patients in dealing with their mental health problems themselves for long-term periods (Deb et al., 2018; Whitehead & Seaton, 2016). Similarly, the current study showed that self-management, in the form of emotion regulation, is also a reason for young adults to continually use Mhapps. Hence, experts perceive self-management as important motivator for using MHapps which is equivalently a reason for young adults to use Mhapps.

Another important finding concerns the concept of competence. Specifically, the control over the type of exercise young adults do, the duration and the degree of difficulty are relevant since young adults expressed a need to make these decisions on their own. Gillson and colleagues (2019) suggested that the possibility to be autonomous and make own decisions have a major influence on motivation. This shown to be the case, but conversely, young adults from this study perceived the possibility to make own decisions not as form of autonomy, but as a form of competence. Interestingly, half of the interviewees perceive that losing control in the context of meditation is the most efficient way to work towards an improved mental health. Thus, their perception of losing control gives them a feeling of competence. Janowiak and Hackmann (1994) found that meditation serves relaxation and focusing on the mind being free of thoughts. This state of mind reduces perceived stress and negative emotions. Moreover, Kjaer et al. (2002) suggested that dissolving the mind throughout meditation increases dopamine levels and improves the mood. Thus, losing control throughout the meditation results in an improved mood and in reduced stress levels. As a result, the young adults from this study see losing control as motivating since it produces the intended effect of improving their mood.

One novel finding was that perceptions of relatedness were mainly manifested as a self-relatedness which differs from Ryan and Deci's (1985) conceptualization of relatedness. Precisely, participants experienced a quite close connection towards themselves after using

the app. Different studies showed that meditation apps such as Headspace support mindfulness abilities which can be an explanation for this finding. Specifically, frequent usage can increase the management of mindfulness and therefore supports the ability to increase body and mind self-awareness (Flett et al., 2020; Baumel et al., 2019). Thus, a higher level of self-relatedness can be achieved. Subsequently, the young adults from this study felt self-relatedness throughout their use and an increased motivation to continually use the app.

Perceptions of autonomy in using MHapps were less important for young adults. The main perception of autonomy was the ability to set an own focus on how to use the app to improve their mental health which is in line with Ryan and Deci's (1985) understanding of autonomy. The interviewees perceived that they were able to make autonomous decisions since they could make use of many different types of exercises. Gillison and colleagues (2016) suggested that acknowledging the users' perspective and emphasizing the user's responsibility serve as strategies to increase autonomy. Hence, perceptions of autonomy in form of user responsibility result in motivation, which was also the case in this study.

Extrinsic motivation was not perceived as important by young adults as other determinants. Interestingly, the interviewees named advertisements as well as lay out of the apps as extrinsic reason rather than rewards as suggested by Ryan and Deci (1985). Specifically, young adults referred to initial use when extrinsic motivation was discussed rather than continued use. This finding can be better explained by the Unified Theory of Acceptance and Use (UTAUT) since this model proposes that performance expectancy describes an individual's belief about that using a system will help to achieve own goals (Kupfer, Ableitner, Schöb & Tiefenbeck, 2016). Specifically, the advertisements were perceived as initial motivator to use the app and improve their mental health by the young adults from this study.

A major finding from the agency model was that the interviewees perceived to have the app fit within their lives as most influential aspect on their motivation, which fits with the definition in the agency model (Kang & Sundar, 2016) where involvement is conceptualized as conscious experiences of connections a user makes with a device. Several studies suggested that app users evaluate how useful an app is for themselves based on the accessibility of use in daily life and the effort they need for using (Yuan et al., 2015; Kupfer et al., 2016). Specifically, headspace offered many different exercises which made it easy for the users to integrate it in their lives and therefore their motivation was increased.

A novel finding was the development of a habit in context with app usage and perceptions of involvement. This conception is not covered by Kang and Sundar's (1985) definition. Even though the creation of a habit is not part of the agency model, the finding is in line with other literature on motivation. Multiple authors suggested the development of an automatic behavior change process can motivate people to continually use an app. This automatic process increases the likelihood of continued use for technology users (Yuan et al., 2015; Kupfer et al., 2016). Likewise, the young adult from this study perceive development of a habit as motivational reason for their continued use.

Moreover, the interviewees were focused on the perceived outcomes the app established which is another major finding. This finding can rather be explained by the reasoned action approach than by the SDT or the agency model. Specifically, the reasoned action approach suggests that outcome evaluations or behavioral beliefs about the negative and positive consequences of behavior have a major influence on attitudes towards this behavior and therefore on intention (Fishbein & Ajzen, 2011). Similarly, the young adults from this study see positive consequences, acquisition of skills and an improved mood, as motivating. Specifically, seeing the progress they made, motivated them to continue with using the app. Thus, young adults from this study also hold behavioral beliefs about positive consequences which motivated them.

Next to this, major findings with regard to the perception of control emerged. This determinant was expected to be more influential since existing literature supposed that control over an app has a major effect on the user's motivation to use it (Kang & Sundar, 2016). The findings from the current study show that when young adults use mental health apps, they discuss control in terms of competence: knowing how to use the app makes them feel in control, which motivates them to use the apps. This conceptualization is not fully in line with Kang and Sundar's notion of control, which focuses on control over presentation or functionality of an interface (Kang & Sundar, 2016; Marathe & Sundar, 2011). Such elements of control did come up when young adults emphasized the importance of being able to choose the specific exercise that fit them. As suggested by Sundar and Marathe (2020) customization of mental health related apps aims at creating the best outcome of interest for a specific user and therefore motivation to use it can be enhanced. Hence, this finding is in line with existing literature.

A novel finding in terms of perceptions of control concerned a decrease in young adults' control. Young adults who used a free version of the app explained that they are not able to make use of some functions which diminishes their control over the app to a large

extent. Precisely, these financial restrains were perceived as external demotivator to continue using the app and the interviewees felt restricted by that. Conversely, a study by Hsu and Lin (2015) suggest that intrinsic motivation (emotional value) and extrinsic motivation (performance value) are increased by using free versions of apps since they provide an offer which satisfies the user. However, in the current study, young adults perceived the offer as unsatisfactory and therefore demotivating.

Perceptions of identity were found to be the least influential determinant on the interviewees' motivation. In this research, young adults used meditation apps which do not provide e.g. counselling exercises and have a rather general offer. Interestingly, individualized suggestions were not important for all of the participants. Conversely, Kang and Sundar (2016) suggest that perceptions of identity in form of customizable interfaces have a positive effect on the user's motivation. A study by Van Der Does, Van Dyck, Spinhoven and Kloosman (2008) provided evidence that there is no difference in the effectiveness individualized meditations and generalized ones since reducing stress and managing emotions do not require individualized instructions in order to be effective, which can explain this finding.

Strength and limitations

This study investigated a novel and relevant topic which, to the author's knowledge, has not often been addressed in previous studies through in-depth qualitative interviews. Specifically, the combination of using the self-determination theory and the agency model in context of mental health related apps gave new insights. Precisely, it represents how mental health related apps are used from a real-life perspective and it is one of the first to picture the understanding of self-determination theory and the agency model from a non-expert perspective. This provided the opportunity to develop a visual representation of motivation as done in research by Wang, Egelandsdal, Amdam, Almli and Oostindjer (2016). This representation is adapted towards the perspective of young adults and how they perceive determinants from the SDT and the agency model.

Next to this, detailed and specific data could be collected since the participants had the opportunity to e.g. check on their apps when they wanted to talk about a specific exercise which resulted in precise answers to the researcher's questions. The interview structure also served the later coding since the researcher was able to interpret the findings accurately and in context with the participants' circumstances since she had the possibility to ask follow-up questions, ask for justification or ask to establish a connection between different topics as suggested by Mclntosh and Morse (2015).

A pilot test of the interview has been conducted since this ensures cogency of the interview scheme and gives the interviewer a possibility to practice (Mclntosh & Morse, 2015). This also served the quality of the study since possible bias which might have been caused by the interview scheme could be removed. The pilot test was also conducted with a young adult, the target group of this study, which increases the reduction of bias since the same population as the research population was investigated.

Qualitative research suggests that a small sample cannot be generalized (Berry et al., 2019; Mclntosh & Morse, 2015). However, the current study can be generalized since the participants all belong to the population of young adults with anxiety and depressive symptoms from western countries. Thus, a homogenous sample arose which also used the same type of apps and therefore the results can be generalized for this target group as suggested by Crouch and McKenzie (2006).

A limitation was the structure of the interview. Since the interview included theory-derived definitions of the different determinants and fitting examples, participants might have been guided by the interviewer as often found in qualitative research (Mclntosh & Morse, 2015). Particularly, the examples might have misled the participants, so that the participants' answers and conceptualizations of the determinants might have been depended on this and would have differed with a different example.

Next to this, language discrepancies emerged since not all participants conducted the interview in their mother language. Consequently, the participants' conceptualization of a motivational reason could have differed from the conceptualization they describe it in their mother language and therefore might have biased the results. This is however only a small limitation since this only applied for two participants, the others were able to conduct the interviews in their mother language.

The last limitation concerns the context in which the interviews were taken. Since almost all of the interviews were conducted via the internet, connection problems arose, and sentences or words have not been correctly understood by the researcher. In this case, the researcher asked for a repetition of sentences or words so that everything could be correctly understood and recorded. However, some direct associations with the participants' conceptualizations of the determinants might have been lost.

Future research and practical implications

Based on the results and the limitations, future implications emerged. A larger and more diverse sample should be investigated in order to make the findings more representative for the population (e.g. older users). Since this study has a qualitative study design, the results

are only applicable for young adults with moderate anxiety and depressive symptoms. Future research should continue to investigate this topic with participants who suffer from severe symptoms of anxiety and depression. Different perceptions of the determinants might arise since these participants might have different needs e.g. a more personalized offer and therefore perceive determinants less or more important while using the app.

Moreover, all participants used the same app, Headspace. For future research it is relevant to investigate whether young adults have different motivational reasons for using different types of apps. Since motivation was very closely related to the perceived functioning of the meditation app under study (e.g. young adults use the app because they believed this provided them with control over emotions), different functionalities, like day planners or psychoeducational tools, could also be used for different reasons.

The current study gave insight in how theoretical models can be used to investigate young adults' motivations to use mental health apps. Specifically, the SDT as theoretical model delivered novel findings (e.g. self-relatedness as form of relatedness) which should be investigated further. Moreover, the participants' notion to see perceptions of competence as most influential whereas literature suggest that perceptions of autonomy are most influential should explored more deeply. Thus, future investigation of the SDT needs to be done.

This study added knowledge to the specific field of MHapps. Therefore, the findings from this study should also be incorporated in the design of these apps in terms of addressing control and involvement for the users more. Moreover, more options (e.g. possibility to skip meditation in free version) should be incorporated since young adults are motivated by the ability to integrate the MHapp in their lives.

Conclusion

Young adults perceive intrinsic motivations as well as competence and autonomy which motivates them to use apps that are designed to improve mental health. In addition, young adults find it important to have a sense of control and involvement with the apps they use. Extrinsic motivations, relatedness and identity are perceived less present when using mental health apps. Hence, reasons for continued mental health app usage can be considered rooted in intrinsic motivations and perceptions of autonomy, competence, involvement, and control rather than in extrinsic reasons and perceptions of identity. Future studies should use broader sample to investigate whether other populations that could benefit from mental health apps (e.g. patients or older adults) share the same motivations. Moreover, it should be examined to what extent motivations are similar across different apps, as this study only examined motivation for use for one specific app.

References

Acharya, A., Prakash, A., Saxena, P. & Nigam, A. (2013). Sampling: Why and how of it? *Indian Journal of Medical Specialties. 4(2).* pp.330-333. doi: 10.7713/ijms.2013.0032

Anderson, K., Burford, O. & Emmerton, L. (2016). Mobile health apps to facilitate self-care: A qualitative study of user experiences. Retrieved from: https://doi.org/10.1371/journal.pone.0156164

Bakker, D., Kazantzis, N., Rickwood, D. & Rickard, N. (2018). A randomized controlled trial of three smartphone apps for enhancing public mental health. *Behavior Research and Therapy 109, pp.* 75-83. doi: https://doi.org/10.1016/j.brat.2018.08.003

Bakker, D. & Rickard, N. (2018). Engagement in mobile phone app in self-monitoring of emotional well-being predicts changes in mnetal health: Moodprism. *Journal of Affective Disorders 227, pp.* 432-442. doi: https://doi.org/10.1016/j.jad.2017.11.016

Barak, A. & Grohol J., M. (2011). Current and future trends in internet-supported mental health interventions. *Journal of Technology in Human Services, 29(30), pp. 155-196.* doi: https://doi.org/10.1080/15228835.2011.616939

Baumel, A., Muench, F., Edan, S. & Kane J. (2019). Objective user engagement with mental health apps: Systematic search and panel-based usage analysis. *Journal of Medical Internet Research. 21(9).* doi: 10.2196/14567

Bendixen, R., Fairman, A., Karavotis, M., Sullivan, C. & Parmanto, B. (2017). A user-centered approach: Understanding client and caregiver needs and preferences in the development of mHealth apps for self-management. *JMIR Publications, 5(9).* doi: 10.2196/mhealth.7136

Berry, N., Lobban, F. & Bucci, S. (2019). A qualitative exploration of service user views using digital health interventions for self-management in severe mental health problems. *BMC Psychiatry. 19(35).* doi: https://doi.org/10.1186/s12888-018-1979-1

Bovier, P., Chamot, E. & Perneger, T. (2004). Perceived stress, internal recourses, and social support as determinants of mental health among young adults. *Qual Life Res 13,* pp. 161-170. doi: https://doi-org.ezproxy2.utwente.nl/10.1023/B:QURE.0000015288.43768.e4

Catwell, L. & Sheikh, A. (2009). Evaluating eHealth interventions: The need for continuous systemic evaluation. *PLoS Med 6(8*). doi: https://doi.org/10.1371/journal.pmed.1000126

Choi, J., Noh, G.-Y. & Park, D.-J. (2014). Smoking cessation apps for smartphones: Content analysis with self-determination theory. *JMIR Publications 16(2).*

doi: 10.2196/jmir.3061

Comello, M., Qian, X., Deal, A.M., Ribisl, K.M., Linnan, L. & Tate, D. (2016**).** Impact of game-inspired infographics on user engagement and information processing in an eHealth program**.** *Journal of Medical Internet Research, 18 (9*). doi: 10.2196/jmir.5976

Crouch, M & McKenzie H. (2006). The logic of small samples in interview-based qualitative research. *Social Science Information. 45(4).* doi: https://doi.org/10.1177/0539018406069584

Deb, K., Tuli, A., Sood, M., Chadda, R., Verma, R., Kumar, S., Ganesh, R & Singh, P. (2018). Is India ready for mental health apps (MHapps)? A quantitative-qualitative exploration of caregivers' perspective on smartphone-based solutions for managing several mental illnesses in low recourse settings. doi: https://doi.org/10.1371/journal.pone.0203353

Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavi*or*. New York, NY: Plenum doi: 10.2307/2070638

Elliott, V. (2018). Thinking about the coding process in qualitative data analysis. *The Qualitative Report. 23(11).* Retrieved from: https://search.proquest.com/docview/2155621346?pq-origsite=gscholar&fromopenview=true

Fishbein, M. & Ajzen, I. (2010). Predicting and changing behavior: The reasoned action approach. New York: Psychology Press

Flett, JA., Hayne, H., Riordan, B., Thompson, L. & Conner, T. (2020). Mobile mindfulness meditation: a randomized controlled trial of the effect of two popular apps on mental health. *Mindfulness 10.* Pp. 863-876. Retrieved from: https://link.springer.com/article/10.1007/s12671-018-1050-9

Gani, N., Rathakrishnan, M. & Krishnasamy, H. (2020). A pilot test for establishing validity and reliability of qualitative interview in the blended learning english proficiency course. *Journal of Critical Reviews, 7(5).*

Gillson, F., Rouse, P., Standage, M., Sebire, S. & Ryan, R. (2018). A meta-analysis of techniques to promote motivation for health behavior change from a self-determination theory perspective. *Health Psychology Review 13(1).* doi: https://doi-org.ezproxy2.utwente.nl/10.1080/17437199.2018.1534071

Grady, P. A. & Gough, L. L. (2014). Self-management: A comprehensive approach to management of chronic conditions. *American Journal of Public Health, 104*(8), 25-

31. doi: 10.2105/AJPH.2014.302041

Granheim, U. & Lundman B. (2004). Qualitative content analysis in nursing research: Concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today. 24(2).* doi: https://doi.org/10.1016/j.nedt.2003.10.001

Headspace (2020). Retrieve from: https://www.headspace.com/about-us

Hsu, C.-L., Lin, J. (2015). What drives purchase intention for paid mobile apps? – An expectation confirmation model with perceived value. *Electronic Commerce Research and Applications. 14(1).* pp. 46-57. doi: https://doi.org/10.1016/j.elerap.2014.11.003

Janowiak, J & Hackman, R. (1994). Meditation and college students' self-actualization and rated stress. *Sage Journals 75(2).* doi: https://doi.org/10.2466/pr0.1994.75.2.1007

Kang, H., & Sundar, S. S. (2016). When self is the source: Effects of media customization on message processing. *Media Psychology*, *19*(4), 561-588. doi: 10.1080/15213269.2015.1121829

Kjaer, T.W., Bertelsen, C., Piccini, P., Brooks, D., Alving, J. & Lou, H. (2002). Increased dopamine tone during meditation-induced change of consciousness. *Cognitive Brain Research, 13(2), pp.* 255-259. doi: https://doi.org/10.1016/S0926-6410(01)00106-9

Kreps, G., L. & Neuhauser, L. (2010). New directions in eHealth communication: opportunities and challenges. *Patient Education and Counselling, 78(3), pp. 329-336.* doi: https://doi.org/10.1016/j.pec.2010.01.013

Kumar, S., Nilsen, W., J., Abernethy, A., Atienza, A., Patrick, K., Pavel, M. Swendeman, D. (2013). Mobile health technology evaluation: The mHealth evidence workshop. *American Journal of Preventive Medicine, 45(2),* pp. 228-236. doi: https://doi.org/10.1016/j.amepre.2013.03.017

Kupfer, A., Ableitner, L., Schöb, S. & Tiefenbeck, V. (2016). Technology adoption vs. continued usage intention: Do decision criteria change when using a technology? Retrieved from: https://www.researchgate.net/publication/306359422_Technology_Adoption_vs_Continuous_Usage_Intention_do_Decision_Criteria_Change_when_Using_a_Technology

Lehmann, J., Lalmas, M., Yom-Tov, E., & Dupret, G. (2012). Models of user engagement. In: Masthoff, J., Mobasher, B., Desmarais, M. C., & Nkambou, R. (eds). User Modeling, Adaptation, and Personalization. UMAP 2012. Lecture Notes in Computer Science, vol. 7379. Springer, Berlin, Heidelberg. doi: 10.1007/978-3-642-31454-4_14

Maxwell, J. (2010). Understanding and validity in qualitative research. *Harvard Educational Review. 62(3).* pp. 279-301. doi:

https://doi.org/10.17763/haer.62.3.8323320856251826

Mays, N. & Pope, C. (1995). Qualitative research: Rigour and qualitative research. *Education and Debate.* doi: https://doi.org/10.1136/bmj.311.6997.109

Mclntosh, M. & Morse, J. (2015). Situating and constructing diversity in semi-structured interviews. *Global Qualitative Nursing Research.* doi: https://doi.org/10.1177/2333393615597674

Mohr, D. C., Burns, M. N., Schueller, S. M., Clarke, G., & Klinkman, M. (2013). Behavioral intervention technologies: Evidence review and recommendations for future research. *General Hospital Psychiatry*, *35*, 332–338.

Noar, S., M. & Harrington, N., G. (2012). EHealth applications. Promising strategies for behavior change. (1st ed.) New York, NY: Routledge.

Pearson, S., Goulart-Fisher, D. & Lee, T. (1995). Critical pathways as a strategy for improving care: Problems and potential. *Annals of Internet Medicine, 123(12), pp.* 941-948. doi: https://doi.org/10.7326/0003-4819-123-12-199512150-00008

Peng, W., Kanthawala, S., Yuan, S. & Hussain, S. (2016). A qualitative study of user perceptions of mobile health apps. *BMC Public health.* Retrieved from: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-016-3808-0

Roquet, C. & Sas, C. (2018). Evaluating mindfulness meditation apps. Pp. 1-6. Retrieved from: https://doi-org.ezproxy2.utwente.nl/10.1145/3170427.3188616

Ryan, R. M., & Deci, E. L. (2000a). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25, 54-67,* doi: 10.1006/ceps.1999.1020

Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., Burroughs, H. & Jinks, C. (2018). Saturation in qualitative research: Exploring its conceptualization and operationalization. *Quality and Quantity 52(4),* Pp. 1893-1907. doi: 10.1007/s11135-017-0574-8

Schnall, R., Rojas, M., Bakken, S., Brown, W., Carballo-Dieguez, A., Carry, M., Travers, J. (2016). A user-centered model for designing mobile health (mHealth) applications (apps). *Journal of Biomedical Informatics, 60,* pp. 243-251. doi: https://doi.org/10.1016/j.jbi.2016.02.002

Sundar, S. S., & Marathe, S. S. (2010). Personalization versus customization: The importance of agency, privacy, and power usage. *Human Communication Research, 36(3),* pp. 298–322. doi: https://doi.org/10.1111/j.1468-2958.2010.01377.x

Schroff, R. & Vogel, D. (2009). Assessing the factors deemed to support individual student

intrinsic motivation in technology supported online face-to-face discussions. *JITE-Research, 8(1).* Retrieved from: https://www.learntechlib.org/p/111391/

Tee, J. & Kazantzis, N. (2011). Collaborative empiricism in cognitive therapy: A definition and theory for the relationship construct. *Clinical Psychology and Practice, 18(1). pp.* 47-61. doi: 10.1111/j.1468-2850.2010.01234.x

Thriveport. Moodkit (2020). Retrieved from: https://www.thriveport.com/products/moodkit/

Torous, J., Nicholas, J., Larsen, M. E., Firth, J., & Christensen, H. (2018). Clinical review of user engagement with mental health smartphone apps: Evidence, theory and improvements. *Evidence-Based Mental Health, 21*(3), pp. 116-119.

Van Der Does, A.J., Van Dyck, R., Spinhove, P. & Kloosman, A. (2008). The effectiveness standardized versus individualized hypnotic suggestions: A brief communication. *International Journal of Clinical Experimental Hypnosis, 37(1).* Retrieved from: https://www-tandfonline-com.ezproxy2.utwente.nl/doi/pdf/10.1080/00207148908410528?needAccess=true

Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information System Research 11(4).* doi: https://doi.org/10.1287/isre.11.4.342.11872\

Wang, Q., Egelandsdal, B., Adam, G., Almi, V. & Oostindjer, M. (2016). Diet and physical activity apps: Perceived effectiveness by app users. *JIMR Mhealth Uhealth. 4(2).* doi: 10.2196/mhealth.5114.

Whitehead, L. & Seaton, P. (2016). The effectiveness of self-management mobile phone and tablet apps in long-term condition management: A systematic reviews. *JMIR Publications 18(5).* doi: 10.2196/jmir.4883

WHO (2020). Adolescent Mental Health Retrieved from: https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health

Yuan, S., Ma, W., Kanthawala, S. & Peng, W. (2015). Keep using my health apps: Discover users' perceptions of health and fitness apps with the UTAUT2 model. *Telemedicine and e-health. 21(9).* doi: https://doi-org.ezproxy2.utwente.nl/10.1089/tmj.2014.0148

Appendix A

Recruitment Message

Hello guys!

I am a psychology student who is currently writing her master's thesis at the University of Twente in the Netherlands. My specific topic for the thesis concerns mental health related applications. I aim to find out more about the motivations and motives to make use of mental health related applications and in which context people use these applications. There is already existing literature about the efficacy and usage of mental health related applications, but little is known about the quality from a user's perspective. And this is where you come into play!

The study concerns an interview which will take approximately 30-60 minutes. During the interview you will be asked several questions with regard to your motivations, decisions and agency in context with the applications. It does not matter whether you use the application every day, once in a week or irregularly. The interview can be held in English or German depending on what you prefer.

If you are interested to take part in the study, I will provide you with further information. I would like to have the meeting via Skype, Zoom etc. with regard to the current situation. However, I would also be willing to meet you in person.

Looking forward to hearing from you!

Kind regards,

Mia

DEUTSCHE VERSION

Hallo Leute!

Ich bin eine Psychologiestudentin, die derzeit ihre Masterarbeit an der Universität Twente in den Niederlanden schreibt. Das spezifische Thema für meine Masterarbeit betrifft Apps im Zusammenhang mit der psychischen Gesundheit. Ich möchte mehr über die Motivationen und Motive von Menschen erfahren, warum sie diese Apps nutzen und in welchem Kontext sie diese Apps verwenden. Es gibt bereits Literatur über die Wirksamkeit und Verwendung

von Apps im Zusammenhang mit der psychischen Gesundheit, über die Qualität aus Nutzer-Sicht ist jedoch wenig bekannt. Und hier kommst du ins Spiel!

Die Studie umfasst ein Interview, das ungefähr 30-60 Minuten dauern wird. Während des Interviews werde ich dir verschiedene Fragen zu deinen Motivationen, Entscheidungen und deinen Handlungen im Zusammenhang mit der App stellen. Es spielt keine Rolle, ob du die App jeden Tag, einmal in der Woche oder unregelmäßig verwendest. Das Interview können wir auf Deutsch oder Englisch führen je nachdem, was dir lieber ist.

Wenn du an der Studie teilnehmen möchtest, werde ich dir weitere Informationen geben. Ich möchte das Interview über Skype, Zoom etc. führen, da es der momentanen Corona Situation angemessen ist. Wenn es dir lieber ist würde ich mich aber auch mit dir treffen.

Ich freue mich, von dir zu hören!
Mit freundlichen Grüßen, Mia

Appendix B

Interview Scheme

Hello,

My name is Mia. First, I would like to thank you for taking part in this interview and the study. In the following, I will ask you some questions with regard to your motivations to use mental health applications. Your answers to my questions will help me to write my master's thesis at the University of Twente. The following interview will be audio recorded. Everything you say will be handled confidentially. This means that your data will be anonymized, and the audio recordings will be destroyed after the interviews are transcribed. I do not believe you will experience discomfort. However, if you experience discomfort in context with the interview or with anything else you can opt-out of the study at any time without naming a reason. Since the applications concern mental health, topics may arise which might be difficult to talk about. If you feel the need to talk to someone about this, I will provide you with a contact since I am not a certified therapist yet.

You have the possibility to ask questions at any time during the interview if something is not clear to you which is discussed during the interview. Do you have any questions or remarks you would like to discuss before we start the interview? [*answer questions if necessary]*. If you agree with the terms and conditions of this interview, I will send you the informed consent via e-mail. This paper states that you have been informed about all conditions and agree to participate. Since I we do not meet face to face I would also like you to give me a verbal consent that the interview can take place. Thank you so far! The interview will start now. [*starting audio record]*

General Questions

Okay, I would like to start with some general questions.

1. Demographic Questions
    a) How old are you?
    b) What is your gender?
    c) What kind of cultural background do you have?
    d) What is your employment?

Now, I would like to ask you some questions with regard to your mental health.

2. Have you ever had mental health concerns such as anxiety or depressive symptoms, or any other?

3. Have you ever used mobile applications or the internet to help you alleviate these problems? (such as relaxation apps, online tips, social media etc.)
4. What kind of mental health related application are you using?
    a) In which context do you use it?
        - Place
        - Affective State
    b) How often do you use the application?
    c) For how long have you been using the application? / When did you download it?

Motivation Questions

Thank you for the extensive responses so far. Now I would like to focus on some questions which concern your motivation to use the application. Specifically, motivation mean to act in a way it is intended by a person. With these questions I would like to get a clearer picture of your motivations use the specific application.

1. What encouraged you to start using such an application? Why? Can you give an example?
2. What made you aware of this application?
3. Why did you decide on this specific application?

Thanks again for your answers. Now I would like to go a bit deeper into your motivational reasons to use this application. Motivation can be divided into intrinsic motivation, so a person's inborn to seek for challenges and change in order to make use of one's own capacities, and extrinsic motivation, so extern rewards which influence one's drive to do something. An example for an intrinsic motivation would then be being ambitious and an external motivation would be money. Did you understand the difference between the two concepts?

4. What intrinsic motivators could you identify as personal reasons to use the application? Why?
5. What extrinsic motivators can you identify as contextual reasons to use the application?

Customization Questions

A concept which is often incorporated in mental health application is the concept of customization. This means, that a person can make changes in an application so that they individualize the application. An example of this would be to create an avatar in an app.

1. Have you ever customized an app to fit with your needs? How?
2. Would you use an app where you cannot customize the app towards your needs? Why? / Why not?

Decision Questions

After this, I would like to further investigate your decisions. Three components are involved in decision making. They concern competence, relatedness and autonomy. The first component concerns competence. A competent person would be able to do things in a way he/she intended to do and succeeds in that.

1. What makes you feel in control when you use an application to improve your mental health? / Do you feel in control when you use this specific application?
    a) Do you feel that being in control is important to you?
    b) Would you use an application that does not make you feel in control?

The next component involves relatedness. An example for relatedness would be having a meaningful relationship with an important other.

2. Do you experience relatedness when using the application? Why?
    a) Is relatedness important to you when you use the application? (Why? / Why not?)

Lastly, autonomy is involved in context with motivations. An autonomous person would be a person who is able to know what he/she wants and engages in own decisions.

3. Do you experience autonomy while using the application? How? Are there any examples?
    a) Is being autonomous while using the application important to you? Why?
    b) Would you use an application in which you cannot be autonomous? Why?

Agency Questions

Now I would like to ask you some questions with regard to your agency in using the application. Agency describes an action or intervention to produce a particular effect. An

agency would for example be to turn on the light to be able to read. Agency includes three components namely perceived involvement, perceived control and perceived identity. An example of perceived involvement would be to use an application to relax when a person is stressed.

1. To what extent do you experience a connection between your life and the application? Can you give an example for that?
    a) Do you feel integrated when using this specific application? How? /What makes you feel integrated?
    b) Is the connection between your life and the use of the application important to you? Why? Can you give an example?

Besides, perceived control is relevant in context with agency. An example would be that if a person clicks on an option the option will open as intended by the user.

2. Do you feel that the options you make use of, work as intended by you? Why? Examples?
    a) What makes you feel that the options work the way you want them to work?

Lastly, the perceived identity also plays a role in context with agency. So, an example for this would be to enter a name when starting to use an application.

3. Do you experience the app being tailored towards yourself? Why?
    a) Do you see your identity represented by the application? How?

Follow-up Questions

In case participants are unclear with a certain aspect, I would make it more precise by asking:

1. Can you explain your answer further?
2. What do you mean by this? Can you explain that again?
3. Could you provide me with an example to make it a bit clearer?

When participants say that a certain aspect is not important to them, I would ask them:

4. You said that ‘concept x’ does not matter to you. Do you think it matters to someone you know? If so, whom and why?

When participants talk about others and not about themselves:

5. You have provided me with a lot of information why this might be important to other people. Still, I would enjoy hearing your perspective on this. What would be important to you?

The Ending

Thank you very much for your participation! If there is anything left, you would like to ask or discuss we can do this now. On the informed consent you will find my contact information in case you have some questions later on. As discussed, the data will be anonymized and deleted after being transcribed. So, thank you again and have a nice day. Goodbye!

Appendix C

UNIVERSITY OF TWENTE.

Informed Consent

Investigator: Maria Jebbink

Contact Person: Maria Jebbink (m.jebbink@student.utwente.nl)

Dear participant,

I would like to invite you to participate in an interview study. If you agree to take part, you will have to answer questions regarding your usage of mental health related applications. These questions will include information about your demographics, your motivations, your decisions and your agency in connection with the use of mental health related applications. The information which you provide serve as data for a master's thesis of a student of the University of Twente.

The goal of the interview is to find out motivators and motives for using a specific mental health related application.

I do not believe that any personal threats, discomforts or harm arise from participating in this study. However, since the topic concerns mental health related applications, there might arise aspects which are difficult to talk about. The researcher can provide you with contact details of a professional if you feel the need to talk about something. Your participation is voluntary, and you can opt-out at any time. You do not have to give a reason for that. Your data will be processed confidentially which means that all personal information such as names, birth dates or places will be anonymized. Your data will only be used for the research purpose of a master's thesis. It is important that you make sure you understood every instruction with regard to the study. If you have any questions about the study, you can contact the researcher by using the contact details.

The researcher will provide you with a copy of this document for your own records. Also, the researcher herself will keep a copy in context with the study records. By agreeing to participate in this study you allow the researchers to keep audio records of the interview for the purposes of this study. These records will be transcribed, and anonymized quotes will be used.

Your participation in this study will have the advantage of informing existing research with new findings. No disadvantages should arise by your participation.

'I hereby declare that I have been informed in a manner which is clear to me about the nature and method of the research. My questions have been answered. I agree of my own free will to participate in this research. I reserve the right to withdraw this consent without the need to give any reason. Additionally, I am aware that I may withdraw from the experiment at any time. If my research results are to be used in scientific publications, they will be made completely anonymous. My personal data will not be disclosed to third parties without my permission. If I request further information about the research, now or in the future, I may contact the contact the researcher of the study.'

…… ……

Date, Name subject Signature

I - the researcher - have provided explanatory notes about the research. I declare myself willing to answer to the best of my ability any questions which may still arise about the research.'

…… ……

Date, Name researcher Signature

Appendix D

Deductive, initial coding scheme

Table 3
Categories, Codes, Definitions, Theories

Category	Code	Code Definition	Theory
Motivation	Intrinsic Motives	Participants' need to make a change for themselves and test themselves to improve their mental health	Self-Determination Theory
	Extrinsic Motives	Advertisements and advice for usage participants received	Self-Determination Theory
Decisions	Competence	Participants are able to make use of the app, as they intended to do	Self-Determination Theory
	Relatedness	Participants experience a relation to others, themselves or the application while using the application.	Self-Determination Theory
	Autonomy	Participants are able to decide on a specific offer and use this offer to improve their mental health	Self-Determination Theory
Agency	Perceived Involvement	Participants are able to fulfill their needs with regard to their intention to use the application to improve their mental health.	Agency Model of Customization
	Perceived Control	Participants are able to use the application's options as expected by them	Agency Model of Customization
	Perceived Identity	Participants have the possibility to incorporate their identity into the application	Agency Model of Customization