

# Usability of the app "Geluk en zo" in the treatment for chronic pain, blended care in the Netherlands.

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## Abstract

Chronic pain is a common condition with serious consequences. An effective way of treatment is Acceptance and Commitment Therapy (ACT) in a multidisciplinary team, as offered by Roessingh Centre for Rehabilitation. ACT focuses on realizing valued goals rather than pain control. Blended care, the combination of eHealth and face-to-face treatment, has advantages and disadvantages, there is not a lot of research on blended care with chronic pain patients. For this qualitative research nine chronic pain patients at Roessingh, from both outpatient and clinical groups, used an ACT-based app to explore how they experienced blended care. Then they were interviewed and the semi-structured interviews were transcribed and coded. Participants were both positive and negative, regarding their experience. Participants reported no change in behaviour and most of them found the app was too much in combination with their treatment, also the pile-up of exercises was demotivating and adherence to the app was very low. However, participants were very accepting of the app and they thought it fit well with treatment. They were motivated by the app to apply learnt behaviour and they were positive about the ability to carry treatment with them. The following recommendations were made: sending reminders during the day, implementing the app after treatment, not piling up the exercises, adding positive feedback, letting users set the app to fit their needs and expanding the app with more information and/or exercises.

## Samenvatting

Chronische pijn is een veelvoorkomende aandoening met serieuze gevolgen. Een effectieve manier van behandeling is Acceptance en Commitment Therapy (ACT) in een multidisciplinair team, zoals het Roessingh aanbiedt. ACT focust op het realiseren van waardevolle doelen in plaats van pijnbestrijding. Blended care, de combinatie van eHealth en reguliere behandeling, heeft voordelen en nadelen en er is niet veel onderzoek gedaan naar blended care bij chronische pijn patiënten. Voor dit kwalitatief onderzoek hebben negen chronische pijn patiënten, van de poliklinische en klinische groepen, bij het Roessingh een app gebaseerd op ACT gebruikt om te onderzoeken wat hun ervaring ermee is. Vervolgens zijn zij geïnterviewd, deze semigestructureerde interviews zijn getranscribeerd en gecodeerd. Patiënten waren zowel positief als negatief wat betreft hun ervaring. Zij hebben geen verandering in hun gedrag gerapporteerd en de meeste vonden de app te veel in combinatie met de behandeling, daarnaast was de opstapeling van de oefeningen demotiverend en de adherence was erg laag. Echter accepteerden de participanten de app en vonden dat deze goed

aansloot op de behandeling. Ze werden door de app gemotiveerd om aangeleerd gedrag toe te passen en ze waren positief over de mogelijkheid om hun behandeling met zich mee te dragen. De volgende aanbevelingen zijn gedaan: reminders versturen gedurende de dag, de app inzetten na de behandeling, de oefeningen niet opstapelen, het toevoegen van positieve feedback, gebruikers de app laten instellen naar hun eigen behoeften en de app uitbreiden met meer informatie en/of oefeningen.

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# Introduction

## Chronic pain

Chronic pain is a serious problem for many people. Chronic pain has an estimated prevalence of 18% of Dutch adults, meaning roughly three million people suffer from some kind of chronic pain in the Netherlands (Keizer & van Wilgen, 2013; Bekkering et al., 2011; De Jong et al., n.d.). This suggests it is one of the most common conditions (Keizer & van Wilgen, 2013; Bekkering et al., 2011).

Pain is described by the International Association for the Study of Pain as an unpleasant, sensory and emotional sensation, which is associated with actual or potential tissue damage (Merskey & Bogduk, 1994). Pain in itself has a purpose, it warns the body for (further) damage to its tissue. When the tissue has fully healed but the sensation of pain remains, even though it lost its function, it is called chronic pain. Chronic pain is described as pain without underlying damage or infection of the body (Keizer & van Wilgen, 2013).

There are a lot of factors involved with chronic pain. The pain someone experiences is dependent on a complex combination of sensitization in the central nerve system, psychological well-being and social circumstances of a person (Keizer & van Wilgen, 2013). The biopsychosocial model of pain, which represents this complex combination of factors, is widely used as a way of understanding chronic pain. It describes chronic pain as a multidimensional, dynamic interaction between physiological, psychological and social factors, mutually influencing each other (Edwards et al., 2016). There is a wide variety of pain complaints and pain syndromes, some examples are backpain, neck pain and whiplash, fibromyalgia, arthritis, headache and pelvic pain (Keizer & van Wilgen, 2013).

People who suffer from chronic pain are severely affected by the condition, it can be quite incapacitating (Keizer & van Wilgen, 2013). It impacts quality of life, activities of daily living and mental health in a negative manner (Bekkering et al., 2011). Breivik et al. (2006) found that roughly half of patients with chronic pain are unable to function normally. Another study found that it results in a decreased yearly income and additional costs (Kemler & Furnée, 2002). Besides the physical limitations, as pain restricts a person from using their body freely, chronic pain patients also face a lack of understanding for their condition, because it is not visible for others. The incomprehension can lead to a range of problems such as, social isolation, feeling helpless, depression and frustration (Keizer & van Wilgen, 2013).

Chronic pain has a significant effect on society as well, as it costs several billions in healthcare, absenteeism and payment (Keizer & van Wilgen, 2013). This is partly due to the

care being experienced by patients as insufficient, they feel treatment is inadequate (Keizer & van Wilgen, 2013; Regieraad Kwaliteit van Zorg, 2011).

Chronic pain should be viewed as a pressing problem, for which attention from the healthcare sector is warranted (Bekkering et al., 2011). It is important to note that chronic pain is not imagined, it should be taken seriously and seen as a severe problem (Keizer & van Wilgen, 2013). The consequences of chronic pain are reason to develop and improve the treatment of chronic pain. Psychology is very important when dealing with chronic pain, treatment purely focused on physical aspects is often not successful. It is recommended that, besides the physical aspect, psychosocial aspects (e.g. mental health, social support) should also be taken into consideration when treating patients with chronic pain (Keizer & van Wilgen, 2013).

### Treatment method and modality

There are a range of different treatments available for chronic pain, such as pharmacological treatments, psychological treatments or a combination. The former, fails to enhance physical and emotional functioning (Turk, Wilson & Cahana, 2011). As mentioned before, taking psychosocial factors into account is important. Intensive multidisciplinary treatment is effective for improvement of functioning and quality of life. Multidisciplinary rehabilitation aims to improve physical, psychological and social functioning (Trompetter, Schreurs, Heuts & Vollenbroek-Hutten, 2014), it treats chronic pain in a comprehensive manner (Turk, Wilson & Cahana, 2011). This manner allows professionals from different disciplines work together to increase the functioning of a patient (Turk, Wilson & Cahana, 2011). A psychological framework, such as Cognitive Behaviour Therapy (CBT) or Acceptance and commitment therapy (ACT), is used as an underlying treatment framework for multidisciplinary treatment (Trompetter et al., 2014).

The multidisciplinary approach, in combination with ACT, has proved to be effective in the improvement of functioning and increasing the quality of life (Trompetter et al., 2014; Scascighini, Toma, Dober-Spielmann & Sprott, 2008). This research will focus on ACT as treatment method, since this is used by the collaborating rehabilitation centre.

ACT focuses on the acceptance of pain, since this helps to function emotionally, physically and socially (McCracken & Eccleston, 2005; Hayes, 2004), and on psychological flexibility (Hayes, Luoma, Bond, Masuda & Lillis, 2006). ACT is based on relational frame theory, a comprehensive empirical analysis of human cognition (Hayes, 2004). Psychological flexibility includes the acceptance of painful sensations, emotions and cognitions. This form

of therapy asks its patients to focus their attention on the present instead of ruminating about the past or worrying about the future. In addition, ACT focuses on realizing valued goals rather than pain control (McCracken & Vowles, 2014). The emphasis on values, sets ACT apart from other treatments, it aims to clarify the values, followed by formulating achievable goals and steps to achieve these goals (Hayes, 2004).

There is a growing need for online ACT-based treatments, for multiple reasons for example the many barriers for accessing treatment (e.g. work, transportation, caregiving) (Scott et al., 2018). Online treatments, or e-health, comprise the combination of technology and health, which can be used to support or improve health care (Thie, 2009; van Gemert-Pijnen, Peters & Ossebaard, 2013). There are other benefits that make e-health attractive, such as the potential to decrease the costs connected to health care, improve the quality and effectiveness of care and to improve the empowerment of consumers (van Gemert-Pijnen, Peters & Ossebaard, 2013), since it makes them less dependent on health care professionals (Thie, 2009). The use of applications (apps) specifically, is called mobile health technologies (mHealth). A mobile technology improves self-management of chronic diseases (van Gemert-Pijnen, Peters & Ossebaard, 2013; Thie, 2009). Patients often find apps attractive and helpful in motivating them to follow advice (Schuurmans, 2015). Also, mHealth is becoming the most convenient form to offer rehabilitation services, as they help transfer care from a treatment centre to a home situation (Chhabra, Sharma & Verma, 2018). mHealth can help people become more actively engaged in health care (Zhao, Freeman & Li, 2016). In addition, patients are highly interested in it (Keogh, Rosser & Eccleston, 2010). The use of apps in therapy is quite effective, between 80% and 90%, with the effects lasting over a long period of time.

Combining eHealth and face-to-face treatment is called blended care. Blended care is recommended over using e-health as a stand-alone treatment, as this often leads to insufficient adherence (Talboom-Kamp et al., 2018; Kloek, Bossen, de Bakker, Veenhof & Dekker, 2017).

It is important that the e-health component, whether or not used in blended care, is tuned to the needs of its intended user group (van Gemert-Pijnen, Peters & Ossebaard, 2013). In order to decrease the possibility of drop-out and other negative consequences, it is recommended that e-health is evaluated regularly by the intended user group. This is done through formative evaluation, meaning users evaluate during the development process (van Gemert-Pijnen, Peters & Ossebaard, 2013). The identification of useful features can aid the development of e-health interventions and increase health behaviour change. (Zhao, Freeman

& Li, 2016).

In order to evaluate an e-health intervention, Nielsen (2012) developed the concept usability. This is defined as the extent to which an interface is easy and pleasant to use, while also providing the features needed by the user group. This research will not focus on usability of an e-health component alone, but rather on usability in relation to blended care. Usability comprises satisfactory, effective and effortless usage as well as the ease and pleasantness to use e-health in combination with regular care (van Gemert-Pijnen et al., 2018), while also adding features that face-to-face treatment does not offer. Fitzpatrick and colleagues (2018) state that information on the usability of blended care is important as this might help with existing barriers (e.g. access, time, stigma)

### Blended care

There is some research on the effectiveness of blended care. However, there is limited research on blended care for chronic pain patients, therefore research on other conditions is used. Kenter and colleagues (2015) found no difference in treatment results (for anxiety and depression) between blended care and care as usual, as both were effective. In research on fear of cancer recurrence, patients treated with blended care reported more improvement than the care as usual group. A clinically significant improvement in the blended care group was found, whereas no significant effect was found in the care as usual group (van de Wal et al., 2017). Another research found no positive and no negative effect, while evaluating two studies on blended care (Talboom-Kamp et al., 2018). Blended care could be effective, but there are still a lot of questions.

An advantage of blended care is that it allows both forms to complement each other (van Gemert-Pijnen, Peters & Ossebaard, 2013), adding e-health means patients will be able to experience the benefits from it as described above (Kloek, Bossen, de Bakker, Veenhof & Dekker, 2017; Kooistra et al., 2016). Blended care has the potential to decrease the medical costs of treatment, while the clinical effects remain the same (Kooistra et al., 2014).

Replacing some of the face-to-face sessions with technology, helps save time, money (direct and indirect) and absenteeism (van de Wal et al., 2017). However, the decrease of (medical) costs can only be achieved when it reduces the number of face-to-face sessions (Kooistra et al., 2014). When the online component is added to regular treatment it leads to a longer treatment period and increased costs (Kenter et al., 2015). Having a part of the treatment online, means always having access to treatment materials and exercises, which could help with learning and retention (Kenter et al., 2015). A blended treatment encourages patients to

have an active role in treatment (Kooistra et al., 2016), which might improve self-management skills (Kooistra et al., 2014). The concept of self-management means more autonomy, an increase in quality of life and self-efficacy (Talboom-Kamp et al., 2018). Empowering patients might help prevent relapse (Peters et al., 2017). This might also help to generalize the ACT skills to everyday situations (Levin, Pierce & Schoendorff, 2017; Wentzel et al., 2016). Empowerment is important as this might lead to high quality management of chronic illnesses (Talboom-Kamp et al., 2018).

On the other hand, therapists are reluctant to accept online treatment components, as they worry about the possible negative impact on therapeutic rapport and treatment outcomes. It is indeed important to maintain face-to-face sessions, as this allows patients to benefit from a therapeutic relation (Kenter et al., 2015). The same study also found a slow uptake of blended care amongst patients, having the face-to-face sessions helped with this issue (Kenter et al., 2015). On the contrary, Kooistra and colleagues (2016) found patients with depression very willing to receive blended care.

Research on blended care for chronic pain patients showed that these patients had a positive experience in general. They participated in a study on TeleACT, where patients took an online module prior to a multidisciplinary treatment. The main benefits noted by patients were being able to start right away, that the module fits the treatment that follows and being able to take time to formulate their answers. Also, being able to work on the module whenever it was convenient for them and working at their own pace were positive aspects according to patients. The only negative aspect they noted was that the module should be longer (Scheurs, 2013).

There are recommendations to help optimize the combination of face-to-face and e-health treatment. The experienced practical added value in daily life is important, as it might help with motivation and could lead to higher usage (Talboom-Kamp et al., 2018). The e-health application should be supportive to the treatment as usual, specifically to the treatment delivery of the therapist and the two components should be well-integrated into a whole intervention (Kloek, Bossen, de Bakker, Veenhof & Dekker, 2017). Wentzel, van der Vaart, Bohlmeijer & van Gemert-Pijnen (2016), have several other recommendations such as, the components should be interconnected, meaning that the e-health should contain parts of the face-to-face treatment. Also, both components should contribute to the goal of the treatment. Following, the importance of careful selection of the online components is noted. Furthermore, both components should be created according to a protocol for treatment (e.g. ACT), where the technology should motivate and support patients during the process. Lastly,

it is recommended that it fits the need, ability and preference of the patient (Talboom-Kamp et al., 2018; Wentzel, van der Vaart, Bohlmeijer & van Gemert-Pijnen, 2016).

There should be more research on the preferred blend of patients and professionals in certain situations. For example, information is needed on how to implement the online component with the regular treatment (Kenter et al., 2015), as this is key for success (Talboom-Kamp et al., 2018). e-Health can be integrated before, during or after treatment. Before treatment might help prepare the patient, while adding e-health during treatment might lead to greater exposure to treatment and add depth and quality to the face-to-face part of treatment. When added after treatment, the online component provides an extension of treatment which patients might find helpful. The latter has been found to help keep the effects of treatment (Fitzpatrick et al., 2018). A good implementation, meaning not adding the online components on top of existing treatment, might lead to more acceptance (Kenter et al., 2015).

Research on why blended care is effective is important in developing and designing interventions. It is encouraged that the underlying mechanisms are explained, in order to explain why blended care is of added value (Wentzel, van der Vaart, Bohlmeijer & van Gemert-Pijnen, 2016).

#### “Geluk en zo”

The intervention “Geluk en zo”, an app based on ACT, was developed by researchers at the University of Twente, Roessingh Research and Development and Roessingh Centre for Rehabilitation. The app aims to make patients with chronic pain aware if their daily activities and the choices they make are according to their values. It is meant to support patients to live a value-based life with pain. The app is still being developed, therefore evaluations are necessary to improve it.

#### Statement of the problem and hypotheses

ACT through e-health seems effective and adding such a component to an existing treatment can be beneficial, as stated above. However, qualitative research is needed, more specifically the usability of an app in relation to blended care for chronic pain patients. This thesis aims to research the usability and experiences of chronic pain patients using the intervention “Geluk en zo” in an app, in combination with the treatment at Roessingh. It aims to evaluate the experiences and use them to improve the app, specifically how the app is used as an extension of the existing treatment programme of Roessingh. The following research questions are formulated:

- How do chronic pain patients experience blended care?

- How do chronic pain patients experience using an app in healthcare?
- What do chronic pain patients need as support during their treatment?

## Methods

### Design & Participants

This is a qualitative research, aimed at analysing interviews to help qualitatively evaluate blended care. Patients from Roessingh centre for rehabilitation were selected for this research, because they treat patients with chronic pain through ACT and this research was done in collaboration with them. In addition, this research focused on the fit between the app intervention “Geluk en zo” and the treatment method of Roessingh.

Currently Roessingh Centre for Rehabilitation, offers a multidisciplinary treatment for patients with chronic pain. This treatment consists of different therapies, who all work according to the principles of ACT. In a typical treatment program, a patient will get physical therapy, occupational therapy, sports, breath and relaxation therapy, social work, psychological therapy, sometimes psychomotor therapy is added. Along with these therapies, patients also receive medical attention (e.g. check-ups). Patients indicated for the outpatients group have eight consecutive weeks of treatment, three days a week. For the clinical groups, treatment lasts six discontinuous weeks (12 weeks total), five days a week.

The patients were selected from the chronic pain patient groups at Roessingh between November 2018 and January 2019, at that time there was one outpatient group and two clinical groups. This made the respondents a select sample, specifically using convenience sampling, of the population (Verhoeven, 2011). After the intake procedure at Roessingh patients were allocated to a treatment group by a minimal of three professionals (rehabilitation doctor, psychologist, physiotherapist). The choice is mainly based on the whether the behaviour pattern is persistent and if the home situation could support behaviour change. If behaviour change is estimated to be difficult with little support in the home situation, the patients were placed in the clinical group. There were also other factors taken into account, such as ability to travel and physical well-being.

Inclusion criteria for this study were experiencing chronic pain, willingness to participate, ability to give informed consent, possession of a smartphone with Wi-Fi and data bundle and ability to download the app.

A total number of nine participants were recruited, two men and seven women. The average age of the participants at the time of the interview was 43 years old, ranging from 24 to 59 years old. Table 1 gives an overview of the participants, with information on their gender, age and treatment programme.

The outpatient group consisted of four people. One person was absent when

information was given and could not give informed consent, and thus excluded. Another one of the patients was unable to download the app and thus ineligible for this research. In the first clinical group, two people were not willing to participate.

Table 1: *Participants included*

Participant	Gender	Age	Treatment programme /group	Informed consent	Start use app	Days using the app	Interviewer*
1	Male	24	Outpatient	Yes	November	Apr. 2	1
2	Female	59	Clinical 2	Yes	December	4	1
3	Female	43	Clinical 2	Yes	December	2/3	1
4	Female	29	Clinical 2	Yes	December	2/3	1
5	Female	36	Clinical 2	Yes	December	4	1
6	Female	57	Outpatient	Yes	November	n/a	2
7	Female	57	Clinical 2	Yes	December	App. 2	2
8	Female	27	Clinical 1	Yes	December	Appr. 1	2
9	Male	54	Clinical 1	Yes	December	2/3	2

\*Initials: interviewer 1: NS, Interviewer 2: JS

\*\*Appr. = Approximately

## Materials

This research used an interview questionnaire (appendix I) to collect information from the participants. The interview was drafted beforehand and designed to obtain information regarding the experience of the patient with the app. The interview was semi-structured, which allowed the researcher to ask questions that were not formulated beforehand. The interview questionnaire used was designed especially for this research, it was based on theoretical concepts and literature as described in the introduction. It was designed to obtain open answers, allowing respondents to formulate their own answer. The interview questionnaire was used for two different researches, one on the usability of the app and this study which is focused on the usability in relation to blended care.

The first ten topics of the interview were used for the technical aspect of usability, used for the associated research. For example, “what problems did you encounter in the system?”. These topics were based on the usability literature (Nielsen, 2012). The eleventh topic regarded blended care, with questions about the combination of the app and treatment at

Roessingh. The questions were drafted with the information from the literature mentioned in the introduction, since recommendations from former research on blended care should be taken into account when researching blended care with chronic pain patients. The recommendations made by Kloek and colleagues (2017) and Wentzel and colleagues (2016), as discussed in the introduction, were mostly used. For example, the recommendation that the two components should be well-integrated into a whole intervention (Kloek et al., 2017). Questions concerned the use of the app in relation to the treatment, such as similarities between treatment and the app, how the participants experienced using an app in treatment and what their opinion of this was. Moreover, previous research on e-health with chronic pain patients (Schreurs, 2013) was used, asking participants about advantages and disadvantages of having an app in their treatment. The last topic of the interview, recommendations, asked participant about their recommendations as well as some additional, general questions.

### Equipment

Additional equipment was used for recording the interviews and analysing the data. To record the interviews a speech recorder and a mobile phone were used. In order to process the recordings faster, it was decided to use a speech recognition programme called Amberscript (Amberscript, n.d.), that transcribes audio into text document. The researcher checked, and altered when necessary, each transcription with the audio of the interview.

The computer programme used to code the interviews was Atlas.ti (1997). This programme functioned mostly according to expectations. Except that it was not possible to run an intercoder analysis for reliability.

### Procedure

There were several procedures involved in this research. Participants were briefed about this study by their psychologist at Roessingh, after which a separate briefing by the researchers via PowerPoint followed and lastly, they were interviewed by the researchers. Each procedure is described below.

A typical briefing lasted about five minutes. The briefing entailed a verbal description of the research given by the psychologist of the group at Roessingh. Afterwards the patients were given further information in the form of a letter, written by the researchers. This letter provided an overview of information and the e-mail addresses of the researchers (appendix II). This allowed patients to ask any questions they had at that point.

The PowerPoint presentation (appendix III), lasted about ten minutes, was given by the researchers a week (outpatient group) or two weeks (clinical groups) after the briefing. It

contained information on the goal of the research and the procedure of participation, such as the length of the trial period of the app (14 days) and the duration of the interview (approximately 30-45 minutes). At the end of the presentation there was time for questions. After answering questions, patients were asked if they wanted to participate in the research.

If a patient chose to apply, they were given an informed consent form (appendix IV). This form stated that there would be no reward for participating. Only patients who signed an informed consent form, were eligible for this research. After signing up, the participants could download the app, possibly with help from the researcher. Patients who participated in this research were asked for their e-mail address, where they received the sign-up link. Once they had signed up, patients had to wait until their application was authorized by the supervisor of the researcher. This took about one or two days. After patients were authorized by the supervisor, they were able to use the app for 14 days. The researcher would make an appointment with each participant individually for the interviews.

When conducting the interviews, the researcher used the same structure for each patient. The interviews were conducted with patients in a one-on-one conversation, so there was a researcher and a participant present. There were two researchers, patients were allocated to one of them based on availability. For the purpose of this research a recording of the interview was needed, to transcribe the information and code it correctly. Before each interview patients were informed of this and were able to give their permission.

Before starting each interview, the researcher provided a short introduction to each participant, which contained information on the structure and the subjects of the interview. Also, the importance of the participant's experience was emphasized. It was aimed to keep these introductions as similar as possible. It was also customary to make each participant feel comfortable to answer honestly. If a participant already answered a question, the researcher summarized the answer given earlier. The participant could interrupt or correct the researcher and they could ask a question. Each participant was thanked for their participation.

After the interviews were conducted, this research used Amberscript (Amberscript, n.d.) which transcribed the audio to text. These texts were coded through a computer programme (Atlas.ti, 1997) using a coding scheme. It allowed the two researchers to exchange their coded data.

## Data-analysis

The data was analysed through a structure based on the provided information. The data was coded through a thematic approach. A theme includes important information regarding the

data, related to the research question, while representing a recurring response (Braun & Clarke, 2006).

The coding scheme (Appendix V) was constructed through an inductive manner (bottom-up). A semantic approach was chosen, using the explicit meaning of what participants said during the interview. The coding process consisted of two rounds of coding. For the first round, there were two coding schemes constructed inductively and individually by two researchers. These coding schemes were critically compared and discussed. The first round of coding allowed the researcher to learn more about the data, which led to the opinion that the first coding scheme was insufficient to represent the data. It was decided to adjust the coding scheme, including the new findings, for the second round of coding. This second scheme was also made in collaboration with the other researcher, where the choices for the coding scheme were discussed. The supervisors provided feedback and critical comments to help increase the quality of the coding scheme. After deliberation a definite coding scheme was constructed, it was aimed to be transcending, exclusive and exhaustive as recommended (Braun & Clarke, 2006).

While the coding scheme was made in an inductive manner, the literature used to describe blended care in the introduction was used as knowledge for the first coding scheme. While constructing the coding scheme a second time, the inductively constructed coding scheme was compared to literature. After this comparison, the themes were adjusted to fit the literature. Since literature has recommendations (Kloek et al., 2017; Wentzel et al., 2016), it is important to use these in the current research, to determine the experience of this patient group. Other research on blended care, such as the benefits or the added value, were also used to determine important concepts.

#### Interrater reliability

To ensure the reliability and avoid subjectivity, two researchers coded the same data independently during the first round of coding. The researchers compared the frequency of the coded fragments as well as comparing the number of interviews the code was labelled in. This was not done during the second round of coding, for this round a comparison was not possible. However, the researchers discussed the difficulties encountered while coding and how each researcher choose to deal with them. Discussing and comparing the coding process with another researcher can possibly increase the reliability of the data-analysis (Armstrong, Gosling, Weinman & Marteau, 1997).

### Coding scheme

Each of the themes in the coding scheme is meant to answer a research question. Theme 1: Implementation with treatment is used to answer research question 1 “How do chronic pain patients experience blended care?”. Theme 2: Patients’ engagement and experience with the app is used to answer research question 2: “How do chronic pain patients experience an app in health care?”. Theme 3: Patients needs is used to answer research question 3 “What do chronic pain patients need as support during their treatment?”. An eleventh code was created for the fragments regarding the research about the usability of the app. The following coding scheme was used for the data-analysis.

Table 2: *Coding scheme*

Theme	Code
Theme 1: Combination with treatment	Supportive to therapy and behaviour change Components are interconnected Intensity of components combined
Theme 2: Patients’ engagement and experience with the app	Acceptance Adoption Adherence Motivational aspect
Theme 3: Patients needs	Self-management Experienced usefulness
Other	Miscellaneous

## Results

This chapter will discuss general information given by the participants and the results divided by the themes, which were used to answer the research questions.

None of the nine participants used the app for the intended 14 days, they all stopped after a couple of days. They either stopped using the app after two days, during the first or second series of exercises. The reason for this varied, as described in the different themes. Three of the participants would recommend the app to other people and six participants would not recommend the app. The average grade was a 5,11 on a scale of 1 to 10, where 1 is the lowest score and 10 the highest score.

Table 3: *Number of coded fragments*

Code/Interview	1	2	3	4	5	6	7	8	9	Total
1	8	12	10	8	15	13	6	6	5	83
2	5	12	2	13	6	6	8	6	2	60
3	3	10	3	12	20	6	15	5	8	82
4	5	10	4	9	6	2	2	5	2	45
5	2	-	2	1	5	3	3	2	3	21
6	4	1	12	9	9	2	4	10	8	59
7	3	7	6	35	15	4	5	5	6	86
8	5	8	3	10	21	1	5	3	1	57
9	9	5	3	7	5	6	6	5	2	48
10	18	23	19	40	27	23	18	13	17	198
11	33	34	25	37	32	32	28	29	26	276
Total	95	122	89	181	161	98	100	89	80	1015

### Theme 1: Combination with treatment

The codes in theme 1 describe how the app works in combination with the treatment according to participants. It regards participants' opinion on the app's supportiveness to the treatment and behaviour change. Also, the fit between both components, as experienced by participants, is described. In addition, the combination of the components in terms of time spent on and time consumed by the components is described.

#### Code 1: Supportive to therapy and behaviour change

The participants found the app supportive to their treatment, as it helped them in their daily lives. Four of the participants were very positive about the supportiveness of the app. The remaining five were positive to some extent, but they expected more support from the app.

These expectations will be discussed later (code 4). Participants mentioned the reminders as supportive, since they served as a memory aid of things discussed during treatment. However, none of the patients explicitly reported experiencing a change in behaviour after using the app, reasons for this were the lack of reminders, the frequency and timing of the reminders, too limited time using the app, variation of the content and the time of implementation. Despite the lack of reported change, seven of the participants found that the app was helpful in reminding them of their values. It was also mentioned that the app helped them to think about their values, supported through their phone, which participants mentioned carrying with them a lot.

*“Tegenwoordig doe je heel veel met je telefoon, je hebt 'm altijd bij je dus daar in het stukje als extra ondersteuning voor het traject wat je bij het Roessingh doet, dat vond ik wel heel handig”* – Participant 1

The majority, six participants, did recommend the app should contain more elements of the treatment, as this would make it more supportive for them. They would like to see more aspects of their treatment. Participants mentioned mindfulness, components of breath relaxation therapy and physical therapy, as supportive additions.

*“Nou ja ik zat toch laatst nog wel te denken, van goh misschien zou je nog wat oefeningen of zo erbij in kunnen... Zoals mindfulness oefeningen of ademhalingsoefeningen. Dat je een completere app hebt zeg maar, dat je niet 5 apps op je telefoon hebt staan.”* – Participant 5

#### Code 2: Components are interconnected

The majority of the participants, seven, found that the app fit well with the treatment. Participants recognized the terminology, the part about (body) awareness and value-based living. Also, the sequenced structure was something recognized as similar to treatment at Roessingh.

*“Het sluit wel aan in de zin van terminologie, vind ik bij wat we hier eigenlijk allemaal te doen krijgen en wat we hier inderdaad doen zoals ergens naartoe gaan of ervan af gaan. Die termen die worden natuurlijk hier continu eigenlijk gebruikt”* – Participant 2

Two participants did not report a good fit with treatment. One participant felt unable to answer the question because they found that their use was too limited (approximately 2/3 days). One participant found that the words chosen in the app were very dissimilar to treatment at Roessingh.

### Code 3: Intensity of components combined

Eight of the participants found that the app, combined with their treatment was too much of a burden. Reasons given for this were the timing of the reminders or the content of the reminders (requested effort for response). Most of them experienced it as a lot of extra work on top their home exercises and/or normal lives.

*“Ja het was gewoon te veel. En als je dan, de tussenweken zijn, vind ik, al best wel druk zeg maar. Je hebt ook gewoon opdrachten, hè iedereen die gewoon verder hier. Het is niet dat je dat moet doen maar dat wil ik wel graag voor mezelf doen. Omdat ik denk dat dat helpt. Ja en er is ook nog gewoon een leven zeg maar wat we nog moeten leiden”* – Participant 5

The majority of the participants, five of them, indicated that they would have liked it better as a way of aftercare, when their treatment had ended.

*“Het is wel een beetje veel als je dat achteraf bekijkt. Tegelijkertijd met hier... Misschien was dat beter geweest als nazorg”* – Participant 7

In addition to the timing of the implementation, three participants reported that the duration of the app, 14 days, was too short. They would have liked to be able to use it for a longer period of time. When asked about the disadvantages, one participant answered:

*“Wat mij net te boven schoot was dat, dat je toen vertelde van het duurt 2 weken. En dat ik daar eigenlijk een beetje een teleurstelling van voelde. Omdat ik dacht: yes, als ik die app bij mij heb dan word ik elke keer met mijn waarden wel herinnert en daarmee geholpen. Misschien nu het half jaar, als ik straks klaar ben om daar nog weer in terug te kunnen kijken en daar nog mee bezig te kunnen zijn. Dat het niet maar voor 2 weken is, dat is best heel kort”* – Participant 4

### Theme 2: Patients’ engagement and experience with the app

Theme 2 includes patients’ engagement and experience with the app. Participants expectations’ regarding the app are discussed, as well as their motivation to start using the app. In addition, it is described if they adhered with the technology, if they used it the intended way and if/how the app motivated them to live according to their values.

### Code 4: Acceptance

All of the participants were very accepting of the app. They reported being interested and curious after the app was presented to them. The participants thought it was a good idea to

use technology, as it can be valuable to them for various reasons. Furthermore, they thought it was very fitting for treatment in this time and age.

*“In het algemeen ik denk inderdaad dat het voor een hele grote groep best wel een nuttige toevoeging kan zijn sowieso omdat we deze periode, deze tijd gewoon heel erg digitaliseren natuurlijk en daarmee bezig zijn”* – Participant 2

Some of the participants, three, did not have any specific expectations. Whereas the remaining six, expected that the app would fit well with their treatment and that this would be helpful during their process of learning and applying behaviour during their treatment.

*“De verwachting dat het mij misschien ook wel een beetje zou kunnen helpen met de hele procedure. Oefenen met wat je in de behandeling krijgt”* – Participant 2

There were three patients with additional, specific expectations of the app. One participant thought it would offer more of a measure for values, such as a graph that would show progress. Another participant expected more tips and tricks. Additionally, another participant expected that the app would make her happier.

*“Maar het is eigenlijk meer, ehm, ja ik weet niet. Ik had ook wel iets verwacht van een soort van grafiek of zo weet je wel dat je je waarde daarin echt kon meten zo iets meer”* – Participant 4

#### Code 5: Adoption

The participants were all excited to start using the app. The expectations that they had, were mostly the reason they decided to use the app. One participant started using the app to provide professional feedback, as they have experience with application management. One participant started using the app because they were interested in it. The motivation of two other participants was curiosity since they wanted to find out if it could help them. The majority, five participants, were motivated to use the app because of they thought it could help them with their values, their treatment at Roessingh or taking a part of their treatment home. When asked about their motivation, one participant answered:

*“Nou eigenlijk wel de spiegel die me dan elke dag even weer werd voorgehouden om aan, volgens mij waarden te leven. Omdat de neiging is om snel weer in het oude patroon verder te gaan en met alledaagse dingen bezig te zijn. Het is eigenlijk niks makkelijker dan op je telefoon, nou ja, een appje krijgen”* – Participant 5

### Code 6: Adherence

All of the participants stopped using the app at some point, before completing the 14 days. The reasons for not adhering to the intervention varied. One participant reported being sick for some time, which prevented them from being able to use the app. One participant reported the timing of the trial as inconvenient, as this was during Christmas and New Year's. Three of the participants stopped receiving reminders after two days, which made it hard for them to remember to use the app.

*“Het is echt na die 2 dagen wanneer er geen reminder is. Ja en toen dacht ik er niet aan ... Dan dan sta je daar ook niet bij stil en dan denk ik er ook niet aan om die app nog te openen”*  
– Participant 1

The remaining four participants, stopped using the app because they found it too intense or too much of a burden in combination with other obligations in their lives, as described in code 3.

*“Dat heeft ook wel heel erg te maken denk ik wat voor leefomstandigheden je hebt, ik heb dan 2 kinderen en er werd heel duidelijk aan het begin gezegd van, stel je voor je krijgt zo'n melding. Zorg dan dat je ook tijd ervoor hebt. En, nouja 3 keer op een dag had ik dat natuurlijk niet. Of gunde ik mezelf dat kan natuurlijk ook maar”* – Participant 4

In addition to the early stop of all the participants, five participants mentioned finding the timing of some reminders inconvenient. This caused them to not use the app as intended. Two participants explicitly reported not using the app as intended. For example, they would answer questions without actually thinking about it or answer multiple questions at the same time.

*“En ik merkte dat ik heel erg geneigd was om 's avonds met m'n telefoon te zitten en dan kreeg ik dan inderdaad weer die melding. Oh ja ik loop al wel 3 vragen achter, nou ik doe die 3 vragen nu wel even allemaal achter elkaar”* – Participant 4

### Code 7: Motivational aspect

Participants were motivated to some extent by the app. One participant reported already applying the behaviour, which meant that they did not necessarily need the app. The other participants mentioned the reminders as useful for remembering their values or other learnt behaviour (e.g. awareness). The reminders triggered them to use the app as well, as without the reminders, participants had the tendency to forget the app.

*“Dat was voor mij wel even een goeie trigger om even dat erbij stil te staan. En ja wanneer die melding dus niet meer komt dan heb je dat ook minder snel dat je er bij stilstaat”* –

Participant 1

Although the majority of the participants mentioned being motivated by the app, some of the participants also experienced irritation and/or frustration because of the app. The reasons mentioned were the monotonous content of the app, not knowing what else was coming or the frequency of the reminders (too many). Especially the monotonous content was reported by multiple participants. They would have preferred to see more motivational reminders, instead of only exercises.

*“Ja het was wat eentonig inderdaad. Vervolgens kwam er dan wel een andere vraag van: wat ga je doen of zo dan werd je wel iets anders geprikkeld daarin. Maar ik merkte gewoon van het interesseert me niet”* – Participant 4

Another demotivating aspect for many participants was that the exercises piled up. This pile up of exercises led to annoyance.

*“Dan loop je zo veel achter en er staat heel veel open en dan dacht ik, weet je ehm, ja dan laat maar even”* – Participant 8

### Theme 3: Patients' needs

This theme discusses the needs of the participants. The extent to which the participants were able to manage their condition while using the app is discussed, as well as the usefulness they experienced during the trial period.

#### Code 8: Self-management

Six of the participants mentioned that they found that the app helped them to apply what they had learnt during treatment. The app allowed them to carry a part of their treatment with them. This meant that it would be easier for them to make valued choices in their home environment. Also, the app allowed for repetition of the content of the treatment.

*“En het is niks fijner, vind ik als ik hier straks weg ben, dan vind ik niks fijner dat, dat er nog iets is wat je nog terug zou kunnen lezen of terug zou kunnen horen en soms even weer herhaling”* – Participant 5

One participant also emphasized the opportunity to increase independence of the patients.

*“Ik denk echt dat we daarmee wel zelf heel wat kunnen doen. Daar hebben we geen derde persoon of een tweede persoon voor nodig zeg maar” – Participant 5*

Two participants did not find the app helpful in managing their condition. One participant would like more clarity about the content of the app and the ability to plan. For one participant the app was unnecessary, as they were already applying the behaviour.

Interestingly, one participant mentioned wanting more control over the app, such as setting up the reminders themselves. This would be more helpful in managing their condition. In addition, three participants reported wanting more aspects in the app. Examples of this were, links to information on their condition, other exercises or videos from different disciplines. This regards a variety in content in addition to the exercises of other disciplines, as described in code 1.

#### Code 9: Experienced usefulness of the app

Three participants did not find the amount of time they put into the app in proportion to the usefulness they experienced. One participant was undecided on the subject, they did find the app to be interesting and could see the added value, however they did not experience it as especially useful. Five participants did find the time spent on the app in proportion to the experienced usefulness.

Three of the participants mentioned not finding the app useful. For one participant, this was because they did not need help. Another participant would have preferred a different, more varied version of the app, such as adding encouragements. The third participant expected more usefulness especially for awareness. One participant was undecided on the subject, as they did not give a definite answer. Five participants did find the app useful. Aspects of the app discussed as useful were more body awareness, knowing and being reminded of your values and being able to look back on the past time they worked on their values.

*“Als je week zo en zo ingevuld hebt en dan gaat je weer naar huis dan ben je thuis nog 14 dagen bewust van oh ik kan mezelf toch nog even, ja of je krijgt een reminder van, zo moet het toch eigenlijk” – Participant 7*

#### Miscellaneous

The miscellaneous category was used for fragments that could not be coded by the existing scheme. This category consisted of fragments reflecting the age, the given grade and the question whether they would recommend the app to others. Also, participants evaluated

whether they missed something during the application process for the research. The majority did not miss anything. A few participants would have preferred to see the app during the presentation.

Furthermore, the miscellaneous category was used for conversation related remarks. These include pleasantries, explanation or clarification of the procedure or questions.

## Discussion & conclusion

### Conclusion & discussion

The results showed that participants had varying experiences with the app, both positive and negative. It can be concluded that there are fitting, useful and supportive aspects of the app 'Geluk en zo' in treatment. In contrast there are also aspects of the app that did not work well for the participants and combining it with treatment is challenging. It is important to note that the results and the conclusion are based on the parts of the app the participants actually used, which is limited. The following paragraphs will answer the research questions and discuss these in relation with existing literature.

The first theme can be used to answer the first research question: How do chronic pain patients experience blended care?. The participants reported finding the app supportive in living according to their values. This suggests that the app contributes to (a part of) the goal of the treatment, which is recommended by Wentzel and colleagues (2016), namely value-based living. Kenter and colleagues (2015) described that having an online component could help with learning and retention. This is what participants found supportive, they found the app useful for learning to apply behaviour in their daily life and they were reminded by the app of what they had learnt during treatment. Also, Fitzpatrick and colleagues (2018) mentioned that adding an online component during treatment might lead to greater exposure, as well as adding depth and quality to the face-to-face treatment. The app probably did create more exposure, as participants were reminded of their treatment. It is not clear if or to what extent the app added depth and quality to the face-to-face treatment. As for the impact of the app experienced by patients, none of the patients explicitly reported any changes in their behaviour. The reasons for this lack of change varied, such as the frequency and timing of the reminders, too limited time using the app and the time of implementation, technical aspects (e.g. lack of reminders), the variation of the content. Literature describing behaviour change techniques that might increase the chances of the intervention successfully changing behaviour, such as enablement or incentivization (van Gemert-Pijnen et al., 2018). Perhaps the app did not enable participants enough, with the frequency or timing of the reminders not being optimal or entirely absent according to the participants. It is also possible that the app did not give enough incentive for participants to change their behaviour, as could have been done by giving a compliment or positive feedback that some participants would have liked. This could be cause for the lack of adherence, discussed further in theme 2, which could also contribute to the lack of change in behaviour. When an intervention is not used enough or

used in its intended way, behaviour change will be unlikely (van Gemert-Pijnen et al., 2018). Patients mostly experienced the part of the app they used as fitting with their face-to-face treatment, although the majority preferred to see more aspects of treatment added. This would suggest that the face-to-face treatment and the app are interconnected and a well-integrated whole as recommended in the literature (Kloek et al., 2017; Wentzel et al., 2016). Despite the reported good fit, however, many participants experienced the app as too much in combination with their treatment. Hilliard and colleagues (2014) researched the use and adherence of mHealth amongst cystic fibrosis, a chronic disease. They found that patients wanted an app that was a minimal burden. This is in accordance with this sample group's opinion that the app was too much of a burden. This finding could be due to the moment of implementation, currently done during treatment. Many participants mentioned preferring the use of the app after treatment, as a way of aftercare to help them after they finished their treatment. This is in accordance with Fitzpatrick and colleagues (2018), they described that adding an online component after treatment would be an extension of the treatment that patients found helpful. The intensity participants experienced can be linked to what Kenter and colleagues (2015) described, adding the online component to existing treatment might be less appealing. As perhaps the app is too much in combination with the existing treatment. Another reason to consider is described by van Gemert-Pijnen and colleagues (2018), different patients need a different amount of exercises and eHealth would preferably be able to be personalized to the individual's need. The app currently uses the same number of exercises and reminders for every user, and these reminders are set for them. Perhaps participants would have had less problems with the intensity of the app, if they were able to set the frequency and time of the reminders themselves.

In order to answer the second research question: How do chronic pain patients experience the use of an app in health care?, the second theme was used. All participants shared the positive opinion of using an app in treatment, they were very accepting of and enthusiastic about the concept and adopted it easily. This is in accordance with Keogh, Rosser and Eccleston (2010), who stated that patients are very interested in the use of apps in healthcare. The positive opinion was mostly conscribed to the usefulness of having something extra reminding them of learned behaviour and to it becoming or being normal in modern day society. This made it valuable for them, being able to explore the technological options in combination with health care. When implementing eHealth, a variety of variables (e.g. relative advantage, source of intervention) can be important. When an intervention originates from an organization in the perception of the participants, it is more easily adopted

(van Gemert-Pijnen et al., 2018). Since the app was (partly) designed by and tested within Roessingh, it could have increased participants willingness to adopt it. When an eHealth intervention contains characteristics of the organization that implements it, influences an effective implementation (van Gemert-Pijnen et al., 2018). So, the reported good fit with treatment and the recognizable components could also have helped with the adoption. The participants were also very motivated to start using the app. A person's motivation to use an app is influenced by what the technology can offer them, such as information, feedback, rewards and embedding new self-management habits (van Gemert-Pijnen et al., 2018). This seems to be the case with the participants, their expectations of the app motivated them to start using it. Participants expected the app to be helpful, in the sense that it would provide them a way to practice with and be reminded of their treatment. Despite this positive attitude and their expectations, none of the participants adhered, meaning none of them used the app for the full 14 days. The reasons given for this varied between personal problems, time-related issues, technical problems (e.g. not receiving reminders) and it being too intense (e.g. too many reminders). Little adherence is not uncommon with eHealth, especially implementation in everyday life is problematic (van Gemert-Pijnen et al., 2018). Also, adding eHealth on top of existing treatment leads to less acceptance (Kenter, 2015). This could be the case for these participants, since the intensity of the app, the technical problems and the timing of the reminders made it difficult use the app in their daily lives. It seems likely that adding the app on top of treatment, during treatment, was too much for the participants. Also, a lack of tailored messages could be cause for less engagement and/or adherence (van Gemert-Pijnen et al., 2018), as mentioned in theme 1. Perhaps if the participants could set up the app, so that it would fit into their lives and fit their needs, adherence would increase. Another reason that could contribute less adherence is the time of implementation. The trial period for some participants was around Christmas and New Year's. This can be quite a busy time for some people, which could have influenced their motivation. Another reason could be that the app did not meet the expectations of the participants, which could have caused them to stop using the app. Besides this, some participants did not use the app as intended. This is a known problem with eHealth, interventions can be made based on theory and have potential effects, yet the use is disappointing in practice (van Gemert-Pijnen et al., 2018). Literature already stated that implementing eHealth in existing treatment is challenging (Kenter et al., 2015), this seems to be the case with this research as well. Even though, an app is often found attractive and helpful in motivating participants to follow advice (Schuurmans, 2015), which seemed to be the case for some participants, as they indicated being motivated by the app to

apply learnt behaviour. However, other participants reported feeling irritated and frustrated by the app. Participants found it annoying that the exercises piled up, as this was demotivating for them. Furthermore, the frequency and timing of the reminders, as well as the monotonous content was found less appealing.

The third research question: What do chronic pain patients need as support during treatment?, can be answered using the third theme. Participants were very positive about the possibilities the app offered to remind them of their values and taking valued actions. It allowed them to access a part of their treatment at home/in their own environment. This is in accordance with Chhabra and colleagues (2018), they stated that mHealth can help transfer care from a treatment centre to a home situation. When participants did not find the app useful, there were various reasons for finding this, such as performance or not needing it. Participants reported needing more variation in the content of the app, specifically the nature of the content/exercises. Also, participants preferred to have access to links and/or videos regarding their condition. They reported needing more exercises, such as mindfulness, breath relaxation and physical exercises. For self-management it is important that the technology provides information, increases skills and gives confidence in managing their condition (van Gemert-Pijnen et al., 2018). It cannot be determined if the participants' self-management increased or if they felt more confident in handling their condition. Interestingly, participants reported needing more than the part about values, they would like to see more aspects of their treatment added as well as more functions. Hilliard and colleagues (2014) also found that patients wanted an app with multiple functions, specific to their chronic disease. Other desires were having information with them and a way to help them deal with their condition. These findings are similar to the wishes of this sample of chronic pain patients. Participants in this research also reported wanting the app to have more functions and variations. The majority also indicated wanting more information through a video or a link, as well as a way to help them deal with their disease. A striking difference is that the chronic pain patients in this sample did not report wanting social support. This was desirable amongst the cystic fibrosis patients (Hilliard et al., 2014).

### Limitations

This research has several limitations. None of the participants used the app (or intervention) for the intended 14 days. Since all of the patients stopped using the app earlier, their experience is not complete. This also means that the data collected cannot reflect the entire app-experience of the participants. Instead, the data reflects the experiences of the

participants, which makes it possible to map why patients stopped using the app. This is valuable information that can be used to improve the app.

The technical difficulties mentioned before, are another limitation of this research. It prevented the group of participants from experiencing the app in the same way. This could influence the results.

Another limitation of this research is that the sample for this research is quite small. The number of participants might not assure information saturation. Literature suggests a minimal of 20 interviews in order to achieve information saturation (Marshall, Cardon, Poddar & Fontenot, 2013). This goal was unrealistic, as the total number of patients following the chronic pain treatment at Roessingh at the time was fourteen. However, information saturation does not solely depend on the number of participants. It is suggested that the number of participants can be determined by the number needed to understand the phenomenon (Marshall, Cardon, Poddar & Fontenot, 2013). According to Marshall (1996) the appropriate sample size for qualitative research is the number required to answer the research question. The sample used for this research provided enough information about their experiences to answer the research questions.

The interview functioned mostly according to the expectations, meaning it insured that all subjects were covered during the interviews. It was, in retrospect, a bit too long and caused several repetitive answers at times. When a participant would answer a question, sometimes the researcher would ask for a clarification, a specification or ask further questions regarding the topic being discussed. Due to the interview being exhaustive, it meant more structure in the interview, but also inflexibility. A less structured interview or mainly one or two open questions per subject would have provided more room for a natural course of the conversation. For some participants the interview might have felt long and maybe like an inquiry. This could have influenced the results as some participants could have become tired, annoyed or have lost concentration. It is possible that this led to shorter answers to some questions and/or different answers as the interview steered the conversation, perhaps leaving less room for the participants to discuss things that were important for them.

The coding schemes did not function according to the expectations. It proved more difficult to distinguish the various codes during the data-analysis. This was due to several codes sharing similarities, making the codes not mutually exclusive. Also, the researcher used the code 'miscellaneous' quite frequently. This improved somewhat for the second coding scheme. However, there was still some overlap between a few codes such as supportive to therapy and behaviour change (code 1) and experienced usefulness (code 9). Since many

participants found the aspects that were (un)supportive to their treatment to be less useful. Also, for the second coding scheme, the code 'miscellaneous' was used quite frequently as well. This indicated that the second coding scheme was not entirely exhaustive either. The researcher coded each interview as careful as possible, while also trying to be consistent and always able to substantiate the code given to a certain fragment. In addition, the researcher looked at the question asked by the interview and the answer given by the participant.

This research is limited in reflecting the interrater reliability, as an analysis could not be conducted due to technical difficulties. Instead researchers discussed difficulties with the coding process. This could be viewed as a decrease in quality. However, it is suggested that a perfect consensus in qualitative research is unattainable, as this kind of analysis does not aim to uncover reality. Instead it can be expected that different people analyse the same text in a different way (Armstrong, Gosling, Weinman & Marteau, 1997).

Further research could use an adjusted version of the interview used in this research. It is recommended that the shorten the interview, with more general and open-ended questions. Further research should also adjust the coding scheme, making it truly mutually exclusive and exhaustive. In addition, it is recommended for further qualitative research, an interrater reliability analysis is added.

A disadvantage of qualitative research is that it is not suited for generalizing the results from a sample. However, it can be transferable to other people and it also allows a more explorative approach to complex human behaviour (Marshall, 1996). This research allowed for a description and explanation on how this sample experienced blended care.

Another point of criticism is the reliability of qualitative research. The open approach that is necessary to explore the behaviour makes it difficult to replicate the research (Verhoeven, 2011). While replication could be difficult, the researcher described the process thoroughly and added all the documents another researcher would need to replicate this research. However, this does not guarantee that the same or similar results will be achieved.

### Practical recommendations

Based on the results, several recommendations can be made. It is recommended that all participants receive reminders during the day, which was not the case with this sample. It is also important to carefully consider the moment of implementation, as it was experienced as too much during treatment. Adding the app after treatment would make the app serve as a tool for care after treatment has ended, which seems preferable. Also, the timing of the implementation should not be done during the holidays. Furthermore, the app should not pile-

up the exercises, instead it is recommended that the app sends a reminder only after the previous exercise is completed. In addition, it could be helpful to add incentives, compliments and/or positive feedback to motivate the participants. Furthermore, it could be interesting to try tailoring the app to a participant's needs, this might also help with their motivation to keep using the app. This means letting the participants set the reminders themselves, the frequency and the timing. Lastly it could be helpful to expand the content of the app, meaning adding information on the condition chronic pain or different exercises from other disciplines that could help with value-based living. This includes making some aspects available at all time, participants indicated that they would like to be able to do certain exercises when they feel it is necessary or helpful. This was particularly desired for mindfulness exercises.

Besides these recommendations for blended care and the app, it is important that after the feedback from this sample is processed further research is done to see if there are any changes in the experience of chronic pain patients.

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## Appendix I: The interview

### Interviewschema

Voor ons onderzoek is het belangrijk dat dit interview wordt opgenomen, gaat u hiermee akkoord?

### Demografische gegevens

- a. Geslacht:
- b. Leeftijd:
- c. Behandelvorm: poliklinisch/klinisch

#### *A. Algemeen, motivatie, verwachtingen en voortgang*

1. Wat in de aanmeldingsprocedure (informatie/presentatie) heeft je enthousiast gemaakt?
2. Wat miste je in de aanmeldingsprocedure?
3. Waarom ben je de app gaan gebruiken?
4. Wat waren je verwachtingen van de app?
5. In hoeverre zijn deze verwachtingen uitgekomen?  
Zou je dit kunnen toelichten?
6. Is het gelukt om de app twee weken te gebruiken of ben je op een bepaald moment gestopt?  
Ja: waar ben je gestopt?

#### *B. Systeem*

1. In hoeverre vond je de app gebruiksvriendelijk?
2. Wat vond je van de knoppen in de app? (goed te vinden/duidelijk wat het was)
3. In hoeverre vond je de app overzichtelijk?
  - 3.1. Wat maakte de app overzichtelijk?
4. Was de informatie goed leesbaar/zichtbaar? (lettertype, lettergrootte, mogelijkheid in te zoomen)
5. Wat vond je van de filmpjes?
  - 5.1. Wat vond je van de kwaliteit van de filmpjes? (beeld/geluid)

#### *C. Usability: subjective satisfaction (tevredenheid gebruikers)*

1. Wat was aantrekkelijk voor jou, en wat niet?

2. Wat vond je van de lay-out?
3. Hoe heb je het gebruik van de interventie in de afgelopen twee weken ervaren?

*D. Usability: learnability (omgaan met de app/bruikbaarheid/kun je de app leren gebruiken)*

1. Hoe zou u het gebruik van de app omschrijven?(eenvoudig, toegankelijk, prettig..etc)
2. In hoeverre kon je (snel) met de app leren omgaan?
3. Wat zou kunnen helpen om de app sneller leren te gebruiken?

*E. Inhoud*

1. In hoeverre vond je de instructies/oefeningen duidelijk? (dus wat je moest doen)
  - 1.1. Welke wel en welke niet?
  - 1.2. Wat maakte dat het duidelijk was?
2. In hoeverre kon de je gegeven informatie begrijpen?
  - 2.1. Wat had je nodig om de informatie beter te begrijpen?
3. Hoe ging het uitvoeren van de oefeningen?
  - 3.1 Wat zou je eventueel nog nodig hebben om de oefeningen goed uit te kunnen voeren?
4. Welk onderdeel vond je het belangrijkste/ of best geschikt? Waarom?
5. Op welke manier heeft het gebruik van de app u geholpen om meer zorg te hebben voor uw eigen gevoel van tevredenheid over uw leven/kwaliteit van leven of levensgeluk?

*F. Usability: memorability (gebruiken van het geleerde wanneer de app niet wordt gebruikt)*

1. In hoeverre lukte het je om de app in je dagelijks leven te integreren?
  - 1.1. Wat maakte dat je het wel/niet makkelijk integreerde in je leven?
2. Heeft de app je in het dagelijks leven geholpen?
  - 2.1. Op welke manier wel/niet?
3. Welk onderdeel vond je het belangrijkste/ of best geschikt? Waarom?

*G. Service (proces van aangeboden zorg, registratie, functies die aanwezig zijn)*

1. Heb je reminders gekregen?
  - 1.2. Wel: Wat vind je van de reminders?
  - 1.3. Wel: Hebben reminders geholpen om de app te gebruiken?

- 1.4. Niet: Denk je dat ze nuttig zouden zijn?
- 1.5. Niet: Heb je de app zonder reminders kunnen gebruiken?
2. Welke reminders zouden behulpzaam zijn?
3. Welke functie(s) vond je het prettigst/meest bruikbaar?
4. Welke ondersteuning had je prettig gevonden tijdens het gebruik van de app? Wat zou je graag toegevoegd zien?

*H. Usability: efficiency (hoeveel tijd besteden gebruikers aan de app)*

1. Wat had je nodig om voldoende aandacht te kunnen besteden aan de app?
2. Heb je tijd genomen toen je de oefeningen ging doen?
  - 2.1. Hoeveel tijd kostte het werken aan de app?
  - 2.2. Komt de tijd die je erin steekt overeen met wat je nuttig/bruikbaar/voordelig vond?

*I. Usability: errors (fouten in het systeem)*

1. Welke problemen ben je tegengekomen in het systeem?
  - 1.1. Hoe heb je deze geprobeerd op te lossen?

*J. Usability: errors (van gebruikers)*

1. Welke fouten heb jij gemaakt tijdens het gebruik van de app?
  - 1.1. Waardoor maakte je de fouten?
  - 1.2. Wat zou hier kunnen helpen, volgens jou?

*K. Blended care (inhoud behandeling)*

1. Sloot de app aan op de behandeling bij het Roessingh?
  - 1.1. Wat sloot goed aan bij de behandeling?
  - 1.2. Wat sloot niet goed aan op de behandeling?
2. Wat miste je in de app? / Welk onderdeel van de behandeling zou je graag terug zien in de app?
  - 2.2. Welke onderdelen van de behandeling zag je terug in de app?
3. Wat vind je van een app in een behandeling (zoals bij het Roessingh)?
4. Wat is er wel/niet prettig aan een app in een behandeling?

5. Heeft het geholpen om hetgeen wat je geleerd hebt in de behandeling vol te houden/toe te passen?

6. Welke oefeningen in de app zouden meer aandacht kunnen krijgen in de behandeling?

*L. Aanbevelingen/overige opmerkingen*

1. Is er iets in jouw situatie veranderd na het gebruik van de interventie?

2. Kun je de voor jou belangrijkste voordelen van de app noemen?

2.1. Kun je de voor jou belangrijkste nadelen van de app benoemen?

3. Heb je aanbevelingen om de app te verbeteren?

4. Zou je de app aanbevelen aan anderen?

4.1. Waarom wel of niet?

5. Zijn er opmerkingen die je wil delen? / Heb je nog aanvullingen?

6. Welke cijfer zou u het gebruik van de app geven op een schaal van 0-10?

Wij willen je bedanken voor je deelname en bijdrage aan ons onderzoek.

## Appendix II: The written information

Enschede, 9 november 2018

### **E-health applicatie TIIM, module ‘Geluk en zo’**

Geachte heer/mevrouw,

Uw behandelaar heeft u gevraagd of u wilt deelnemen aan het gebruik van de e-health applicatie ‘Geluk en zo’, ontwikkeld aan de Universiteit Twente. U beslist zelf of u mee wilt doen. Voordat u de beslissing neemt, is het belangrijk om meer te weten over de studie. Met deze brief geven we u meer informatie over de studie en wat deelname voor u betekent. Lees deze informatie rustig door. Bespreek het met anderen. Als u na het lezen van deze brief nog vragen heeft, kunt u terecht bij onderstaande onderzoekers. De contactgegevens vindt u aan het eind van deze brief.

**1. Wat is het doel van de studie?**

Het doel van de studie is om de gebruikersvriendelijkheid en nuttigheid van de applicatie ‘Geluk en zo’ te testen.

**2. Wat houdt de e-health applicatie in?**

Aan het begin van de studie krijgt u toegang tot de applicatie ‘Geluk en zo’. Deze applicatie is bedoeld als ondersteuning bij chronische pijn. In de applicatie komen thema’s aan bod als acceptatie, mindfulness en leven naar waarden, om u bewust te maken voor uw persoonlijke doelen en waarden in het leven.

**3. Hoe wordt het onderzoek uitgevoerd?**

Aan het begin van de studie krijgt u uitleg over de e-health applicatie en krijgt u toegang tot ‘Geluk en zo’. We zijn geïnteresseerd in uw meningen en waarnemingen over het gebruik van de applicatie.

**4. Wat wordt er van u verwacht?**

Als u meedoet, vragen we u om de e-health applicatie gedurende 9 dagen te gebruiken, waarin elke dag een andere module aan bod komt van ongeveer 10 minuten.

Na het gebruik van de applicatie worden face-to-face interviews afgenomen van ongeveer 30 minuten per persoon.

**5. Wat gebeurt er als u niet wenst deel te nemen aan dit onderzoek?**

U beslist zelf of u meedoet aan deze studie. Deelname is vrijwillig. Als u besluit niet mee te doen, hoeft u verder niets te doen. U hoeft niets te tekenen. U hoeft ook niet te zeggen waarom u niet wilt meedoen. Als u wel meedoet, kunt u zich altijd bedenken en ten aller tijden stoppen met uw deelname.

**6. Wat gebeurt er met uw gegevens?**

Al uw gegevens blijven vertrouwelijk en worden anoniem verwerkt. Alleen de onderzoekers hebben toegang tot u gegevens en het wordt niet aan derden verstrekt. Als u de toestemmingsverklaring ondertekent, geeft u toestemming voor het verzamelen en bewaren van u gegevens.

**7. Zijn er extra kosten, is er een vergoeding wanneer u besluit aan dit onderzoek mee te doen?**

Deelname aan deze studie is gratis; er is geen vergoeding voor deelname.

**8. Wat doet u als u mee wilt doen?**

Wanneer u heeft aangegeven geïnteresseerd te zijn in deelname aan de studie, ontvangt u vrijdag 16 november 2018 nadere instructies en de toegang tot de applicatie ‘Geluk en zo’ en kunt u het toestemmingsformulier invullen.

Met vriendelijke groeten,

Jawaneh Sanaie, Nienke Smidt en Gert-Jan Prosman

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053-4875388

# Appendix III: The presentation

## Sheet 1



## Sheet 2

**Wie zijn wij?**

- Masterstudenten Positieve Psychologie & Technologie aan de Universiteit Twente

Doel

- Onderzoek naar gebruikerservaringen:

- Is de app prettig?
- Wat vinden jullie goed aan de app?
- Wat kan er beter?

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## Sheet 3

**INHOUD**

- Het onderzoek
- Aanmelden
- Na aanmelding

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## Sheet 4



## HET ONDERZOEK

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**Het doel: *Optimalisering van de app***

- Doel van het onderzoek is door gebruikerservaringen de app te evalueren en voor toekomstige patiënten te verbeteren en aan te passen
- Dus het in kaart brengen van de gebruikerservaringen met de „prototype“ app „*Geluk en zo*“
- Gericht op waarden
- Focus op wat gelukkig maakt
- Vasthouden en oefenen wat in de behandeling aan bod komt

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Sheet 5



## Deelname aan het onderzoek

---

- Deelname is vrijwillig en anoniem
- Je mag op elk moment stoppen, elke ervaring is bruikbaar
- Deelname (of niet) heeft geen gevolgen voor de behandeling
- Toestemmingsformulier

Waarom meedoen?

- Aan de slag met e-health
- Mogelijkheid voor het optimaliseren van de zelfhulpinterventie voor toekomstige patiënten
- Bijdrage aan wetenschappelijk onderzoek

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Sheet 6



## AANMELDEN

---

Wat heb je nodig:

- Smartphone
- Gegevens voor inloggen
- E-mailadres
- Internet (op Roessingh beschikbaar)

Wat gaan we doen?

- Aanmelden via link in e-mail
- Autorisatie
- Inloggen en aan de slag

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Sheet 7



## NA AANMELDING

---

Wat houdt het in:

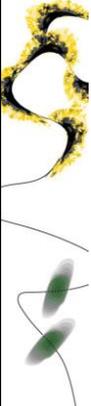
- 14 dagen de app doorlopen
- Na het gebruik volgt een individueel interview (30-45 min)

Oefeningen:

- App bevat reminders
  - Neem de tijd voor de oefeningen
- Oefeningen twee weken doorlopen
- Terugblik

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Sheet 8



## Bedankt voor het luisteren!

Zijn er nog vragen?



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## Appendix IV: The consent form

### Toestemmingsverklaringformulier (informed consent)

**Titel onderzoek:** De applicatie Geluk en zo bij chronische pijnpatiënten. Co-creatie en onderzoek naar gebruikerservaringen.

**Verantwoordelijke onderzoekers:** Jawaneh Sanaie, Nienke Smidt en Gert-Jan Prosman, Universiteit Twente, Enschede

In te vullen door de deelnemer

Ik verklaar op een voor mij duidelijke wijze te zijn ingelicht over de aard, methode, doel en belasting van het onderzoek. Ik weet dat de gegevens en resultaten van het onderzoek alleen anoniem aan derden bekend gemaakt zullen worden. Mijn vragen zijn naar tevredenheid beantwoord.

Ik begrijp dat het materiaal of bewerking daarvan uitsluitend voor het verbeteren van de app wordt gebruikt en voor presentaties daarover.

Ik stem geheel vrijwillig in met deelname aan dit onderzoek. Ik behoud me daarbij het recht voor om op elk moment zonder opgave van redenen mijn deelname aan dit onderzoek te beëindigen.

Naam deelnemer: .....

Datum: ..... Handtekening deelnemer: .....

In te vullen door de uitvoerende onderzoeker

Ik heb een mondelinge toelichting gegeven op het onderzoek. Ik zal resterende vragen over het onderzoek naar vermogen beantwoorden. De deelnemer zal van een eventuele voortijdige beëindiging van deelname aan dit onderzoek geen nadelige gevolgen ondervinden.

Naam onderzoeker:

*Nienke Smidt / Jawaneh Sanaie*

Datum: ..... Handtekening onderzoeker: .....

## Appendix V: Coding scheme

The coding scheme used for this research.

<b>Theme</b>	<b>Code</b>	<b>Definition of the code</b>
<p><u>Integration/ implementation with treatment.</u>            Definition: The combination of face-to-face treatment and the app, meaning the fit between two components, the intensity.            Talboom-Kamp (2018) finds implementation a key factor for success.</p>	<p><u>Supportive to therapy and behaviour change</u></p>	<p>The extent to which the app contributes to goals of treatment and help behaviour change. As recommended by Kloek et al., 2017 &amp; Wentzel et al., 2016</p>
	<p><u>Components are interconnected</u>            Recommended by</p>	<p>The extent to which patients experience the combination of the components to be a whole instead of two stand-alone components. A recommendation by Kloek et al., 2017 &amp; Wentzel et al., 2016.</p>
	<p><u>Intensity of components combined</u></p>	<p>Patients' opinion on the time spent on both components and combining the two components time-wise. Kenter et al., 2015 recommended a specific time to implement eHealth, since this might help implementation</p>
<p><u>Patient engagement and experience with the app</u>            Definition: Patients' attitude/opinion on using an app in treatment. The importance of acceptance, adoption and adherence are noted by van Gemert-Pijnen et al., 2018. As well as motivation (van Gemert-Pijnen et al. 2018 &amp; Wentzel et al., 2016)</p>	<p><u>Acceptance</u></p>	<p>The decision if, how and when they would use the technology. It is a necessary precondition for the use of and user engagement with the technology (Van Gemert-Pijnen et al., 2018)</p>
	<p><u>Adoption</u></p>	<p>The decision of the target group to start using a new technology (Van Gemert-Pijnen et al., 2018).</p>
	<p><u>Adherence</u></p>	<p>The extent to which patients stick with the technology and use it the intended way (Van Gemert-Pijnen et al., 2018).</p>
	<p><u>Motivational aspect</u></p>	<p>To what extent were patients motivated by the app? Was it helpful during their process?            Motivation to use self-management apps can be influenced by the potential of this technology to provide information, feedback, reward systems and automaticity which could embed new self-management habits (Gemert-Pijnen et al., 2018). Technology should motivate patients during the process. Recommended by Wentzel et al., 2016. Also, van Gemert-Pijnen et al., 2018 mentioned this in relation to self-management</p>

<p><u>Patients' needs</u>  Definition: This theme maps the needs of patients. Mapping the needs of the patients is necessary according to Talboom-Kamp, 2018 &amp; Wentzel et al., 2016. This way an eHealth component can be tailored to the needs of a specific patient group (Kenter et al., 2015). For chronic pain patients there is limited information available</p>	<p><u>Self-management/ Autonomy Generalize ACT skills (e.g. awareness, value-based living)</u></p>	<p>To what extent did the app help them apply learnt behaviour in their lives. What do patients need to help them apply ACT in daily life? What do patients need to become more autonomous or to manage their disease themselves. i.e. does it offer knowledge, skill and confidence in managing their condition.  Self-management is a benefit mentioned by Kooistra et al., 2014, this can help with autonomy. Empowerment might help applying ACT in daily life (Levin, Pierce &amp; Schoendorff, 2017).</p>
	<p><u>Experienced usefulness of the app</u>  It is important to map what patients found useful or less useful.</p>	<p>Patients' experience with regard to usefulness of the app.</p>
<p>Other</p>	<p><u>Miscellaneous</u>  Category designed for the</p>	<p>Other fragments that do not fit the abovementioned descriptions.</p>