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Tablet-based support for older adults with severe mood disorders treated in an ambulatory geriatric psychiatry setting: Protocol of a feasibility study of the eCare@Home platform

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ABSTRACT

Introduction: Although older adults are just as likely to benefit from e-mental health as their younger counterparts, there are virtually no applications specifically designed to accommodate the needs of older adults with recurrent depression or bipolar disorder. Recurrent mood disorders constitute a large and rising proportion of the global disease in older populations, indicating a need for more e-mental health applications targeting this group. This paper describes the theoretical background and methodology of a study examining the feasibility of a tablet-based self-management platform for older adults with recurrent mood disorders. The eCare@Home platform was designed to 1) improve patients' awareness and knowledge of recurrent mood disorders and their treatment, 2) promote self-management through the use of a simple daily monitoring tool, and 3) facilitate online contact with their clinician through videoconferencing.

Methods: The design involves a single-group four-month pilot study, with measurements at baseline (T0), and at weeks 8 and 16 (T1 and T2). The target group consists of older outpatients (aged 60 or above) who are undergoing treatment for recurrent depressive or bipolar disorder (N = 50), and their clinicians (N = 10). Primary feasibility endpoints will be system acceptability, system usability, and client satisfaction with the platform. In addition, qualitative data from semi-structured interviews in N = 10 patients and N = 5 clinicians will be gathered to provide more insight into user experiences and evaluations of the platform's added value.

Discussion: To the best of our knowledge, this is the first study to evaluate the feasibility and acceptability of a tablet-based e-mental health platform for older adults with severe mood disorders. If tablet-based support for this group is shown to be feasible, the intention is to proceed with the design of a large-scale process and outcome evaluation. The strengths and limitations of the methodology used are addressed in this article.

Trial Registration: registration is pending.

1. Introduction

This article describes the design of a pilot study to evaluate the feasibility of a tablet-based e-mental health platform for older adults with severe and recurrent mood disorders (depression and bipolar disorder). E-mental health applications for mood disorders appear to be effective in younger age groups and show promise as a supplement to conventional care (Griffiths et al., 2010). Although older adults are just as likely to benefit from e-mental health as their younger counterparts, there are virtually no applications specifically designed to accommodate the needs of older adults with mood disorders. Recurrent mood disorders constitute a large and rising proportion of global diseases in older populations (Volkert et al., 2013), indicating a need for more e-mental health applications targeting this group. There have been a few studies into online cognitive behavioural therapy for late-life depression, however these targeted older adults in the general population with mild to moderate symptoms (Mcmurchie et al., 2013; Spek et al., 2007; Titov et al., 2015). The present study is one of the first to develop an e-mental health application

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supporting the needs of older adults with severe recurrent mood disorders, in a specialized mental health care context.

1.1. Theoretical background

Long-term mental health care and the intensity of treatment for older adults with severe mood disorders, such as recurrent depressive disorders and bipolar disorder, depends on the stability of the patient between episodes (Blazer, 2003; Dols et al., 2012). Although recurrent depression and bipolar disorder are generally regarded as two distinct disorders, they share certain essential features. Both conditions have a fluctuating course, in which periods of relative stability are intertwined with moderate to severe relapses in mood disorder episodes. Thus, patients with these conditions (and their clinicians) face varied, but similar, challenges in managing their illness (Keitner et al., 2006; Russell and Browne, 2005).

These challenges include: 1) monitoring warning/early signs such as changes in mood, sleep patterns and activity levels, which can precede a new episode (Baglioni et al., 2011; Lam et al., 2003; Mammen and Faulkner, 2013) 2) being aware of the dynamics of the disorder, the importance of treatment adherence, drug-drug interactions and somatic comorbidities (Lam and Wong, 1997; Todd et al., 2012) and 3) identifying the features of different phases of stability i.e. although a hospital admission or intensive ambulatory care may be required during exacerbations of the illness, patients may have far less need of specialized mental health care during phases in which they are relatively stable (Michalak et al., 2006). The care provided by mental health care services therefore needs to allow for timely adjustments in the need for support and autonomy. Self-management skills and flexible access to specialized care therefore seem to be fundamental for patients with recurrent mood episodes.

'Self-management' refers to the individual's ability to cope with the symptoms, treatment, physical and psychosocial consequences and lifestyle changes inherent to living with a chronic condition (Barlow et al., 2002). Frequently used self-management strategies for mood disorders include self-monitoring of disease-specific symptoms, psychoeducation and maintaining a relapse prevention plan (Murray et al., 2011; van Grieken et al., 2014). Psycho-education is effective in improving clinical course, treatment adherence and psychosocial functioning (Tursi et al., 2013). Self-monitoring is not only effective as an aid to understanding the dynamics of patients' everyday lives, it is also widely believed that this can benefit patients directly (e.g. Janney et al., 2014). All existing evidence-based psychological treatment protocols for depression and bipolar disorder involve various aspects of self-management (Kupka et al., 2015; Spijker et al., 2013).

Self-management activities, however, often require high levels of daily commitment from patients, which may result in low compliance rates (Whybrow et al., 2003). E-mental health applications can help facilitate self-management processes by offering easy access to brief, user-friendly, real-time assessments, whereas traditional pen and paper charting is more time-consuming and is normally retrospective in nature. Thus, e-mental health applications can increase accuracy and minimize retrospective bias (Aan het Rot et al., 2012; Ebner-Priemer and Trull, 2009). In e-mental health applications, multiple self-management activities can also be combined in a single platform, making it easier for patients to stay involved. Various e-mental health applications, offering a range of self-management options, have been designed for both recurrent depression and bipolar disorders. The results of several studies suggest that it is feasible to implement these applications as a supplement to routine practice and that patients regard these applications as a useful addition to regular treatment (e.g. Bardram et al., 2013; Depp et al., 2015; Hunkeler et al., 2012; Lauder et al., 2014).

There has only been one study, targeted specifically at older adults, that involved the use of a mobile device to self-monitor for depressive symptoms (Moore et al., 2016). However, no results concerning the feasibility and usability of the mobile device and app used in this study have yet been published. Nevertheless, based on the fact that older adults are often less familiar with computer technology and the internet (LeRouge et al., 2014), we may assume that their specific needs must be taken into account when designing e-health applications.

1.2. The co-creation of the eCare@Home platform

The eCare@Home (ECH) platform was developed in response to the need for target-group-specific e-health applications. ECH is a tablet-based self-management platform for late-life recurrent depression or bipolar disorder, for use in addition to regular treatment. A co-creational approach was used, to compensate for the lack of sufficient theoretical background data in the literature. In this way, the design team was able to ensure that the product would be usable for our specific target group. The design of eCare@Home was informed by the use of personas (detailed patient profiles) and ongoing user tests of interim design visualisations, as opposed to the traditional rigid waterfall method, that incorporates only a single assessment round. In the initial stages of development, six personas were created to familiarise the design and software development team with the characteristics of the targeted patient group, including its members' social relationships and their interactions with mental health care professionals. The next step consisted of actual patient and clinician interviews. The first author of the present study (Josien Schuurmans) conducted semi-structured interviews on three separate occasions with a total of eight volunteers who were being treated for recurrent depression or bipolar disorder at inGeest's outpatient geriatric psychiatric department. For each of the three rounds, interactive demo material and screenshots provided by the design team were used as stimuli. Several rounds of semi-structured individual and group interviews were held with a total of 20 clinicians who were employed at the same facility.

After each round of interviews, detailed feedback was provided to the design team. Feedback was not restricted to a one-time communication regarding the interviews held after each round. The design team translated feedback into new screenshots and wireframes, then two members of the research group (Josien Schuurmans and Jeroen Ruwaard) reviewed the work and provided additional feedback based on user assessments. In this way, a continuous interactive model was implemented to ensure that the design reflected the end-users' demands.

These tests gave rise to specific requirements regarding usability, involving such aspects as larger fonts, the use of easily discernible colours, and controls that can be easily operated by individuals suffering from tremors or arthritis. However, 'usability' also involved a need for applications and controls that are sufficiently simple, intuitive and straightforward that even those with little or no familiarity with the internet or computers can use them. Furthermore, the tests resulted in a focus on three main objectives regarding those contents of the platform that correspond with the aforementioned challenges (Section 1.1, page 4) in dealing with recurrent mood disorders. These three objectives are: support for daily self-monitoring in an unobtrusive and non-stigmatizing manner; support for communication with clinicians from the comfort of the patients' own homes via videoconferencing; and easy access to personalized information regarding their disorder and relapse prevention plan. The ECH patient portal is designed to be used on mobile tablet computers, as this is expected to make the internet more accessible for older adults who may be unfamiliar with the use of computers (Werner et al., 2011). Also, tablets have fewer usability barriers (e.g. no mouse is required, screen size is larger than a smartphone's etc.) (Foster and Sethares, 2014) (Fig. 3).

1.3. Aim and focus of the proposed study

In the proposed study, we will evaluate the feasibility of the ECH platform (i.e. system usability, system acceptability, and client satisfaction) through a pilot study in an ambulatory geriatric psychiatry setting

among patients (aged 60 +) and their clinicians. Patients will be observed over an extended time period (four months), during which they will become acquainted with the tablet computer (the "HomePad") and pre-installed eCare@Home functionalities. We will explore end-user experiences with the "HomePad" and their evaluation of the platform's added value. It is hoped that the results of this study will provide sufficient grounds to justify a large-scale study (i.e. a randomized controlled trial to investigate the cost-effectiveness of implementation in routine practice).

2. Methods

2.1. Study design

This study is a single-group four-month pilot study, with measurements at baseline (T0), and at weeks 8 and 16 (T1 and T2). The target group consists of outpatients, aged 60 and above (N = 50) who are in treatment for recurrent depressive or bipolar disorder, and their clinicians (N = 10). This study will be conducted at the geriatric psychiatry department of GGZ inGeest, Amsterdam - a large Dutch mental health organisation. The protocol for this study has been approved by the Medical Ethics Committee of VU University Medical Centre (Registration number 2014.428).

2.2. Participants

2.2.1. Recruitment

Patients with a primary diagnosis of recurrent depression or bipolar disorder, who are currently undergoing treatment, will be invited by their clinician to participate in the study. Any patients interested in participating will be provided with an information letter and an informed consent form. They will be contacted by a member of the research team who, in addition to answering any questions the patients might have regarding the study, will confirm that they do indeed wish to participate. If such confirmation is obtained, the patients in question will be required to submit a written informed consent. Thereafter, they will be invited to attend a session at the clinic to complete the T0 questionnaires and to undergo a comprehensive training course in the use of the ECH platform. Patients who do not have a Wi-Fi connection at home will be provided with one for the duration of the study (four months).

2.2.2. Inclusion and exclusion criteria

Patients are eligible to participate if they are aged 60 years or above and are currently being treated at the participating mental health centre for either recurrent depression (i.e. with a minimum of two depressive episodes including the present episode) or bipolar disorder, as determined by in-patient records. Patients should have undergone treatment for at least six months at the mental health centre prior to participating in the study, and should have an adequate verbal and written command of the Dutch language. They must also provide a signed informed consent. Any patients who score below the established threshold (a score of 24 or below) on a validated screening instrument for dementia (the MMSE; Folstein et al., 1975; Molloy and Standish, 1997) are excluded from the trial.

2.3. The ECH platform

ECH is based on an existing IT platform (AAL - Ambient Assisted Living, 2012) that was developed to support senior citizens. The platform is an Internet-based, multi-user system that connects applications on different types of computers. As described in the introduction to the present paper (Section 1.2), the development of ECH was guided by patient profiles and ongoing user tests. The platform, which is designed to be an addition to the existing treatment of older patients with recurrent depressive or bipolar disorder, consists of a tablet computer application for patients (the "HomeTab") and a web-based clinician's portal ("CP").

2.3.1. The HomeTab

HomeTab is the tablet computer application that provides:

- *A personal mood-monitoring platform* that patients can use to monitor important aspects of their illness on a daily basis. Three trackers monitoring mood, activity levels, sleep duration and sleep quality were specifically designed for the ECH system (Fig. 1). These are based on continuous user feedback from both patients and clinicians during the development phase, as described in Section 1.2. These trackers allow patients to rate their mood, activity levels etc. according to an 11-point scale ranging from −5 (lowest) to +5 (highest), where 0 is neutral. The trackers represent mood, sleep duration and activity levels as a balance, and high scores at either end of the spectrum indicate cause for concern regarding the client's well-being. These scores are displayed in a chart to obtain an overview of the patient's status (Fig. 2).
- *Psycho-educational resources* on disease-management, medication and self-management activities, in the form of a wellness library (matching the patient's specific diagnosis), which can be personalized. Clinicians can upload disease-specific information to an individual patient's library, which will also contain the patient's relapse prevention plan (Fig. 3).
- *Videoconferencing* to facilitate easy access to a clinician through a secure communication channel.

During the study period, the clinician will initiate two scheduled videoconferencing consultation sessions with the patient (at week 8 and week 16) (Fig. 4).

All participants will be given a one to two-hour face-to-face instruction session, either at their home or at GGZ inGeest, in which the three applications are introduced and explained. The patient is then asked to complete daily ratings over the next four months.

2.3.2. The clinician's portal

The CP of the ECH system is a web-based platform. Here, clinicians can view details of the patient's self-reported mood, sleep and activity. In the present study, the clinician will not actively monitor these variables and charts (and patients will be informed of this). Clinicians will be instructed to use this data during face-to-face sessions, to discuss salient patterns in any symptoms that are being tracked. In addition, the CP allows clinicians to push relevant psycho-educational material to the HomeTab. The clinician is instructed to upload patient-specific

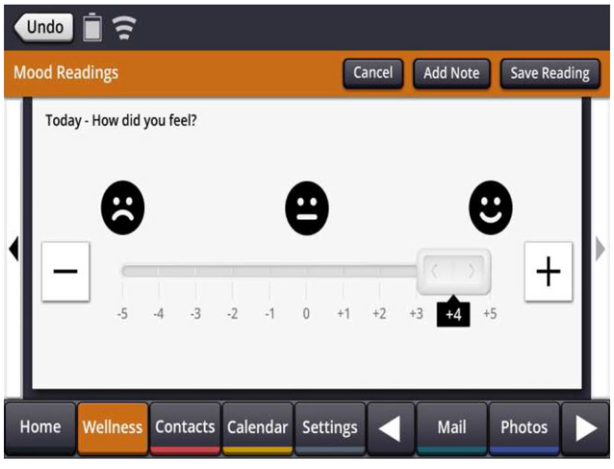

Fig. 1. Example of how to monitor one's mood.

Fig. 2. One-month mood and activity ratings displayed in a chart.

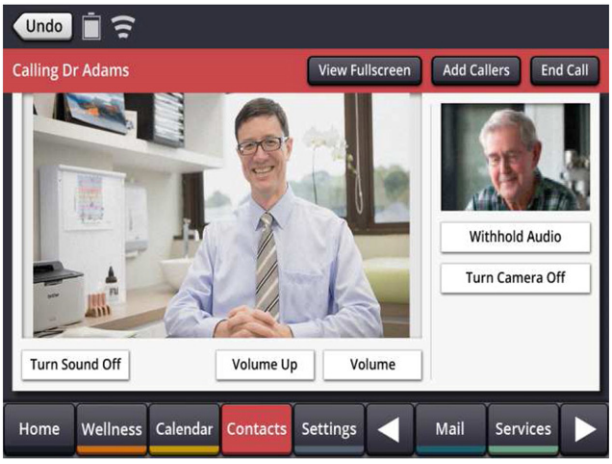

Fig. 4. Example of a videoconference session between a clinician and a patient.

information regarding the disorder, medication, and a personalized signal plan to the tablet as soon as the HomeTab is introduced. During the study period, the clinician will hold videoconferences with the patient at week 8 and at week 16, or sooner if necessary.

2.4. Assessments

Assessments will be based on the feasibility of the ECH approach. For the purposes of this study, feasibility is defined in terms of three main criteria – acceptability of the platform, usability of the platform and patient satisfaction. This will indicate how patients and clinicians perceive the ECH platform. Feasibility will be assessed through the analysis of process variables, questionnaires, and qualitative interviews. In order to draw firm conclusions about the feasibility of the platform, we defined all feasibility criteria in advance. Other study parameters, such as symptom severity and use of technology, will also be included.

2.4.1. Feasibility outcomes

System acceptability will be measured in two ways. Firstly, we will use log file analysis to determine usage levels for ECH's three main functions (mood monitoring, library and videoconferencing). For the first of the feasibility criteria, patients rate their mood, sleep and activity three or more times per week, on average. For the second criterion, the patients access the library and the relapse prevention plan at least ten times, and for the third criterion, the clinicians initiate two videoconferences with the patients, one at week 8 and one at week 16. Secondly, at baseline/T0, the patients will complete *The Credibility/Expectancy Questionnaire* (CEQ) (Devilly and Borkovec, 2000), to measure *prior expectancies toward the system and the credibility of system options*. This questionnaire consists of six items, half of which relate to the subscale system of credibility and the other half to the subscale system of expectancy. Four of these items are scored on a 9-point Likert scale ranging from 1 (not at all) to 9 (absolutely). Two items of the credibility subscale are scored on a continuous scale, ranging from 0% (not at all) to 100% (absolutely). These two items can be transformed into a 1 to 9 scale, such that both subscales can yield a total score of 3 to 27, as proposed by Smeets (Smeets et al., 2008). Higher scores are indicative of more positive attitudes. There is no normative data for the CEQ. We will use moderate subscale scores of 18 or higher as a feasibility criterion.

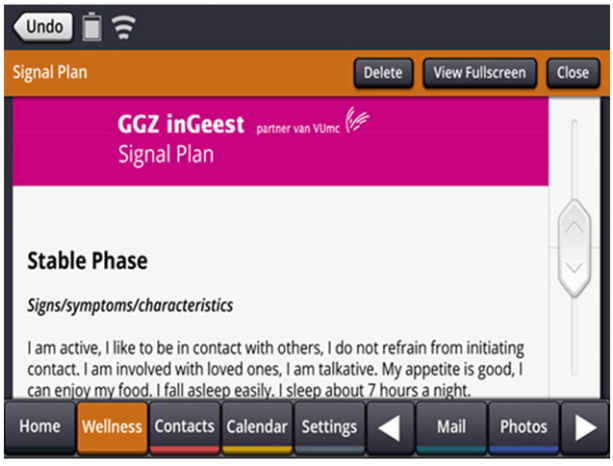

Fig. 3. A relapse prevention plan in the personalized library.

At T1 and T2, study participants will rate the usability of their interface to the ECH system using the *System Usability Scale* (SUS) (Bangor et al., 2008; Brooke, 1996). The SUS consists of ten questions (e.g. 'I imagine that most people would learn to use this system very quickly') with five response options (ranging from 'strongly disagree' to 'strongly agree'). The total scores range from 0 to 100, with higher scores representing higher usability. In line with Bangor (Bangor et al., 2008), an average SUS score of 70 or above will be considered adequate. A second usability evaluation will take place at T2, involving a short evaluation questionnaire to be completed by patients and clinicians. This evaluation will assess the individual's overall approval rating of the various functions (mood monitoring, videoconferencing, and the library) on a scale from 1 (very poor) to 10 (very good). Those completing the evaluation will be asked about the added value of the platform and about their patient/clinician relationship.

At T1 and T2, patients will complete *The Client Satisfaction Questionnaire-8* (CSQ-8) (Attkisson, 1982; Nguyen et al., 1983) to assess the client's views concerning the value of e-mental health services received. Patients will be asked questions about the use of ECH. The CSQ is a standardized measure consisting of eight questions with item-specific four-point response scales (scored 1–4). The total score ranges from 8 (great dissatisfaction) to 32 (great satisfaction). A score of 20 indicates indifference. The CSQ has excellent reliability and internal consistency. It is also well accepted by clients and service providers, and is highly sensitive to different levels of program quality (Attkisson, 1982; De Wilde and Hendriks, 2005; Greenfield and Attkisson, 2004; Nguyen et al., 1983). For the purposes of this study, we defined an average CSQ score of 20 or more at T2 as an adequate outcome in terms of patient satisfaction.

Given that this is a pilot study focusing on feasibility endpoints, acquiring extra information about user experiences (including any potential obstacles within the system) could be helpful in terms of optimizing ECH. It would also be interesting to find out whether patients really do

engage in such self-management strategies and whether they find them valuable, as an addition to their existing treatment. With this in mind, a semi-structured qualitative interview will be administered to a random selection of ten patients and five clinicians involved in the feasibility study. This interview will cover the following topics: overall impression, personal experiences with the system, added value in terms of treatment, contact with the clinician, self-management strategies, and any flaws in the system itself.

2.4.2. Other study parameters

In addition to the primary study parameters, factors such as symptom severity and the level of user familiarity with technology will be examined. Measuring symptom severity can provide information about group characteristics such as the severity and stability of depressive symptoms or manic symptoms.

At baseline/T0 we will give subjects five self-report questions regarding the use of desktop computers, tablet computers, mobile phones and smartphones. These will include questions such as "How often do you use a smartphone?" The corresponding scale consists of the following options: "Never/I do not own a smartphone", "I use it less than once a month", "I use it 1 to 3 times a month", "I use it about once a week", "I use it several times a week", "I use it daily".

The Quick Inventory of Depressive Symptomatology Self Report (QIDS-SR) (Rush et al., 2003), a shortened version of the IDS-SR (John Rush et al., 1986; Rush et al., 2006, 1996), is a self-report measure of the severity of depressive symptoms in the previous week. This questionnaire consists of 16 questions. The total score ranges from 0 to 27, with higher scores being indicative of more severe depressive symptoms.

The Altman Self-Rating Mania Scale (ASRMS) (Altman et al., 2016), is a five-item, multiple choice scale in which manic symptoms are rated from 0 to 4, based on increasing severity. The ASRM was validated on in-patients with manic and non-manic disorders, in a research context rather than clinical setting. In this situation, it showed satisfactory reliability and validity (Altman et al., 2016). As with the QIDS-SR, the ASRMS will be administered at all measurement points.

2.4.3. Overview of all measures

For a full overview of all outcome measures and of the measurement points at which these will be administered to patients, see Table 1 (Table 2 shows the corresponding details for clinicians).

2.5. Sample size calculation

The sample sizes used in pilot studies should be large enough to provide useful information about the aspects being assessed to determine feasibility (Thabane et al., 2002). We calculated the sample size by using the R PWR package (Champeley, 2007). With N = 50 and an estimated SD of 21, the targeted feasibility criterion mean score on the System Usability Scale of M = 70 will have a 95% confidence interval of ±6 scale points (Lewis and Sauro, 2009), where the lower end of the confidence interval (64) can be considered marginal but still sufficient (Bangor et al., 2008).

2.6. Data analysis

All quantitative outcomes will be summarized using descriptive statistics. Point estimates and 95% confidence intervals of key feasibility outcomes will be calculated and tested against the feasibility criteria, according to the aforementioned pre-set definitions.

Data from the semi-structured interviews will be digitally recorded and transcribed verbatim. A content analysis approach will be used to analyse the transcripts. This approach involves coding statements based on their key concepts, combining these coded concepts into themes, and refining the themes identified in this way (Doing Qualitative Research, 1999). Transcripts will be read, reread and coded independently by two researchers, who will then compare the coding they have each produced.

Table 1
Overview of patient outcomes.

Questionnaire	Aim	Baseline (T0)	Week 8 (T1)	Week 16 (T2)
Primary outcomes				
CEQ	Credibility and expectancy	x		
Log files	System usage		x	x
SUS	System usability		x	x
Evaluation questionnaire	User experiences			x
CSQ	Client satisfaction	x		x
Other outcomes				
Demographics		x		
QIDS-SR	Depressive symptoms	x		x
ASRMS	Manic symptoms	x		x
Technology use	Familiarity with technology	x		
Use of care				x
Study processes				
Questionnaire completion rates		x	x	x
Percentage of missing data		x	x	x

CEQ: Credibility/Expectancy Questionnaire; SUS: System Usability Scale; CSQ: Client Satisfaction Questionnaire; QIDS-SR: Quick Inventory of Depressive Symptomatology-Self Report; ASRMS: Altman Self-Rating Mania Scale.

When these researchers have reached a consensus, a final, combined coding scheme will be drawn up.

3. Discussion

In the proposed study, the feasibility of the ECH approach will be assessed among older adults with mood disorders who are being treated in an ambulatory geriatric psychiatry setting, and their clinicians.

3.1. Strengths

This is one of the first studies to focus on the feasibility of e-mental health in older adults with severe psychiatric disorders. The limited number of studies in this area have focused on a relatively young group of older adults (55+), with relatively mild symptoms (McMurchie et al., 2013; Spek et al., 2007). Moreover, to the best of our knowledge, this is the first study to focus on a supportive e-mental health platform as an addition to regular treatment for older adults with severe and recurrent mood disorders. The feasibility criteria that will be used to determine whether this pilot is a success or whether it needs further development have been defined in advance. This is a strength of the study, as pilot

Table 2
Overview of clinician outcomes.

Questionnaire	Aim	Baseline (T0)	Week 8 (T1)	Week 16 (T2)
Primary outcomes				
CEQ (short version)	Credibility and expectancy	x		
Log files	System usage		x	x
SUS	System usability		x	x
Evaluation questionnaire	User experiences			x
Other outcomes				
Demographics				
Technology use	Familiarity with technology	x		
Study processes				
Questionnaire completion rates		x		x
Percentage of missing data		x		x

CEQ: Credibility/Expectancy Questionnaire; SUS: System Usability.

studies should have a well-defined set of aims and objectives, to ensure methodological rigour and scientific validity (Lancaster et al., 2004). Many pilot studies lack clear pre-set criteria for feasibility (Thabane et al., 2002), making it difficult to draw sound inferences from the data. An additional strength of this study is that the purely quantitative feasibility outcomes are supplemented with more qualitative data. For instance, greater insight will be gained through the qualitative interviews which focus on the experiences of ECH, obstacles, and benefits, and on individuals' experiences of self-management. One of the platform's strengths is that both patients and clinicians were involved in its co-creation, thus ensuring that its design is effectively tailored to the specific needs of this particular target group. Clinicians are also treated as relevant end-users. Accordingly, they provide data (by means of validated questionnaires and structured interviews) regarding their experiences with the platform. This will provide greater insight into the feasibility of this system's implementation in routine care than would be the case if we were to focus solely on patient perceptions.

3.2. Limitations

The main limitation of the present study is that it focuses on a relatively small sample without employing a randomized controlled design. The present study will not, therefore, provide us with definitive information on the added value of using the eCare@Home platform in routine care. As this platform has never been used by older adults with severe mood disorders, little is known about how such a system might be used in everyday practice. Accordingly, it is important to obtain information about the feasibility of using this platform, as well as more in-depth details of user experiences, before subjecting it to a large-scale process evaluation. Additionally, as participants will be recruited from one specific mental health care setting, it could be argued that this may have an impact on the generalizability of our results to other clinical populations. However, previous studies undertaken in this setting do seem to be representative of "real-world" data and can be generalized to older psychiatric patients treated in outpatient clinics (Dols et al., 2014).

The current study sets out to explore the feasibility of incorporating the platform into routine care. For this reason, we chose a single-group repeated measures design. No treatment effect sizes will be calculated, as their use would suggest that any positive or negative effect that might be found can be ascribed to the intervention itself. However, as we have no control group, we cannot make this kind of assumption. Any effects resulting from the use of the eCare@Home platform need to be established in a larger randomized controlled trial. Indeed, we are planning to proceed with a trial of this kind if the feasibility study proves successful.

The definition of the term 'older adult' is complex, and subject to change. In most studies, the age threshold is set at 55 or 60 years of age. However, it has been argued that this threshold is too low. For the purposes of the present study, we selected the age of 60 and above as our 'older adult' category, as this is still the established age threshold for most mental health care facilities in the Netherlands that specialize in geriatric psychiatry. It should be noted, however, that ageing is an ongoing process that is related to many physical and psychological changes, and that the rate of change involved can vary quite markedly from one individual to another.

3.3. Implications for everyday practice

This study may help to influence prevailing views concerning the feasibility of e-mental health interventions and supplements for older adults with mental health problems. Given the relatively novel nature of this field, it is hoped that this work will provide an initial stimulus for an expansion of the treatment options for this vulnerable group.

3.4. Current status and future directions

At this point, it is important to note that the ECH platform is currently still in the development phase. The system is constructed to meet the established user needs. Its design specifications were finalised before the preparation of the present manuscript. However, the initial basic user acceptance tests have shown that the software developed does not fully meet the requirements. Thus, the ECH platform is not yet considered to be ready for routine use in clinical practice. The proposed feasibility study will commence when the identified shortcomings have been adequately addressed.

3.5. Conclusion

In summary, late-life mood disorders are particularly common and often have an unfavourable prognosis. This study describes e-mental health applications for severe mood disorders in older adults, and aims to encourage the development and use of these systems. More specifically, it aims to determine whether patients with recurrent depression or bipolar disorder – and their clinicians – view tablet-based support as a feasible option.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

HR, MS and JHS obtained funding for this study, in addition to previously awarded funding for the development of the tablet-based program. All of the authors contributed to the study design. JS and JR conducted the user assessments and provided continuous feedback to the development team to guide the design. HR, MS, JR and JS are responsible for the overall design and supervision. JL and JS prepared the manuscript. All authors read, contributed to, and approved the final manuscript.

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