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User activity in a mobile phone intervention to assist mindfulness exercises in people with depressive symptoms

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ABSTRACT

This study investigated the user activity in a text messaging intervention to assist mindfulness practice in patients with symptoms of depression. Participants ($N=21$) allocated to the intervention group of a pilot RCT received an introduction to mindfulness exercises during hospital treatment, and text messages to assist mindfulness practice during follow-up. Results showed that text messaging activity decreased over the course of the intervention. Participant characteristics showed moderate associations with text messaging activity. User activity was moderately associated with clinical outcome. We highlight the careful integration of mobile interventions in mental health services in order to maximize patient engagement and outcome.

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1. Introduction

1.1. Mobile mental health interventions

Parallel to the rapid development of mobile technology, different kinds of mobile mental health approaches have evolved ranging from simple text messaging to complex context-aware, sensor-based smartphone applications (Aboujaoude, Salame, & Naim, 2015; Proudfoot, 2013). Health interventions using mobile technologies (often labeled mHealth) can supplement existing services in various ways, e.g. by sending reminders for appointments, therapeutic homework or medication, by delivering information, psycho-education self-help, and minimal interventions, or by tracking symptoms, behavior, and treatment progress (Boschen & Casey, 2008; Luxton, McCann, Bush, Mishkind, & Reger, 2011).

MHealth interventions may contribute to reducing symptoms, and to improving uptake of evidence-based treatments in mental health care (Harvey & Gumport, 2015; Kazdin & Blase, 2011), and may be particularly useful in the long-term disease management of chronic or recurrent mental health conditions, such as major depression (Bockting, Hollon, Jarrett, Kuyken, & Dobson, 2015). However, researchers have just begun to explore the potentials of mobile interventions in depression prevention and treatment, and only few programs have evaluated user activity in clinical samples (Aboujaoude et al., 2015; Donker et al., 2013).

1.2. User activity in mhealth interventions for depression

With the growth of mHealth interventions, analyses of user activity become increasingly important, providing important information about program acceptability, user preferences, and mechanisms of change (Christensen & Mackinnon, 2006). Reduced therapeutic contact and the lack of other binding characteristics of the setting inherent to mHealth interventions bear the risk of limited use or premature dropout. However, determinants of attrition are manifold and should be carefully taken into account (Eysenbach, 2005). For instance, a participant may have improved substantially during the first sessions and hence decide to terminate the intervention. On the other hand, reasons for low usage include symptom deterioration, lack of motivation, or simply low quality and usability of the intervention.

Communication in mHealth interventions may be one-way or two-way. Typically, behavioral health interventions using text messages are one-way interventions where recipients receive

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messages or prompts being sent automatically, semi-automatically, or manually by a provider system or therapist, without recipients being able or asked to respond (Agyapong, Ahern, McLoughlin, & Farren, 2012). Over the last years, increasing research attention has been devoted to interventions applying two-way interactions with a mutual exchange of messages between the participant and provider. For example, a proof-of-concept study evaluated a comprehensive mobile self-help tool based on the principles of cognitive-behavioral therapy (CBT) including symptom monitoring over a 6-week period in a non-clinical sample of 26 people with mild to moderate depressive symptoms (Harrison et al., 2011). About two thirds of the participants reported that they accessed the program on at least a weekly basis for answering the brief monitoring, and about 40% were rated adherent to the intervention. Furthermore, Aguilera and Muñoz (2011) examined feasibility of text messaging to increase homework compliance in group CBT for depression. 12 depressive outpatients received two to three daily messages during treatment asking them to report current mood, number of positive thoughts and pleasant activities. Response rate averaged at 65% with large inter-individual variation (27–99%). Despite the high frequency of prompts, none of the participants wished to decrease the number of messages. However, participants identified receiving messages at inopportune times as the biggest downside of the program.

In a larger trial, Proudfoot, Clarke, Birch, and Whitton (2013b) offered 7-week access to a mobile phone and web-based CBT program, including symptom tracking, various treatment modules, and reminders, to 231 people with self-reported mild to moderate symptoms of depression, stress and anxiety. More than one quarter of the participants never logged into the program (29%), and almost two thirds used the symptom tracking (62%). Detailed analyzes of participant activity showed that engagement in self-tracking varied considerably ranging from 0 to 260 assessments. Overall, program usage decreased continuously over the 7-week period. Older participants tended to log into the program more often and also used symptom tracking more frequently. Utilization of the CBT modules was lower than expected and was not associated with symptom reductions. However, increased use of supportive-motivational messages and tracking reminders was associated with symptom reductions (Proudfoot, Clarke, Birch, & Whitton, 2013b; Whitton et al., 2015). In a recent RCT, Kok et al. (2015) tested a mobile web-based version of preventive cognitive therapy (CT) with minimal therapist telephone contact and mood monitoring in a sample of patients diagnosed with recurrent depression. About half (53%) of the 113 participants in the mobile CT group finished all eight modules of the program, and the authors concluded that additional therapist support had an overall positive impact on attrition and adherence (Kok et al., 2015).

Moreover, in one of the first studies to explore the effects of a mindfulness intervention as a smartphone application, Ly et al. (2014) compared the effects of an 8-week behavioral activation (BA) intervention with minimal therapist contact with mindfulness-based guided self-help (MF) in 81 people with major depression. Adherence was higher in the BA group with 78% of the participants sending at least one message to the therapist within each of the eight week program, compared with 63% of the participants in the MF group.

Taken together, there is first evidence that mHealth interventions can be effective in the treatment of people with depression. However, attrition and risk for non-usage or drop out are high, and vary considerably between studies. MHealth interventions may be particularly useful to support maintenance treatment in people with depression after inpatient treatment, but research in this clinical population is lacking so far.

1.3. Objectives of the current study

This study will examine user activity in a mobile phone text messaging intervention to assist mindfulness home exercises in individuals with depression after discharge from inpatient psychiatric treatment. Specifically, the following research questions will be addressed:

1) How actively did the participants use the program during the 4-month intervention and how did program usage change over time?
2) Is there an association between participant characteristics (i.e. age, gender, prior text messaging and mindfulness experience, illness chronicity and residual symptom distress) and user engagement?
3) Does text messaging activity affect outcome?

2. Materials and methods

2.1. Study design and procedures

The study “An SMS-assisted Mindfulness-based Intervention for Relapse Prevention in Depression” (MIND-S, ISRCTN58808893) was a pilot two-arm randomized controlled trial. Participants received a manualized group introduction to three mindfulness exercises during inpatient psychiatric treatment. During four-month follow-up, participants randomized to the intervention group received supportive text messages to assist mindfulness practice. Participants in both groups were free to utilize any additional treatments as usual (TAU) during follow-up. Data collection took place at study intake (T0), at discharge from hospital (T1), and four months after discharge (T2). Participants received a compensation of 25 Euros after returning the follow-up questionnaire, and an additional 10 Euros to cover costs for text messages. The study was approved by Ulm University's ethics committee.

2.2. Participants

Recruitment took place between September 2013 and June 2014 at Ulm University's Clinic for Psychiatry, Psychotherapy and Psychosomatics in Günzburg, Germany, which is a large psychiatric hospital in rural Bavaria. Inclusion criteria were being inpatient, age 18 to 75 years, and showing symptoms of depression according to the therapist assessment. Patients were excluded if they showed psychotic or manic symptoms or had a history of schizophrenia, or showed an acute risk of a dissociative crisis, severe cognitive deficit/impairment, persistent severe substance abuse, or acute suicidality or risk of self-harm. Additional exclusion criteria were insufficient command of the German language and lack of mobile phone access. Of the 116 patients who attended the mindfulness group introduction, 41 patients were randomized to the intervention and the control group. The sample of the current analyses included the 21 patients of the intervention group. See Kraft and colleagues (in preparation) for further details on participant flow.

2.3. Intervention

During hospital stay all participants received an introduction into three basic mindfulness exercises (mindful breathing; mindful walking; mindfulness of the body). These group sessions were manualized and offered on a weekly basis. Participants received a written instruction of the exercises to take home, and it was recommended to practice one or more of the exercises for at least five minutes daily. Prior to discharge, patients randomized to the

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