

# **Make the Most of Waiting: Theory-Driven Design of a Pre-Psychotherapy Mobile Health Application**

*Emergent Research Forum papers*

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## **Abstract**

This paper addresses the theory-driven design of mobile health (mHealth) applications for improving psychotherapy outcomes. It takes a novel approach, by using information communication technology (ICT) for gathering rich data during the pre-therapy period. Due to severe strain on global healthcare systems, the waiting period for psychological treatment oftentimes is several months. This prolonged waiting is detrimental to patients and it also represents a missed opportunity for collecting data to support the ensuing therapy. In order to provide the theoretical basis for how ICT features can be beneficial during pre-therapy waiting periods, we derive six core requirements that link ICT designs to users' emotional benefits and to the overall therapeutic outcome quality. We illustrate our approach by applying these requirements to the creation of an mHealth application that supports psychotherapy patients during their waiting for cognitive behavioral therapy (CBT). We further present our planned multi-disciplinary field-experiment for testing these design requirements.

## **Keywords**

Mobile Health, App Design, Data Collection, Pre-Therapy Waiting, Psychotherapy.

## **Introduction**

Mental health disorders pose an enormous challenge to affected individuals and to overstrained public healthcare systems (Gustavsson et al. 2011). Anxiety disorders are a prevalent mental disorder—about 18% of the US population will be affected by anxiety disorders during their lifetime. Yet, of these, only one third will access therapeutic treatment (Anxiety and Depression Association of America 2014). It is not uncommon for patients who access psychotherapy to face long waiting periods that range from several weeks to months. Long waiting periods have considerable effects on patients such as prolonged suffering, impairment or chronification (Reins et al. 2013). The shortage of resources in public healthcare has made waiting lists the standard. Information communication technology (ICT) opens up several opportunities for addressing this challenge. On the one hand, ICT in the form of mobile health (mHealth) applications provides immediate assistance to patients that otherwise would not receive *any* kind of support while on a waiting list. In addition, the use of ICT during waiting list periods enables the

collection of therapy relevant data that can inform the therapist and increase therapy success. Based on this, we ask the following two research questions:

**RQ1:** Can ICT use during the pre-therapy waiting period improve therapy success?

**RQ2:** Which specific design requirements are required for benefitting therapy success?

Past research has evaluated the usefulness of *web-based* guided interventions for supporting patients during waiting list periods (Kenter et al. 2013; Reins et al. 2013). Although first evidence suggests that the use of web-based self-help systems during waiting list periods is beneficial to therapy success (Kok et al. 2012), several shortcomings of desktop-bound systems are evident: first, non-mobile self-help applications are not helpful if the stressful event occurs outside the proximity of a desktop computer. Second, non-mobile applications cannot collect *additional* data that relates to the stressful event, such as time, geo location (gps), photos, voice recordings, or sensor data such as e.g. heart rate. For these reasons, in this research-in-progress paper, we advocate the use of a *mobile* health application (mHealth app). We derive six core requirements for the mHealth app design in waiting period scenarios from established theories. The six requirements affect users immediate *emotional state* as well as the overall *therapeutic outcome*. The derived requirements are grounded on the fact that psychotherapy relies on *information* – either reported by the patient (e.g. reports events, situations in between therapy sessions) or emerging from therapist-patient dialogue. Oftentimes, patients use standardized paper-based reporting sheets, such as the Activation-Beliefs-Consequences (ABC) sheet (e.g., Ellis 1991), to record these events. In the following table, the derived requirements are presented along with their theoretical grounding and their value for the therapy process and the patients (see table 1).

1	<b>Requirement</b>	<b>Expression/Disclosure:</b> Patient registers stress-provoking events (via text, audio, photo, geo-location)
	Data	Data collection
	Theory	Information processing theory, Dual representation theory, Social facilitation theory
	Therapeutic value	Provides therapist with rich information about stress-provoking events
	Emotional value	Relief, distraction
2	<b>Requirement</b>	<b>Objectification:</b> Patient describes the emotional consequences experienced during a stressful event
	Data	Data refinement
	Theory	Affect regulation theories
	Therapeutic value	Makes stimuli easier for the therapist to understand
	Emotional value	Promotes greater awareness of stressful stimuli
3	<b>Requirement</b>	<b>Categorization:</b> Patient categorizes stress-provoking events (e.g. an object, a sound, a situation etc.)
	Data	Data refinement
	Theory	Social-cognitive theories, affect regulation theories
	Therapeutic value	Collection of additional information about stress-provoking events
	Emotional value	Promotes greater awareness of and control over stressful stimuli

4	<b>Requirement</b>	<b>Encouragement:</b> Patient receives feedback through messages
	Data	Data collection (times of encouragement)
	Theory	Role of empathy in psychotherapy, Self-Determination Theory
	Therapeutic value	Encourages patients to continue collecting data, which provides more relevant information to the therapist
	Emotional value	Encourages active engagement in the process of therapy, intrinsic motivation
5	<b>Requirement</b>	<b>Reflection:</b> Patient receives statistical summaries of previously registered events
	Data	Information gathering
	Theory	Achievement Goal Theory
	Therapeutic value	Provides therapist information about the order of stress-provoking events
	Emotional value	Feeling of control
6	<b>Requirement</b>	<b>Engagement:</b> Patient ranks events by their level of perceived stress
	Data	Data refinement
	Theory	Affect regulation theories, Self-Determination Theory
	Therapeutic value	Provides therapist information about order of stress-provoking events
	Emotional value	Feeling of control and autonomy, awareness

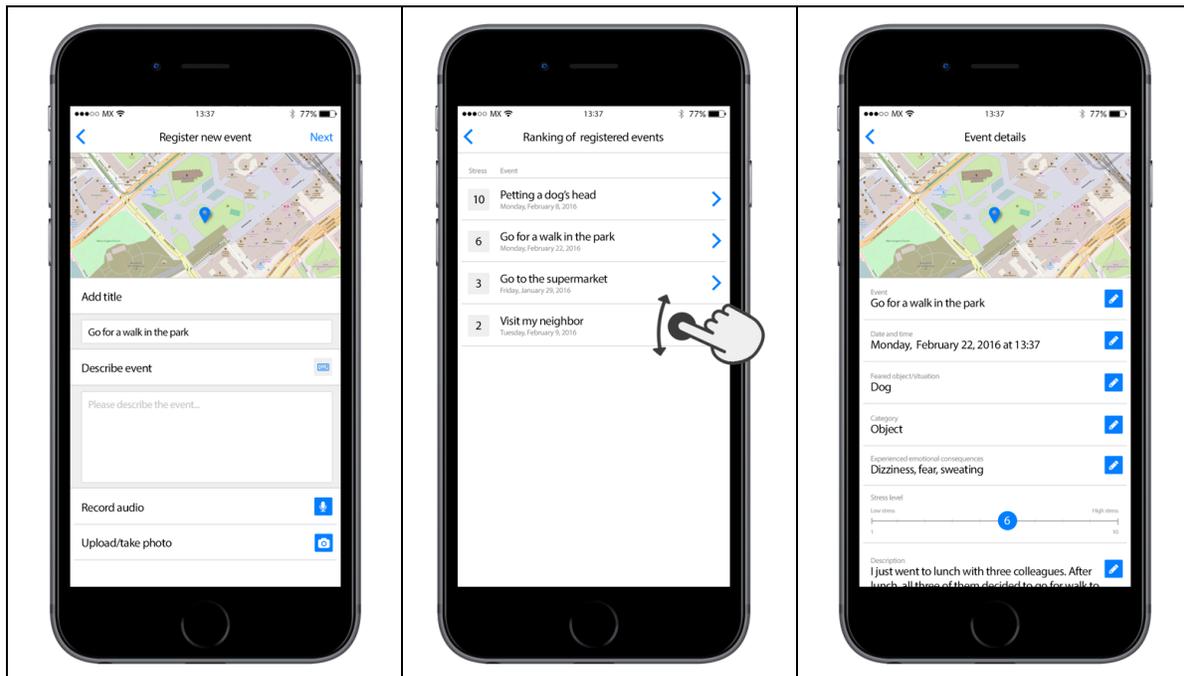
Table 1. Derived design requirements

## Design of an mHealth app for pre-psychotherapy waiting periods

In table 1 we derived six core requirements for developing mHealth apps supporting pre-therapy waiting periods. The following describes how we *apply* the requirements to guide the development of a *specific* mHealth app. The app aims to support patients with anxiety disorders during the waiting period before psychotherapy commences. Because healthcare systems in most countries are congested, most people seeking treatment face waiting times before therapy begins. This presents an opportunity for patients to document their symptoms, which in turn can be inherently, and immediately beneficial to the patient, and useful once therapy begins. Thus, in accordance with the derived six core requirements, the goals of the mHealth app are twofold: (i) to address the immediate psychological distress that arises while waiting for therapy to begin (table 1 “emotional value”), and (ii) to enable data collection during the waiting period in order to improve therapy progress and success (table 1 “therapeutic value”).

In requirement 1, we posit that providing an opportunity to describe troubling events allows patients to understand their feelings, and provides therapists with relevant information on stress-inducing events. We implement this requirement by allowing users to create, describe, and save troubling events. Additional data such as geo location and time are stored. In requirement 2, we propose that naming the emotional consequences of encountering a stress-evoking event serves to promote a more complete understanding of how disturbing emotions emerge. Further, this information can support therapeutic outcomes by providing therapists with information that may supplement data collected during initial assessment, and this may be useful when a specific psychotherapeutic intervention is being designed (e.g., situational exposure). We implement this requirement by allowing users to name emotions experienced during stress-inducing events. In requirement 3, we posit that categorizing stress-inducing

events promotes a positive emotional outcome by creating awareness and increasing perceived control, and a positive therapeutic outcome by providing well-structured information on stress-inducing events to the therapist. We implement this requirement by allowing users to categorize events they have logged. In requirement 4, we argue that giving feedback to patients is beneficial as it acknowledges their efforts at collecting information. Further, it encourages enhanced therapy outcomes by motivating patients to continue collecting data, which in turn gives the therapist an even more complete view of symptoms and stressful events. We implement this requirement by providing acknowledgment messages to every input users perform. In requirement 5, we propose that maintaining and presenting summary statistics is beneficial as it gives users a sense of control regarding the totality of previously registered stress-provoking situations. By making these visual summaries easy to understand, patients can view past achievements, and therapists would have a baseline level of functioning that would complement the information collected once therapy is underway. We implement this requirement by allowing the user and the therapist to view summary statistics of past events. In requirement 6, we propose that ranking past events helps patients to discriminate between, and thus become aware of, events associated with varying levels of symptom severity. This may help to increase patients' perceived control over such events. Since ordering events by severity is a common therapeutic task (Barlow and Craske 1994), categorizing events before therapy has begun may encourage engagement in the process of therapy. For therapists, there are clear benefits to having information on the level of stress induced by various situations. We implement this requirement by allowing users to rank past events according to the level of stress which they provoke. Figure 1 depicts three of the requirements.

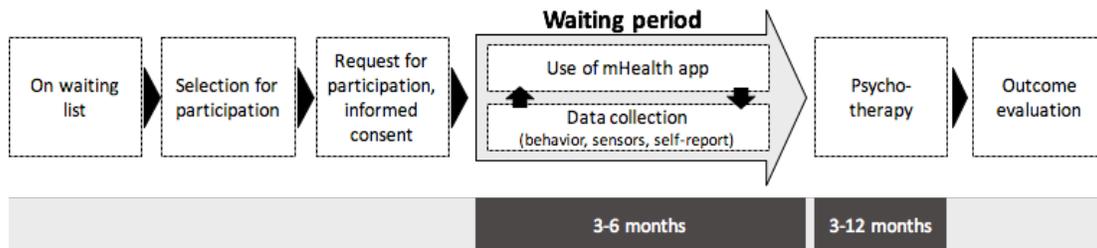


**Figure 1. Screen 1 (left) depicts requirement 1, Screen 2 (center) depicts requirement 5, Screen 3 (right) depicts requirement 6**

## Empiricism and field experiment design

We intend to empirically test the validity of our six core requirements in a real-life pre-therapy waiting scenario. The pre-therapy waiting period typically lasts several months. For this reason, the use of a field experiment design appears justified. Field experiments involve studying people in real-life situations and are well-suited to studying dynamic processes across extended periods of time. Because studies are conducted in the environments to which researchers want their results to generalize, field studies are regarded as having greater ecological validity than laboratory experiments (Reis 2012). The following outlines the design of the randomized field experiment we intend to conduct. The field experiment will target patients suffering from anxiety disorders. Because *anxiety* is an umbrella term for a

variety of related but different mental disorders, it is necessary to define a specific subset of anxiety disorders in order to maintain a homogeneous and thus comparable sample. We use the International Statistical Classification of Diseases and Related Health Problems (ICD-10) for selecting and inviting waiting list subscribers. After participant selection, participants are briefed without revealing the purpose of the field experiment. Demography questionnaires and an informed consent sheets are administered. Participants are randomly selected for the treatment (use of app) or control (no app) group. Therapy success (outcome evaluation, cf. figure 2) is measured as patients' symptoms ratings using standardized questionnaires compared with earlier ratings. Figure 2 depicts the timeline of the field experiment.



**Figure 2. Use of mHealth app in the process of psychotherapy**

## Outlook

The outlined research project represents a first step towards understanding the successful design and the impact of ICT for psychotherapy success. We intend to finalize the theorizing on the core requirements (cf. table 1), and to conduct the described field experiment. The results will inform IS researchers, policy makers, and therapists about the usefulness of mHealth-driven waiting period support, and it will provide guidelines in the form of a set of empirically validated core requirements. Beyond these implications, the multidisciplinary project can provide a basis for further information systems (IS) research on the theoretical constructs relevant to assessing patient-centered mHealth design success. For example, as reflected in the derived design requirements, patients' emotional responses to specific ICT features is expected to have an impact on their level of *engagement* in the therapy, and thus the ultimate success of the mHealth application. Accordingly, future research on the design of ICT solutions for psychotherapy should further investigate the role of the related emotional constructs.

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