Towards Efficacious Mobile Technologies for Anxiety Self-Regulation

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BACKGROUND

▪ *Anxiety* involves a set of cognitive, behavioral, and physiological responses. These responses are often anticipated and dislocated from the external stimulus in contrary to *fear* and *stress.*

▪ The current prevalence of anxiety disorders is estimated at 7.3% worldwide, and only 27.6% of the affected are estimated to receive any treatment [1].

▪ A variety of mobile HCI technologies are introduced each year to facilitate self-regulation of stress [2], combinations of mental conditions [3], sub-clinical anxiety conditions [4], and some specific anxiety disorders [5]. However, less is known on how to design efficacious mobile technologies specifically for anxiety self-regulation, considering anxiety symptoms in general [5].

RESEARCH PROBLEMS

▪ What are the effective treatment components to be supported by anxiety self-regulating technologies?

▪ Which technologies and characteristics are well-suited for anxiety patients and mobile usage?

▪ How can such technologies be personalized to increase the efficacy of interventions?

METHODOLOGY
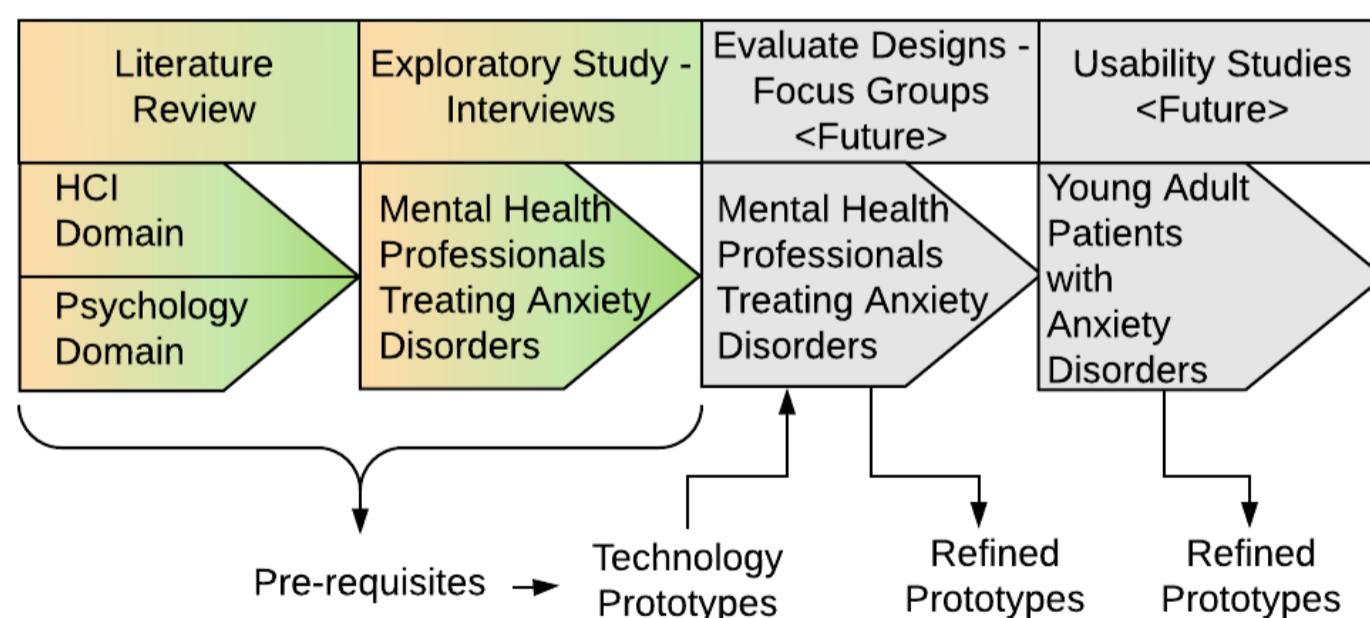
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[3] Schroeder, J. et al. Pocket skills: A Conversational Mobile Web App to Support Dialectical Behavioral Therapy. CHI '18.
[4] Simm, W. et al. Prototyping 'Clasp': Implications for Designing Digital Technology for and with Adults with Autism. DIS '14.
[5] Topham, P. et al. Mentalhealth App Design: A Journey from Concept to Completion. MobileHCI '15.

EXPLORATORY STUDY

▪ Followed by a comprehensive literature review in HCI and psychology domains, an exploratory study was conducted with 15 mental health professionals treating anxiety disorders ([male=6, female=9]; # of years of experience: [M=14.13; SD=10.45]; # of hours of practicing per week: [M=23.80; SD=13.46]).

▪ This study consisted of a short online questionnaire and a one-hour face-to-face semi-structured interview, where the initial literature review guided the questions.

▪ Each participant used Cognitive Behavioral Therapy for treating anxiety, where many used Mindfulness-based interventions, and Acceptance and Commitment Therapy. Relaxation was not recognized as a stand-alone intervention, but mostly used as a treatment component.

**Participants' Practice-Based Demographics**
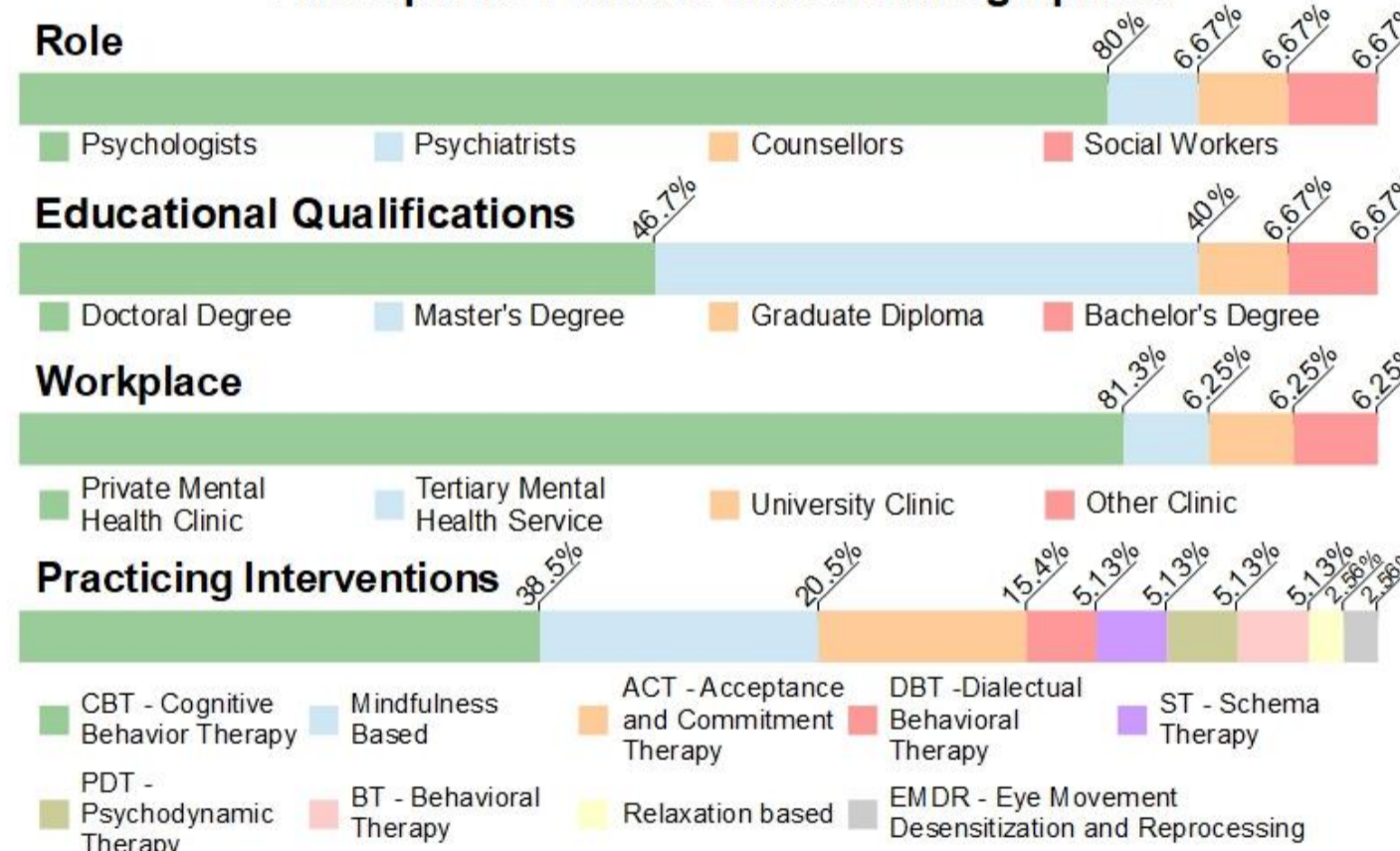
PRELIMINARY RESULTS

▪ *Cognitive Restructuring* (11/15), *Cognitive Defusion* (6/15), *Exposure* (14/15), *Psychoeducation* (15/15), *Mindfulness* (13/15), *Relaxation* (12/15) and *Later-reflection* (15/15) were identified as the most effective and widely-used treatment components. Hence, it is suggested to support these through the proposed technologies. Although some existing technologies are based on *distraction*, and *comfort or self-soothing* [4], these were identified as components that should be discouraged in long-term.

▪ Delivering the identified components using multiple modalities (i.e., visual, auditory, and haptic) is identified to be important, to support individual and contextual differences. Apart from generic characteristics such as affordability, accessibility, privacy, security, portability, and the ability to work offline, some specific characteristics for proposed technologies were also discovered:
  ▪ Design the appearance carefully to make the users less prone to stigma.
  ▪ Include interfaces as extensions to everyday devices, without introducing additional devices.
  ▪ Design for minimum distractions from everyday activities.
  ▪ Support identification of treatment component based exercises that best work for a user, and allow configuration of the interfaces based on those exercises.
  ▪ Motivate users to engage in treatment component based exercises and to change cognitions and behaviors.

▪ A smartphone application combined with a tangible interface to support haptic interactions and a wearable device to detect real-time anxiety levels was recognized to be appropriate. Usefulness of tangible interfaces was emerged based on their ability to reduce the cognitive load in learning, and their dissociation from ICT devices that are known to increase stress.

▪ Also, it is discerned to personalize these technologies as follows.

Personalization Mechanism for Proposed Technology

Adaptation Strategy – Recognize anxiety symptoms and phases through self-reports integrated into a smartphone app (which are based on clinical anxiety scales). Further, strengthen the identification of anxiety phases through real-time collected physiological data, and history related data that indicates how well a recommended strategy worked.
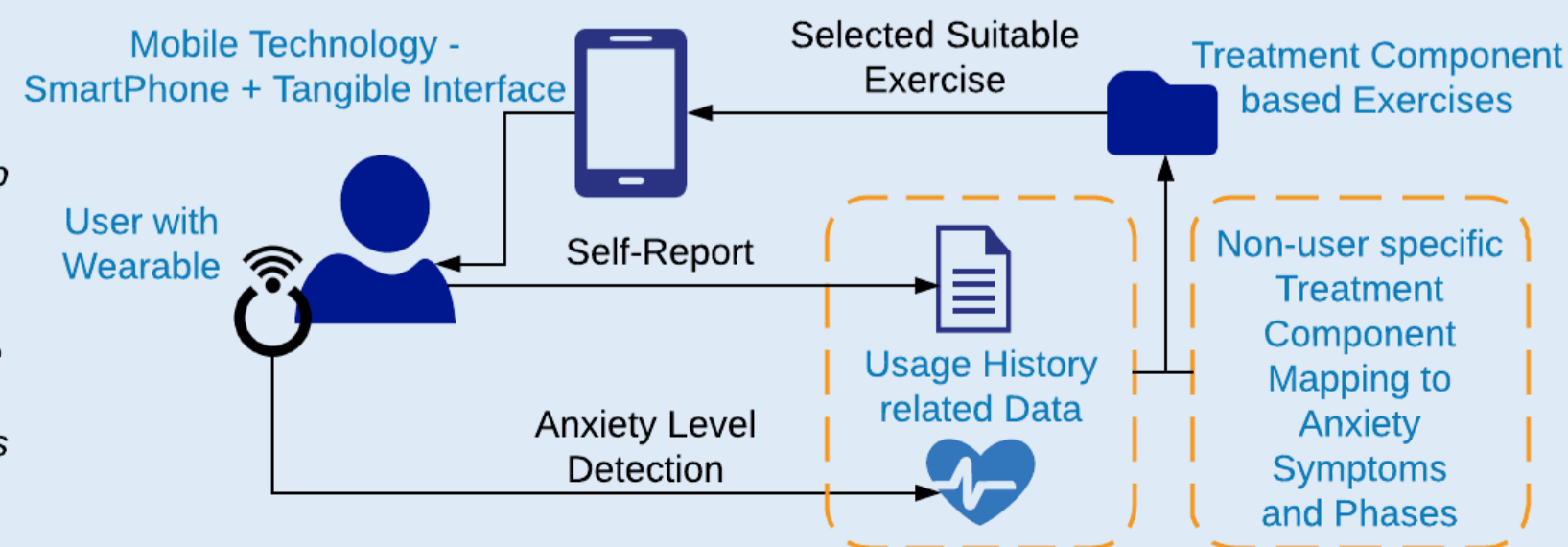
Adaptation Rule- Recommend a suitable treatment component based exercise that is decided based on the identified anxiety symptoms (e.g., maladaptive cognitions, avoidance behavior) and the experiencing phase of anxiety (e.g., non-anxious, before anxiety episode, within anxiety episode, and after anxiety episode).