
Computing in Mental Health

Rafael A. Calvo

School of Electrical and
Information Engineering
University of Sydney
Sydney, Australia
rafael.calvo@sydney.edu.au

Rosalind Picard

MIT Media Lab
Cambridge, MA USA
picard@media.mit.edu

Karthik Dinakar

MIT Media Lab
Cambridge, MA USA
karthik@media.mit.edu

Pattie Maes

MIT Media Lab
Cambridge, MA USA
pattie@media.mit.edu

Abstract

18.5% of adults in the US suffer mental illness. Just under half of all adults will experience mental illness at some point in their life. These compelling statistics have prompted computing researchers and practitioners to work toward developing technologies that can support those with mental illness and promote thriving universally. For example, wearables and sensors can help detect mental states, smartphone apps can be used to expand the reach of interventions, and our understanding of the impacts of everyday technology on our mental health can contribute to a future of technology design for flourishing. This interdisciplinary workshop will provide the opportunity for mental health professionals and technologists to come together to explore how new computing technologies can support mental health and promote psychological flourishing.

Author Keywords

Mental Health; Positive Computing; ehealth; Social Media; Wearables

ACM Classification Keywords

H.5.m [Information interfaces and presentation (e.g., HCI)]: Miscellaneous; See [<http://acm.org/about/class/1998/>]: for full list of ACM classifiers. This section is required.

Introduction

Technology, like any aspect of our experience, can impact our mental health. This impact may be by design, for example, when it comes as a result of a technology-based psychological intervention, or unintended (as when social media use creates anxiety). There is a need to both, better understand how technology already impacts mental health and to better understand how to design specifically to support mental health. Meeting this need requires gathering researchers from health, psychology and human-computer interaction together to consider ways technology can be used to improve psychological wellbeing. This workshop will provide a unique opportunity for members of this growing multidisciplinary research community to come together. Researchers from education, government and organizations interested in using technology to support wellbeing bring ideas and questions, discuss their projects and explore how these innovations can translate to positive societal impact.

Background

The prevalence of mental illness among US adults is 18.5% [13] and even higher in adolescents [7] suggesting an important area where new technologies could make a difference. Fortunately, there is growing evidence to support the effectiveness of technology-based mental health interventions [10] as well as a desire among people needing help for technology-based solutions. [4].

A burgeoning community is now exploring how new forms of interaction combined with data from sensors, social media and other sources might help us: better understand the mental health of populations, detect people at risk, personalize interventions, provide new models of care and improve psychological wellbeing population-wide.

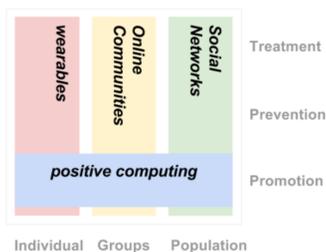


Figure 1: Design for mental health in two dimensions based on target audience (individual, groups or populations), and goals (promotion, prevention and treatment), with example applications

Figure 1 offers one way to organize the different forms of HCI being used to improve mental health. Along the y axis are three categories of mental health initiative: treatment (which addresses illness), prevention (which targets populations at risk) and promotion (which fosters optimal mental health universally). The x axis describes whether a digital experience is focused on the individual (eg. counseling session, journal writing), a group (eg. online community intervention) or the general population (as in [3]).

By way of example, Embodied Conversational Agents [2] and computer based CBT [1] would sit at the intersection of "treatment" and "individual" since they are intended to treat illness on a one-on-one basis. The area of Positive Computing [6] would sit in the promotion category (as it explores ways to design everyday technologies to support psychological wellbeing) and would run across all three audience levels. This basic taxonomy can be refined or replaced during the workshop and is intended as a way to help us begin to identify stronger and under-researched areas as the area grows.

We describe in more detail three areas in which HCI researchers are already contributing: wearable interfaces, online communities and designing for wellbeing.

Wearables, Interfaces & Interventions for Mental Health

Computer interfaces and wearables can be designed to work in symbiosis with the user, eliciting behavioral signals, or even nudging behavior change. This is a complex and nuanced area that will benefit from the contributions of the CHI community.

Though the use of mobile phones and wearable sensors for mental health has proliferated [14], significant challenges

remain in increasing their adoption and embedding them unobtrusively for users in the wild. Furthermore, the design of interfaces meant to collect self-reported information to complement continuous signal data without disrupting the end-user poses another challenge, particularly to long-term end-user adoption. Interface design for real-time retrieval of wearable signals at the caregiver's end can also be challenging, particularly with regard to signal processing and machine learning to identify and remove noisy bursts of data.

Deployment of mental health interventions through mobile phones and social media based on real-time collection of in-the-wild subject data is yet another challenging arena, but one with great promise as evidenced by successful small-scale studies using reflective user interaction on social networks [9] and crowdsourcing as a means to deliver CBT [12] via the internet.

Online Communities

Certain designs aim to help groups of people who might have similar mental health risk patterns, or other psychological traits in common. Designing interfaces that take into account the psychological wellbeing of a group will also address some of the challenges of aiming an unsolicited intervention to an individual.

On the one hand we can design treatment interventions such as online peer-support groups. [10] reviewed their effectiveness in 31 papers (28 trials) and found that 62.5% reported a positive effect on depressive symptoms. There is much potential for the integration of new technology, for example, none of the studies reviewed used Natural Language Processing (NLP) techniques.

Due to the emotional nature of their work, groups of mental health professionals (counselors, psychiatrists, etc) have a

higher risk of burnout and therefore would also benefit from technology-based support. Besides helping them be more efficient in their support work, designers can take into account their wellbeing. Moderator Assistant [5], for example, aims to provide better support to counselors in such peer-support groups. In similar fashion Fathom [9], helps counselors who provide help through SMS interventions (Crisis Text Line). Fathom uses topic models, a statistical modeling technique to track the evolution of themes in a conversation, in real time.

Positive Computing

Some of the most familiar apps relating to mental health support are those designed to foster a wellbeing factor, such as positive psychology apps and online interventions that develop factors like mindfulness or gratitude [15]. But beyond these "dedicated" interactions a growing number are looking at how all technology can be designed to respect psychological needs and even improve psychological wellbeing across the population [6]. As technology becomes ubiquitous, it increasingly influences every aspect of our lives including our relationships, our emotions, our motivations, and our overall life satisfaction and wellbeing [6]. The premise of positive computing and design [6, 8] is that we can evaluate for the wellbeing impact of technologies and design them to better support wellbeing, for example by redesign to reduce negative impacts or designing to promote positive ones.

Arguably, much is yet to be discovered about how and when to provide mental health support, how values and privacy should be addressed [11] or which theoretical models and methods from the social science could best support work in the HCI context. A goal of the workshop will be bringing various approaches and perspectives together to begin tackling some of these questions.

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