

8th International Workshop on Mental Health and Well-being: Sensing and Intervention

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ABSTRACT

Mental health and well-being are critical components of overall health: suffering from a mental illness can be both debilitating and life-threatening for individuals experiencing symptoms. Detecting symptoms of mental illness early-on and delivering interventions to prevent and/or manage symptoms can improve health and well-being outcomes. Ubiquitous systems are increasingly playing a central role in uncovering clinically relevant contextual information on mental health. Research shows that these systems can passively measure symptoms and enable opportunities to deliver

intervention. However, despite this potential, the uptake of ubiquitous technologies into mental healthcare has been slow, and a number of challenges need to be addressed towards the effective implementation of these tools. The goal of this workshop is to bring together researchers, practitioners, and industry professionals interested in identifying, articulating, and addressing such issues and opportunities. Following the success of this workshop for the last seven years, we aim to continue facilitating the UbiComp community in both the conceptualization, translation, and implementation of novel approaches for sensing and intervention in the context of mental health.

CCS CONCEPTS

• Applied computing → Health care information systems; • Human-centered computing → Ubiquitous and mobile computing.

KEYWORDS

Mental Health; Mobile Sensing; mHealth; Predictive Modeling; Behavioral Intervention

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1 INTRODUCTION

Mental illness remains an urgent global issue. Today, more than 750 million individuals worldwide suffer from a mental illness [5], and this prevalence continues to grow. For example, during the COVID-19 pandemic, the number of individuals suffering from major depressive and anxiety disorders increased by 27% and 25% respectively [12]. Mental illness has a devastating impact on individuals experiencing symptoms, including an increased risk of disability and premature mortality from preventable, comorbid physical conditions and suicide [11]. In addition, mental illness has a large economic burden, with an estimated annual cost on the global economy of US \$1 trillion [6].

Despite these known challenges, symptoms of mental illness often remain undetected and untreated. The National Alliance on Mental Illness (NAMI) reports that more than half of the individuals in the U.S. living with a mental health condition do not receive any treatment [10]. Further, our current healthcare systems are largely *reactive* — that is, patients typically only receive treatment after symptom onset, contributing to the aforementioned consequences to both individuals and society.

As such, there has been an increased interest in using technology for both early detection and intervention of mental illness. For example, in February 2023, the White House Report on Mental Health Research Priorities included “preventing, identifying, and treating mental health conditions” as well as “understanding and leveraging digital mental health interventions” [7]. Ubiquitous technologies provide a unique opportunity to advance these priorities by measuring behavioral patterns associated with mental health and well-being, and then identifying appropriate moments for intervention. This promise has resulted in over a decade of research by the UbiComp community to apply wearable, mobile, and other ubiquitous technologies towards both sensing symptoms of and intervening on a variety of mental health conditions [1–4, 8, 9, 13–15]. While this research illustrates the intention of such sensing and intervention systems to positively impact mental healthcare, the adoption of these ubiquitous technologies remains low — suggesting that a number of challenges remain towards developing effective solutions that improve mental health and well-being.

These challenges invite both technical and sociotechnical research towards the effective implementation of these tools. From a technical lens, there is a need for continued research on how to best model multimodal mobile sensing data with more traditional forms of clinical data (e.g., electronic health records, patient reported outcomes), handle missing or sparse data, and develop personalized predictive models or interventions delivered at the appropriate time

for action. From a sociotechnical lens, further understanding of how to best interpret collected data, provide meaningful and actionable feedback to both patients and treatment providers, ensure intervention adherence, and address privacy concerns within sensitive data flows are necessary. Towards implementation, it is critical to understand how to best embed both novel measurement tools and interventions into clinical pathways, establish the validity and efficacy of such technologies, and create regulatory frameworks to ensure appropriate use. These challenges are multifaceted, requiring interdisciplinary approaches for effective development and adoption of ubiquitous technologies to support mental health and well-being.

2 WORKSHOP OBJECTIVE

The objective of this workshop is to bring together researchers, practitioners, and industry professionals with both technical and clinical backgrounds to address these challenges by exploring novel technologies, analysis methodologies, and design techniques. Past UbiComp Workshops on Mental Health and Well-being have successfully convened community members to engage with these topics (more information on previous workshops can be found at <https://ubicomp-mental-health.github.io/>). Building on insights gathered from that experience, the present workshop has refined and extended its focus and scope. We encourage submissions from a range of topics, including but not limited to (in alphabetical order):

- Design and implementation of computational platforms (e.g., mobile phones, instrumented homes, skin-patch sensors) to collect health and well-being data.
- Design and implementation of feedback (e.g., reports, visualizations, proactive behavioral interventions, subtle or subconscious interventions etc.) for both patients and caregivers towards improved mental health.
- Design of privacy-preserving strategies for data collection, analysis, and management.
- Development of methods for sustaining user adherence and engagement over the course of an intervention.
- Development of robust models that can handle data sparsity and mislabeling issues within mobile sensing and mental health data.
- Ethical deployments of ubiquitous computing systems in traditionally marginalized communities and developing countries.
- Ethical frameworks for developing and implementing ubiquitous technologies for mental health.
- Experience reports from clinical studies in any phase, from early pilot studies to large-scale clinical trials.
- Identification of opportunities for UbiComp approaches (e.g., digital phenotyping, predictive modeling, micro-randomized intervention trials, adaptive interventions) to better understand factors related to substance abuse.
- Integration of multimodal data (with potentially clinical data) from various sensor streams for predicting or measuring mental health and well-being.
- Integration of ubiquitous technologies into existing healthcare infrastructures (e.g., payment models, regulatory frameworks) and policy.

- Investigation of new methodologies for intervention (e.g., conversational agents, AR/VR applications).
- Reflections on implementing ubiquitous computing-based technologies to improve mental health and well-being in both clinical and general populations.

2.1 Types of submission and selection criteria

As in previous years, we will accept submissions up to 6 pages. The 6 pages are not a requirement; shorter submissions (e.g., 3 pages) are welcome. Specific types of papers include:

- Scientific papers describing novel technologies, approaches, and studies related to ubiquitous computing and mental health.
- Challenge papers, in which authors describe a specific challenge to be pitched and discussed at the workshop. These papers often lead to a lively discussion during the workshop.
- Demonstrations, to facilitate authors demonstrating developed technologies and early systems at the workshop.
- Critical reflections (new in 2023) of one’s own research or existing research at the intersection of ubiquitous computing and mental healthcare. We expect critical reflection papers to contribute towards better research practices in the community.

All submitted papers will be reviewed and judged on originality, technical correctness, relevance, and quality of presentation. We explicitly invite submissions of papers that describe preliminary results or works in-progress, including early clinical experiences. The accepted papers will appear in the UbiComp supplemental proceedings and in the ACM Digital Library. We plan to have a fully in-person workshop in Cancun.

2.2 Expected Attendance

The workshop attendees will include UbiComp attendees, authors of accepted papers, as well as keynote speakers. We expect to have 50 total workshop attendees, and currently do not plan to limit attendance.

2.3 Preparation and Planned Activities

Upon workshop acceptance, we plan to update the prior year’s website (see <https://ubicomp-mental-health.github.io/>) with key information about the 2023 workshop, including the workshop overview, call for participation, important dates for workshop paper submission, and formatting instructions. The organizers will then advertise the workshop to recruit authors, speakers, panelists, and mentors for participation. In addition, we will coordinate with the UbiComp organizing committee on the physical infrastructure (e.g., room, food/drink, audiovisual setup) necessary for a successful workshop. Organizers will conduct all paper reviews, and send out notifications of paper acceptance as well as registration information to authors.

Table 1 shows the tentative workshop schedule. A summary of the planned workshop activities include:

- Talks: regular presentations where authors present their findings followed by a brief Q&A.

- Group/panel discussions: We are planning to invite academic, industry researchers, and practicing clinicians to discuss challenges and potential future directions of mental health and well-being research.
- Grant/project ideation: Participants with similar or complementary interests will engage in guided/mentored discussion towards pursuing a research collaboration.
- Parallel mini-tutorials: We plan to have mini-tutorials, where participants might be able to learn about new tools or intervention design concepts that they can then potentially apply to their future projects.

Morning Session	
Time (EST)	Activity
09:00–10:00	Opening remarks, Keynote speaker 1
10:00–10:45	Paper presentations with Q&A
10:45–11:00	Coffee break
11:00–12:30	Parallel mini-tutorials Potential topics: <ul style="list-style-type: none"> • Tools for intervention design • Trial methodologies for mental and behavioral-health interventions • Tools for multimodal data collection and models for analysis
12:30–14:00	Mentoring lunch with organizers and senior researchers
14:00–15:00	Keynote speaker 2
15:00–15:15	Coffee break
15:15–16:00	Paper presentations with Q&A
16:00–17:00	Mentored group discussion and ideation Potential themes: <ul style="list-style-type: none"> • Study design and evaluation • Integrating with clinical care • Engagement and adherence • Ethical challenges
17:00–18:00	Panel discussion Potential topics: <ul style="list-style-type: none"> • Interdisciplinary collaboration strategies • Technical and clinical challenges • Funding and publishing strategies • Entrepreneurship and commercialization
18:00–18:15	Closing remarks
18:15	Dinner and socialization

Table 1: Workshop schedule.

2.4 Organizers’ Background

Organizers include both leading academics (Mishra, Sano, Bardram, Abdullah, Murnane, Choudhury, Musolesi, Nandakumar, Rahman, Salekin), PhD students (Adler, Xu, Zhao, Kunchay, King, Kalanadhabhatta, Zhang), and industry professionals (Krell) at the intersection of ubiquitous computing and mental health.

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