# $2^{nd}$ International Workshop on Mental Health and Well-being: Sensing and Intervention

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*UbiComp/ISWC'17 Adjunct* , September 11–15, 2017, Maui, HI, USA

ACM 978-1-4503-5190-4/17/09...$15.00
https://doi.org/10.1145/3123024.3124461

## Abstract
Mental health issues affect a significant portion of the world's population and can result in debilitating and life-threatening outcomes. To address this increasingly pressing healthcare challenge, there is a need to research novel approaches for early detection and prevention. In particular, ubiquitous systems can play a central role in revealing and tracking clinically relevant behaviors, contexts, and symptoms. Further, such systems can passively detect relapse onset and enable the opportune delivery of effective intervention strategies. However, despite their clear potential, the uptake of ubiquitous technologies into clinical mental healthcare is rare, and a number of challenges still face the overall efficacy of such technology-based solutions. The goal of this workshop is to bring together researchers interested in identifying, articulating, and addressing such issues and opportunities. Following the success of last year's inaugural workshop, we aim to continue facilitating the UbiComp community in developing a holistic approach for sensing and intervention in the context of mental health.

## Author Keywords
Mental Health; Mobile Sensing; mHealth; Predictive Modeling; Behavioral Intervention

## ACM Classification Keywords
J.3 [Life and Medical Sciences]: Health

## Introduction

Mental illness is an urgent global issue. Today, more than 450 million people worldwide suffer from mental illnesses [7], with prevalence continuing to grow. For example, the number of people suffering from depression has increased more than $18\%$ from 2005 to 2015 [8].

Such mental health problems are associated with devastating personal burdens. Mental illnesses are the leading cause of years lost to disability globally [5] and are linked to approximately $800,000$ cases of suicide every year [8]. Mental illness results in a huge societal-level economic burden as well, with a projected global cost of $\$6$ trillion by 2030 [2].

However, mental health issues often remain undiagnosed and untreated. Wang et al. [9] reported that only one-third of adults with mental health issues receive any treatment. Further, our current healthcare systems are largely *reactive* — that is, patients typically only receive treatment after the onset of relapse, which can contribute to the aforementioned consequences related to personal well-being and healthcare expenditure.

As such, there has been an increased interest in the early detection of mental health issues. For example, the National Institute of Mental Health (NIMH) considers identifying early-warning signs (e.g., biomarkers and behavioral cues) to be a key objective in their strategic plan [6]. Ubiquitous technologies provide a unique opportunity to advance this goal by tracking behavioral patterns and identifying appropriate moments for intervention.

Indeed, recent research from the UbiComp community has applied wearables and mobile phone based systems to sense behavioral markers of different mental illnesses [1, 3, 4, 10]. However, while these studies illustrate the potential of sensing and intervention systems, the adoption of such ubiquitous technologies in mental healthcare practice is nearly non-existent — indicating that a number of challenges still need to be resolved to achieve successful penetration into clinical care.

Such challenges include integrating multimodal data with different timescales, handling issues of data sparsity and misclassification, developing personalized predictive models, tailoring intervention steps to individual needs, providing meaningful and actionable feedback to both participants and treatment providers, ensuring adherence over long periods of time, and addressing privacy concerns given the sensitive nature of collected data. Moreover, these issues are multifaceted and require cross-disciplinary approaches.

The goal of this workshop is to bring together UbiComp researchers interested in addressing these challenges (and identifying others) by exploring novel technologies, analysis methodologies, and design techniques. Last year, the first annual UbiComp Workshop on Mental Health was a great success in convening community members to engage with such topics. Building on insights gathered from that experience, the present workshop has refined its focus and scope and encourages submissions from a range of topics, including but not limited to:

- Design and implementation of computational platforms (e.g., mobile phones, instrumented homes, etc.) to collect health and well-being data.
- Development of robust behavioral models that can handle data sparsity and mislabeling issues.
- Integration of multimodal data from different sensor streams for personalized predictive modeling.

- Automated inference from sensor data of high-level contexts (e.g., environmental, social, etc.) indicative of mental health status.
- Design and implementation of feedback (e.g., reports, visualizations, proactive behavioral interventions, etc.) for both patients and caregivers.
- Methods for sustaining user adherence and engagement over long periods of time.
- Devising privacy-preserving strategies for data collection, analysis, and management.
- Deployment in low-income communities and countries.
- Identifying ways to better integrate ubiquitous technologies into existing healthcare infrastructures and government policy.

We will accept regular (up to 9 pages) and short (up to 5 pages) paper contributions. 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 work-in-progress. The accepted papers will appear in the UbiComp supplemental proceedings and in the ACM Digital Library.

## Planned schedule

Given our overall focus, we plan to group submitted papers into three broad categories: i) design and deployment challenges, ii) data analysis and predictive modeling, and iii) feedback and intervention strategies. The tentative plan for resulting sessions is shown in Table 1.

| *Time* | *Activity* |
|---|---|
| 09:00 – 09:10am | **Opening remarks** |
| 09:10 – 10:30am | **Paper Session I**:<br>Design and deployment of<br>systems for assessing<br>mental health issues |
| 10:30 – 11:00am | **Coffee break** |
| 11:00am – 1:30pm | **Paper Session II**:<br>Developing algorithms for<br>assessing mental well-being<br>based on behavioral and contextual data |
| 1:30 – 2:30pm | **Lunch** |
| 2:30 – 4:30pm | **Paper Session III**:<br>Design and implementation of<br>feedback and interventions |
| 4:30 – 5:30pm | **Group discussion and devising an actionable research agenda with concrete next steps** |
| 5:30 – 6:00pm | **Closing remarks** |

**Table 1:** Workshop schedule.

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