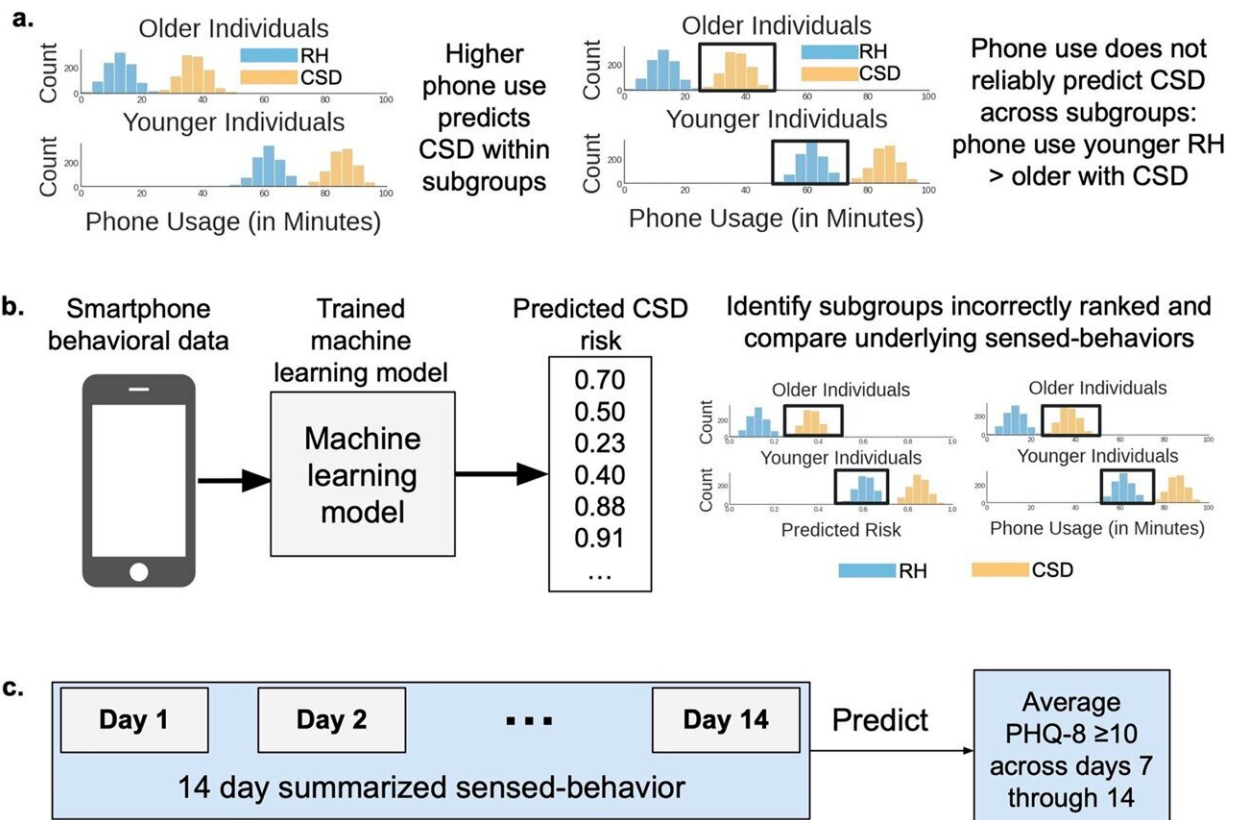


# AI tools reveal complexity of mental health measurement

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Analyzing reliability in AI tools that predict depression symptom risk. Credit: *npj Mental Health Research* (2024). DOI: 10.1038/s44184-024-00057-y

With an increased focus on mental health and growing understanding of its complexities, new research led by Cornell Tech Ph.D. candidate Dan

Adler finds that there's no one-size-fits all for how we experience mental health symptoms in everyday life.

Using [artificial intelligence](#), Adler is identifying trends that advance our understanding of the field to make symptom detection and treatment more effective. The study is [published](#) in the journal *npj Mental Health Research*.

While the study found AI currently unreliable for such tracking, it raised important questions for future research, including the potential for bespoke, tailored solutions for targeted populations, and the challenges that are inherent when attempting to implement broad-stroke diagnoses and solutions to large and diverse groups of people.

Adler looked at how technology, such as smartphone data, can aid in measuring behaviors related to mental health. For instance, smartphones can track GPS data to monitor mobility, which is closely associated with depression symptoms—prior researchers have published papers showing that those who are more mobile throughout the day are less prone to depression symptoms than those who are more sedentary.

Adler's research also uses AI to find correlations between behaviors and mental health. He explains that while some studies argue for the consistency of such measurements, his team, which includes faculty advisor Tanzeem Choudhury, Professor in Computing and Information Sciences and the Roger and Joelle Burnell Chair in Integrated Health and Technology, focuses on a larger, diverse population.

Their research reveals that no single set of behaviors uniformly measures mental health across all individuals, a finding that emphasizes the importance of personalized measurement in mental health care.

Despite the dedication of mental health clinicians who strive to support

their patients, Adler points out significant challenges within care, particularly with regard to measurement. Traditionally, mental health diagnoses and assessments rely heavily on self-reported information, clinician observations and collateral information from family and friends. This approach often complicates accurate diagnosis and treatment evaluation.

Mental health measurement is inherently complex and often lacks objective tools for clinicians to utilize because patient progress looks different to everyone. Adler notes the limitations of the historical pursuit of more objective measures, such as biomarkers in the brain, or the smartphone measurements he researched.

"Research continues to emphasize that mental health isn't that simple," he said, emphasizing that while data-driven methods are promising, mental health remains a deeply personal and subjective experience.

"We used AI tools to find associations between behaviors and mental health, and we found that these tools are not very accurate," Adler says of the paper. His research suggests conflicting signals in the data, indicating that a one-size-fits-all approach to mental health measurement is ineffective. Instead, Adler advocates for precision medicine and personalized tools, which can tailor care to individual triggers or needs.

For example, his paper shows that high phone use might be associated with depression for [older adults](#), while low phone use might be associated with depression for younger adults, showing that additional context is needed to understand how behavior precisely impacts mental health.

Choudhury says that "the promise of wearable sensors and smartphones may lie in their ability to account for differences, track symptoms, and support precision treatment for individualized symptom trajectories."

Adler's engineering background and the interdisciplinary environment at Cornell Tech create a unique environment in which solutions can be explored in the context of multiple disciplines and perspectives. His work, influenced by personal experiences with the mental health care system, is driven by a passion to advance technological solutions to these challenges and create a more effective care system for patients and providers alike.

He stresses the importance of real-world impact in academic research, a principle deeply ingrained at Cornell Tech and in Choudhury's People-Aware Computing group, which focuses on advancing the future of technology-assisted well-being.

For future research, Adler still sees significant potential in using AI to address access to care challenges. For example, Adler mentioned that new large language model tools could bridge gaps in mental health services. However, he cautions against the uncritical adoption of such technologies. Technologists, he argues, must implement guardrails to ensure these systems offer helpful, not harmful, guidance.

Adler envisions a balanced approach to AI in [mental health care](#), where AI serves both as a way to fill gaps that are known to exist in the health care system and also as a way to supplement existing care practices. Adler believes that using AI to handle administrative tasks or summarize information can improve efficiency, but that it's crucial to evaluate these tools to genuinely enhance care delivery.

**More information:** Daniel A. Adler et al, Measuring algorithmic bias to analyze the reliability of AI tools that predict depression risk using smartphone sensed-behavioral data, *npj Mental Health Research* (2024). [DOI: 10.1038/s44184-024-00057-y](https://doi.org/10.1038/s44184-024-00057-y)

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