

# Wrist-wearable devices can spot pain, sleep and anxiety outcomes after trauma

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Results from the largest prospective study of its kind indicate that 24-hour rest-activity characteristics from wrist-wearable devices predicted adverse symptom outcomes in the 8 weeks after traumatic

stress exposure. In a diverse group of individuals, variability in 24-hour activity based on wrist accelerometry reported greater pain severity.

During the 8 weeks after trauma, changes in several rest-activity measures were also associated with changes in pain, sleep, and anxiety in this group of patients. Additionally, simple thresholds for these biomarkers identified individuals with good recovery for pain, sleep, and anxiety with high predictive value.

Wrist wearables with accelerometry are easy to wear and commonly used among consumers, and this research, published in the *JAMA Psychiatry*, suggests that 24-hour rest-activity characteristics obtained from these devices might identify those who will recover from trauma in high-risk populations.

"These findings are important both to identify specific individuals who are vulnerable to pain and [mental health problems](#) after trauma, and to test potential treatments focused on reducing these problems for individuals who have recently experienced traumatic events," said lead author Laura Straus, Ph.D., staff research psychologist at the San Francisco VA Medical Center and assistant professor of psychiatry at UC San Francisco.

This research is part of the national Advancing Understanding of RecOvery afterR traumA (AURORA) Study.

AURORA allows researchers to leverage data from patient participants who enter emergency departments at hospitals across the country after experiencing trauma, such as car accidents or other serious incidents. The ultimate goal of AURORA is to spur on the development and testing of preventive and treatment interventions for individuals who have experienced [traumatic events](#).

AURORA scientists have known that only a subset of trauma survivors develop long-term pain and mental health difficulties, and that this is especially true in individuals from socioeconomically disadvantaged backgrounds. No objective assessment methods or biomarkers are available to determine who will recover from trauma versus who will develop long-term symptoms.

To examine the question if any candidate biomarkers could be identified based on wrist-wearable data, participants wore a study watch for 8 weeks, beginning in the [emergency department](#), and completed periodic smartphone-based assessments of neuropsychiatric symptoms. Straus and her colleagues derived and validated rest-activity characteristics that were associated with specific self-report symptom domains at a point in time, and changes in symptom severity over time.

"We found that several rest-activity measures were associated with changes in pain over time. We also found that objective sleep/wake fragmentation was associated with changes in [pain](#), self-reported sleep problems, and anxiety," said Thomas Neylan, a senior author on the paper and professor of psychiatry from UC San Francisco. "These findings highlight a potential use for wrist-wearables in identifying who may need further evaluation and support after a trauma."

"These latest findings are very exciting because they suggest objective biomarkers from [wearable devices](#) could be used as screening tools to help patients and physicians identify whether symptoms are improving or worsening post-trauma," said McLean, a senior author on the paper. "Studies focusing on the early aftermath of [trauma](#) are critical because we need a better understanding of how adverse symptoms develop so we can prevent and treat them."

**More information:** Laura D. Straus et al, Utility of Wrist-Wearable Data for Assessing Pain, Sleep, and Anxiety Outcomes After Traumatic

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