

Researchers to use wearable device to measure resident wellness, prevent burnout

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Dr. Alexander Hajduczuk, right, a third-year internal medicine resident at Penn State Health Milton S. Hershey Medical Center, visits with a patient. Credit: Penn State Health

Researchers at Penn State College of Medicine are conducting a study to determine if a wearable device can measure wellness and predict burnout among resident physicians. The results from the clinical trial could be used to develop targeted interventions for depression and burnout in graduate medical education.

Dr. Alexander Hajduczuk, a third-year internal medicine [resident](#) at Penn State Health Milton S. Hershey Medical Center and principal investigator for the study, said that training to become a physician can be stressful and that interventions are necessary to address the growing rates of [burnout](#) and depression in residents and other medical professionals, especially in light of the COVID-19 pandemic.

"Prior studies have shown that depression and burnout in residents can increase medical errors and worsen patient outcomes," Hajduczuk said.

"We hope that the data we collect from the study can help us identify stress triggers and develop interventions to help residents cope with those challenges."

The trial recruited 38 internal medicine residents from the Milton S. Hershey Medical Center and began on July 1. Each participant will wear a device manufactured by WHOOP for one year that will measure their [heart rate](#), respiratory rate, sleep and other physiologic data. The research team will compare the data collected by the device to subjective assessments of wellness and burnout collected in weekly surveys to see if physiologic trends in the data align with how residents report they feel. During the study, if signs of stress are indicated in the residents' results, appropriate healthcare measures will be suggested.

Researchers will particularly evaluate heart rate variability (HRV), the fluctuation in the time intervals between adjacent heartbeats, during the study. HRV is a measure of the balance of the autonomic nervous system, which acts largely unconsciously and regulates bodily functions, such as the heart rate, digestion and respiratory rate. It can be used as a surrogate measure for physical, mental and emotional stress. According to Hajduczuk, when residents are subjected to the high levels of stress of medical training, HRV may decrease. He predicts that trends in HRV will be a key indicator of resident wellness, burnout and depression.

In addition to the subjective measures of wellness and remote monitoring with the WHOOP device, the researchers will also periodically measure salivary cortisol levels as a secondary objective indicator of stress. Cortisol is a hormone involved in metabolism and immune responses that helps the body respond to stressful stimuli.

Hajduczuk said the idea for the study came to him while working nights in the Intensive Care Unit during his second year of residency. He was

already wearing the WHOOP device to measure his performance and recovery while training for national CrossFit competitions. He noticed that decreases in his [heart rate variability](#) aligned with stressful times in his physical training as well as his medical training.

A previous study by Dr. Jamie Coleman, a trauma surgeon from Denver, used WHOOP devices to measure how trauma surgeons' sleep patterns were affected by being on call. Hajduczuk and Coleman have shared ideas on using the device for research purposes.

Hajduczuk hopes that the results from the study will lead to an increased understanding of the most difficult and stressful parts of residency so that actions to prevent burnout and depression can be taken. He said that measures to address resident stress could include optimizing and possibly individualizing resident schedules, encouraging healthy behaviors such as self-reflection and exercise, and targeting specifically identified systems-based stressors for change.

"Everyone across the [medical education](#) spectrum, from medical students to residents to attendings, experiences [stress](#)," Hajduczuk said. "This study is evaluating resident stressors, but the findings could have broader implications for the medical community as a whole."

More information: Learn more about the clinical trial by searching for identifier [NCT04304703](#) on [clinicaltrials.gov](#).

Provided by Pennsylvania State University

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