Consumer Wearable Sensor Data and Adolescent Internalizing Symptoms in a Nationally Representative Sample

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Adolescence is characterized by alterations in biobehavioral functioning, during which individuals are at heightened risk for first onset of psychopathology, particularly internalizing disorders. Researchers have proposed using digital technologies to index daily biobehavioral functioning, yet there is a dearth of research examining how wearable metrics are associated with mental health.

We preregistered analyses using the Adolescent Brain Cognitive Development Study dataset using large scale wearable data collection in 5,686 adolescents (123,862 person days or 2,972,688 person hours) to determine whether wearable indices of resting heart rate (HR), step count, and sleep duration as well as variability in these measures were cross-sectionally associated with internalizing symptomatology. All models were also run controlling for age, sex, body mass index, socioeconomic status, and race. We also performed prospective analyses on a subset of this sample (n = 143) across 25 months that had Fitbit data available at Baseline and Follow Up.

Cross-sectional analyses revealed that higher resting HR, lower step count and step count variability, and greater variability in sleep duration were associated with greater internalizing symptoms. Cross-lagged panel model analysis revealed that there were no prospective associations between wearable variables, but greater internalizing symptoms predicted lower step count 25 months later.

Findings indicate that wearable indices concurrently, but not prospectively, associate with internalizing symptoms during early adolescence. Future research should capitalize on the temporal resolution provided by wearable devices to determine the intensive longitudinal relations between biobehavioral risk factors and acute changes in mental health.