

## **Researchers find a way to track how you feel** when it's time for a meal

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Credit: AI-generated image (disclaimer)

Many of us lie or can't remember what we ate when asked to reveal our eating habits, and that makes it difficult for doctors and researchers to guide us toward better diets and behaviors. But what if there was a way for them to monitor us?



Donna Spruijt-Metz, director of the mHealth Collaboratory at the USC Center for Economic and Social Research, and her team are testing an innovative approach to address obesity: devices that measure mood and eating behaviors rather than focusing on <u>dietary intake</u>.

"The three-day multiple pass dietary recall that asks people to remember what they ate is the gold standard for measuring food intake, but we can't accurately measure someone's diet or food intake," said Spruijt-Metz, a research professor of psychology at the USC Dornsife College of Letters, Arts and Sciences. "We really have no idea what people eat, because people lie. People don't remember."

## Mood and food

In 2015, Spruijt-Metz, along with her colleagues John Stankovic and John Lach at the University of Virginia, and Kayla de la Haye at USC, received a \$1.7 million grant from the National Science Foundation to study obesity and <u>eating habits</u> within families through wearable, mobile health devices.

The approach to monitoring mood and food, called M2FED, enables the researchers to detect eating behaviors and emotional responses of the study's participants. The researchers aim to develop a real-time intervention that could stop unhealthy behaviors and reduce obesity, which affects more than one-third of adults and 17 percent of all children and teens in the United States, according to federal health statistics.

Jessica Rayo, a California State University, Long Beach undergrad assisting on the project, presented details of the technology at this year's annual conference of the American Psychosomatic Society held this week in Spain.



"As a behaviorist, I began thinking that we do know that behaviors affect eating, such as the attitudes around the table, whether or not you are angry or if you are depressed or you don't like what your mother said," Spruijt-Metz said. "We can now reliably measure that with sensors. Forget measuring dietary intake."

## **In-home mics**

Spruijt-Metz, along with the University of Virginia team, developed algorithms for this cyber-physical system to detect, based on audio data collected by in-home microphones, the mood of a study participant and his or her family. The system also detects eating behaviors based on signals from a wrist-worn smartwatch. The devices are being programmed to improve accuracy through machine learning, allowing the researchers to increase the accuracy of their monitoring with each use.

Family members participating in the study wear the smartwatches on their wrists. The device sensors pick up wrist movements to detect a person's eating behaviors, including when, how long and how fast they eat, said Brooke Bell, a doctoral candidate in health <u>behavior</u> research at the Keck School of Medicine of USC who is involved in the project.

"We are also placing beacons—small sensors—around the home that can identify where someone is located in the home," Bell said.

Rayo, a research assistant on the project supported through a National Institutes of Health grant for biomedical, undergraduate research training, is helping to refine the protocols that will enable the research team to understand the family eating dynamics. She co-monitors the families' emotions while recording them in 15- to 20-minute sessions during which the families discuss topics that she suggests and eat. Rayo said she enters codes into Noldus Observer XT, the device software



tracking the moods of the family.

"One of the primary components of this system is the detection of conversation, stress and mood," Rayo said. "This system detects and models eating events and eating rate, mood and interpersonal interactions in home environments. The system includes sensors that capture acoustic signals and analyze the audio data for mood and stress."

Tested on participants—five female and five male—the devices can gauge the following moods with a high rate of accuracy:

- Anger (94.5 percent accuracy)
- Anxiety (95.7 percent accuracy)
- Boredom (97.5 percent accuracy)
- Happiness (88.7 percent accuracy
- Sadness (88.9 percent accuracy)

Spruijt said that the literature has shown that <u>food intake</u> and <u>mood</u> go hand in hand.

"There is scientific literature showing that people are stress eaters," she said. "The culture at home, within the family, can affect how people eat."

## Provided by University of Southern California

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