

WillSense: Will Participants Wear Passive Sensing Devices Long Enough To Study Eating Behavior?

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Background:

Due to high burden and bias of self-report, passive sensing of food intake systems is rising as an alternative measure to operationalize eating habit and caloric intake behavioral constructs. Existing machine learning models designed to detect eating based on studies in-lab fail to detect eating episodes in free-living populations. In order to improve our machine learning models, a sensing suite comprising a wrist- and neck-worn sensor, and a wearable video camera (with a fish-eye lens) was designed to reliably capture eating in the field.

Methods:

Participants (n=24, 12 obese, 6 overweight, and 6 normal BMI) wore the sensing suite while performing structured (talking to a stranger in the mall, eating, using a restroom, checking email, using an ATM, looking at a mirror) and unstructured activities in the field for a day that would affect willingness to wear the sensors. They were requested to take notes in a diary about how they felt while out in the field. Participants then answered questions regarding their willingness to wear the sensor suite. To prevent breach of privacy participants were provided with a Data Annotation Tool (DAT) to facilitate deletion and annotation of data.

Results:

87.5% of the participants agreed to wearing the wrist- and neck-worn sensor for 30 days during waking hours if paid \$100. 87.5% were also willing to wear the entire system (including the video camera) for 30 days if paid \$100 and were able to keep the equipment. Participant's main motivators for wearing the sensor suite are money and health; and the main barriers included user-comfort, and bystander reactions.

Conclusion:

Participants are willing to wear a sensing suite with a video camera if the price is right. This system opens up the potential to build effective machine learning models that can reliably passively operationalize eating-related constructs in the field. Future studies will test the device's performance in the wild and utility as part of an eating intervention.