# Assessing Adults' Physical Activity and Sedentary Behavior Using Ecological Momentary Assessment with Mobile Phones

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## BACKGROUND

•Recent advances in mobile phone technology have created opportunities for Ecological Momentary Assessment (EMA) of physical activity and sedentary behaviors in naturalistic settings (Dunton, 2009; Patrick, 2008).

•Software applications can be loaded onto basic mobile phones or smartphones to trigger electronic EMA surveys in real time.

•EMA has the added benefit over accelerometers, heart-rate monitors and GPS in its ability to measure activity type (e.g., TV , eating, riding in a car).

## RESEARCH AIMS

**To test the feasibility, acceptability, and validity of a real-time EMA protocol using self-report electronic surveys on mobile phones to measure adults' physical activity and sedentary behaviors in naturalistic settings.**

## PARTICIPANTS

•N = 110 adults
•Ages 27-73 years (M = 40.42, SD = 9.74)
•72.5% Female,
•66.1% Married
•61.8% Overweight/obese
•30.3% Hispanic/Latino.
•24% Household income < $40,000.

## PROCEDURES

•Monitoring occurred across 4days (2 weekdays and 2 weekend days)
•8 randomly-spaced prompts each day (32 total ).
•Auditory beep when time to complete a survey
•Reminder prompt after 3 min for missed entry.

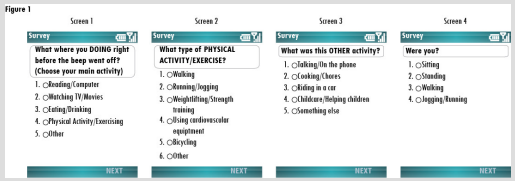
## EQUIPMENT

**Ecological Momentary Assessment (EMA)** data was collected through an HTC Shadow mobile phone (T-Mobile USA, Inc.).

**Accelerometer**
The Actigraph, Inc. GT2M model activity monitor provided a measure of physical activity that was time matched to the EMA entries.

## MEASURES

Ecological Momentary Assessment
•***Physical Activity*** (i.e., Physical Activity/Exercise" and "Jogging/Running" )
•***Sedentary Activity***(i.e., "Reading/Computer," "Watching TV/Movies," and "Sitting")




Accelerometer
•***Moderate-to-vigorous physical activity (MVPA)-*** greater than 2020 counts per minute (equivalent to 3 METs). (Freedson et al., 1997; Troiano, 2008).
•***Sedentary Activity (SA)-*** less than 100 counts per minute (Healy, 2008).

## DATA ANALYSES

•Data were analyzed using multilevel logistic and linear regression modeling in SUDAAN 10.0 and multilevel repeated measures models conducted with SAS PROC MIXED.

## RESULTS

Descriptive Statistics
•On average, participants answered 82% (range 25% – 100%) of EMA prompts.
•Physical activity = 8.6% of EMA surveys and sedentary activity = 39.6% of EMA surveys.

Unanswered EMA Prompts (± 15 min. of each EMA prompt)
•SA did not differ between answered and unanswered EMA prompts.
•For under/normal weight individuals, MVPA was greater during unanswered (M = 1.35, SE = 0.34) than answered (M = 0.60, SE = 0.11) EMA prompts (p = .029) for underweight and normal weight participants.

Whether EMA Disrupted Activity (15 min before vs. after each EMA prompt)
•For EMA-reported physical activity, MVPA minutes did not differ during the 15-min before vs. after the answered EMA prompt.
•For EMA-reported sedentary activity, overweight/obese individuals engaged in less SA during the 15-min before (M = 11.04, SD = 3.34) vs. after (M = 11.44, SD = 3.11) the answered EMA prompt (p <.05).

Validity of EMA Activity Responses (± 15 min. of each EMA prompt)
•MVPA was higher for EMA surveys reporting physical activity than any other type of activity (p's < .001) (See Fig. 1).
•SA differed across the types of sedentary activities reported by EMA (p < .001) (See Fig. 2).

Fig. 1

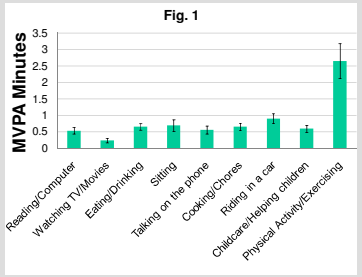
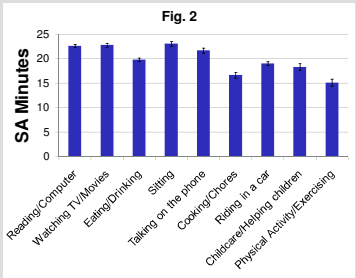



Fig. 2




## CONCLUSIONS

• Under/normal weight individuals may be less likely to response to EMA prompts during physical activity.
•Overweight/obese individuals increased sedentary behavior after answering EMA prompts.
•Objective activity data (measured by accelerometer) corresponded with EMA self-reports of current activity levels, providing support for construct validity.

## ACKNOWLEDGMENTS

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