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

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RESULTS

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 4 days (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

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”)

Equation

- 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 Analysis

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

Conclusions

- Under/normal weight individuals may be less likely to respond 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

Funded by: American Cancer Society (118283-MRSGT-10-012-01-CPPB) (Dunton, PI) and (R01-CA-123243) (Pentz, PI). Contact information: Genevieve Fridlund Dunton, Ph.D, M.P.H., Univ. of Southern California. 2001 N. Soto St. Los Angeles, CA 90033. dunton@usc.edu

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).

Accelerometer

- Monitoring occurred across 4 days (2 weekdays and 2 weekend days)
- 8 randomly-spaced prompts each day (32 total)
- Auditory beep when time to complete a survey
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