COLLEGE OF PUBLIC HEALTH AND HUMAN SCIENCES

Measuring Pedometer Accuracy in Free Living Conditions

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Introduction

- Pedometers are a frequently used tool to measure physical activity (Stanish & Draheim, 2005).
- The accuracy of pedometers has been of interest given the popularity of the tool.
- Many potential sources of error, including missing data.
- This missing data can be a significant problem if researchers are interested in directly comparing between groups and/or conditions.
- Impossible to make direct comparisons without knowing how much data is missing.

Purpose

The purpose of the study is to examine how much information is missed when participants are asked to follow the common instructions of pedometer daily wear.

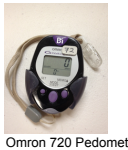
Methods

Participants

- 29 participants (16 males and 13 females)
- Recruited from a university community in the Northwest

Equipment

- Pedometer: Omron - 720 ITC (Bannockburn, IL)
- Accelerometer - Actical (Mini-Mitter, Bend, OR)



Omron 720 Pedometer

Actical Accelerometer

Research Design

- Participants were blinded for the specific research questions, but were told the overall objective of the study.
- Participants were randomly assigned to either the experimental or the control group
- Participants in experimental group were given a log to record wear time.

Procedures

- All participants were asked to wear the belt from waking up until going to bed for at least seven consecutive days.
- One accelerometer strapped to wrist and a belt with an accelerometer and a pedometer to be worn over the iliac crest of hip.

Methods – cont.

Data Reduction

- To find the amount of missing wear time:
  - Compared the activity of the wrist accelerometer to the hip accelerometer.
  - Each day consists of 1,440 data points
  - Missing wear time was estimated after rising in the morning and prior to bedtime.
    - The following criteria of physical activity count from accelerometer were used as guidelines for missing wear time:
      - Wake-up - at least 5 minutes in a row over 100 physical activity count
      - Sleep - at least 5 minutes in a row under 25 (Garnier & Benefice, 2006),
      - The pedometer data was compared with the accelerometer to see how many daily steps the data is missing.
  - Comparing the wrist and hip data tells us how much pedometer data is missing.
  - The wrist activity counts will then be used to calculate steps missed by now wearing the pedometer.

Data Analysis

- To find the amount of missing wear time:
  - The percent of time the participants wore the pedometer were calculated based on number of minutes spent awake divided by amount of minutes the participant wore his or her waist belt.
  - One way ANOVA was run to compare difference of wear time between experimental and control groups.

Wrist accelerometer is worn on the right wrist. The belt is to be worn around the waist with the pedometer and accelerometer over the illiac crest.

Preliminary Results

- These results are from 17 participants
  - Participants on average wore their pedometers 14.26 hours
    - 14.19 hours during weekdays
    - 14.29 hours during weekend days
  - Participants were awake for an average of 15.95 hours
    - Weekdays 15.85 hours
    - Weekend days 16.12 hours
  - Subjects missed on average 109.73 minutes of data
  - Ranging minutes from 320.43 to 29.29 minutes

Preliminary Results –cont.

	Minutes missed		Steps per day		Hours Worn		Hours Awake	
	M	SD	M	SD	M	SD	M	SD
Avg. Total	320.43	97.14	8,942.56	104.02	14.26	1.73	15.95	1.45
Avg. WD	109.91	105.65	9,407.75	112.05	14.19	1.87	15.85	1.40
Avg. WE	102.31	112.14	7,709.08	139.50	14.29	2.33	16.2	2.16

Note: WD: week day, WE: Weekend day

- The overall percent of time participant did not wear pedometer belt while they were awake was 11.08% with 95% confidence interval (6.34%,15.81%)
- Experimental group missed 7.58% ranging from 3.13%-16.73% of their total wake time.
- Control group missed 14.66% ranging from 3.22%-34.98% of their total wake time.
- However, there was no statistical difference between the two groups, $F(1,16) = 2.82$, $p > .05$.

Discussion

- Reported results are from a preliminary analysis of 17 subjects. More subjects are currently being recruited to increase sample size and target subjects are 80.
- Based upon preliminary analysis
  - Participants are not wearing pedometer as instructed and it results in large amount of errors.
  - Using the log does seem to increase subject compliance on wear time

Future Questions

- What are appropriate strategies to increase participant compliances regarding wear time.
  - Log
  - Reminders, Emails
  - Social Support

References

Garnier, D., & Bénéfice, É. (2006). Reliable Method to Estimate Characteristics of Sleep and Physical Inactivity in Free-Living Conditions Using Accelerometry. *Annals of Epidemiology*, *16*(5), 364–369. doi:10.1016/j.annepidem.2005.07.057

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