Youth Physical Activity Data Collection in Low Resource Community Settings using Accelerometers

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Acknowledgements
Workshop Objectives

Participants will be able to...

✓ Select validated self-report physical activity measures for youth subjects
✓ Understand time and equipment specifications related to the use of accelerometers in field based research
✓ Identify groups or individuals with whom they might partner in order to facilitate large-scale accelerometer data collection on a limited budget
✓ Conceptualize barriers to accelerometer data collection given the nature of their specific low resource population, as well as identify strategies to address some of these barriers
Our Study: Project Aims & Measures

Aim 1: Determine efficacy of target grant funding
- Youth physical activity measured via accelerometry

Aim 2: Identify effective interventions for increasing physical activity in youth
- Youth physical activity as measured via accelerometry
- Reporting by grantees on process and outcomes

Aim 3: Identify characteristics of community partnerships that positively impact interventions
- Qualitative assessment of grant coordinators and community partners
- Reporting by grantees on project process and outcomes
Accelerometer Distribution Sites
Our Study: Youth Data Collection Process

Pre-data collection
- Obtain consent from parents
- Charge, initialize and pre-assign accelerometers
- Prepare surveys

Data Collection
- Obtain assent from youth
- Administer youth survey
- Distribute accelerometers

Post-data collection
- Collect accelerometers 8 days later
- Download and store data for later processing
- Recharge, reinitialize, reassign, repeat \( \times 20!! \)
<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989 youth surveys administered</td>
<td>1825 youth surveys administered</td>
<td></td>
</tr>
<tr>
<td>1355 accelerometers distributed</td>
<td>1280 accelerometers distributed</td>
<td></td>
</tr>
<tr>
<td>74% of participants returned accelerometers when due</td>
<td>84.5% of participants returned accelerometers when due</td>
<td></td>
</tr>
<tr>
<td>98.1% of participants returned accelerometers eventually</td>
<td>97.4% of participants returned accelerometers eventually</td>
<td></td>
</tr>
<tr>
<td>76% of participants provided at least 4 days of usable data*</td>
<td>69% of participants provided at least 4 days of usable data*</td>
<td></td>
</tr>
<tr>
<td>95% of participants provided at least 1 day of usable data</td>
<td>96% of participants provided at least 1 day of usable data</td>
<td></td>
</tr>
<tr>
<td>55 incidences of malfunctioning accelerometers</td>
<td>64 incidences of malfunctioning accelerometers</td>
<td></td>
</tr>
</tbody>
</table>

*NHANES 2003-4 reported 69-71% of 6-11 year old participants provided at least 4 days of usable data (Troiano 2008)
Selecting Measures

- Systematic observation
- Questionnaires
  - Subjective measure of physical activity
- Wearable monitors
  - Objective measure of physical activity
Selecting Measures: Questionnaires

- Select validated survey questions to assess subjective physical activity
  - Test/retest and alpha > 0.7
  - Resources for choosing validated instruments
    - National Collaborative on Childhood Obesity Research (NCCOR) Measures Registry
    - Physical Activity Research Center for Public Health
Specific Questionnaire & Population Characteristics Search

Select questionnaire characteristics to view a list of questionnaires matching the criteria specified.

OR

Select an item from the drop down list to search for articles related to a specific questionnaire.
(To limit the number of articles returned, select population characteristics and/or enter keywords.)

Questionnaire: Select

Questionnaire Characteristics:

Time Frame:
- Past Day
- Past Week
- Past Month
- Past Year
- Historical
- Other

Domain:
- Leisure or Sport and Exercise
- Transportation, Household
- Occupational, Other

Administration:
- Self Administered
- Interviewer Administered

Age:
- Child
- Teen
- Adult
- Older Adult

Gender:
- Male
- Female

Race/Ethnicity:
- Black, non-hispanic
- Asian or Pacific Islander
- White, non-hispanic
- American Indian or Alaska Native
- Hispanic
- Other
Selecting Measures: Questionnaires

- Choose instruments validated on slightly younger children than those in your study population
- Choose questions based on the TYPES of conclusion statements you would like to make
- Also consider length of questionnaire and cost of questionnaire analysis
Selecting Measures: Wearable Monitors

- Monitor selection: Accelerometers vs. other wearable monitors for objective physical activity data collection
  - Research question (volume vs. intensity of PA)
  - Reliability/validity of device type/brand
Selecting Measures: Wearable Monitors

- Contraindications for using accelerometers with youth study populations
  - Cost
  - Tamperability
  - Compliance
  - Inability of accelerometers to detect certain types of motion
Best Practices for Using Physical Activity Monitors in Population-Based Research

  ▪ Updates and expands on previous recommendations by Trost et al. (2005)
  ▪ Includes strengths and weaknesses of monitor measures and best practice for using monitors in studies and reporting on studies involving monitors
Using Accelerometers

- Charging devices
Using Accelerometers

- Initializing devices with Actilife™
Using Accelerometers

• Initializing devices with Actilife™
Using Accelerometers

• Initializing devices with Actilife™
Using Accelerometers

- Initializing devices with Actilife™: GT3X+
Using Accelerometers

- Downloading devices with Actilife™
Using Accelerometers

- Downloading devices with Actilife™: GT3X+
Using Accelerometers

• Converting .agd files to .csv for processing in Meterplus™
Using Accelerometers

- Managing data with Meterplus™
Using Accelerometers

- Managing data with Meterplus™: Valid day determination
Using Accelerometers

- Managing data with Meterplus™: Output
Using Accelerometers

• Managing data with Meterplus™:

Cut Points

<table>
<thead>
<tr>
<th>Group/Category Name</th>
<th>Min Value</th>
<th>Max Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evenson_Child (age 5 to 15)</td>
<td>-999</td>
<td>-999</td>
</tr>
<tr>
<td>not_wearing</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>sedentary</td>
<td>51</td>
<td>1147</td>
</tr>
<tr>
<td>light</td>
<td>1148</td>
<td>2005</td>
</tr>
<tr>
<td>moderate</td>
<td>2006</td>
<td>100000</td>
</tr>
<tr>
<td>vigorous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freedson_Adcult_30sec (age 10 to 100)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incline (age 0 to 100)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freedson_Adcult_60sec (age 10 to 100)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

File Name

- Create variables from the file name
- Begin parsing for variables after the last character

Sample file name: XXXX.csv

Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Character Position</th>
</tr>
</thead>
</table>
Using Accelerometers

• Managing data with Meterplus™:

Bouts

Caloric Output
Using Accelerometers

- Managing data with Meterplus™: Filters
Using Accelerometers

- Managing data with Meterplus™: Processing Files
Using Accelerometers

- Managing data with Meterplus™: Scoring
Using Accelerometers

• Managing data with Meterplus™: Results
Collecting PA Data in Low Resource Communities

• How does this affect your choice of measure?
  ▪ “White coat” trust issues
  ▪ Literacy for grade
  ▪ Location/setting concerns
  ▪ Difficulties in following up with participants
Collecting PA Data in Low Resource Communities

• How to mitigate effects on measurement?
  ▪ Pilot testing
  ▪ Choosing instruments validated for slightly younger study population
  ▪ Reminder systems
  ▪ Coordination with sites
Collecting PA Data in Low Resource Communities

- Coordinating with sites: Consent Process

<table>
<thead>
<tr>
<th>Consent Plan: __________________ County</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Youth recruitment site(s):</td>
</tr>
<tr>
<td>• Person(s) at site(s) responsible for distributing consent forms:</td>
</tr>
<tr>
<td>• Person(s) at site(s) responsible for collecting consent forms:</td>
</tr>
<tr>
<td>• Opportunities/dates for in-person recruiting (PTA meetings, open houses, teacher conferences, etc.):</td>
</tr>
<tr>
<td>• Grouping of youth at sites for data collection purposes (grade, class, etc.):</td>
</tr>
<tr>
<td>• Plan for reminding youth/parents to return consent forms (Incentive planned if applicable):</td>
</tr>
<tr>
<td>• Date consent forms will be returned to county project coordinator:</td>
</tr>
<tr>
<td>• Person who will return consent forms to county project coordinator:</td>
</tr>
<tr>
<td>• Date project coordinator will send consent info spreadsheet to Sara:</td>
</tr>
</tbody>
</table>
Collecting PA Data in Low Resource Communities

• What potential bias does it introduce into data?
   Almost completely unknown
   Very little research looks at systematic bias introduced by differences in wear time or other differential patterns
Partnership: Key to Data Collection in Low Resource Communities

Research Staff

County Level

University
State PAN Branch
Research Project Coordinator

ESMM Community Grants project coordinators
Grantee partners

Community Level

Community data collection sites
Research population

Research population
How can these principles apply to your work?
Questions?

Please contact us at:
Sara: sara.morris@dhhs.nc.gov
Justin: jmoore@mailbox.sc.edu
Mary Bea: marybea.kolbe@dhhs.nc.gov