Acceptability of Accelerometers to Measure the Physical Activity of Preschool Children in the Children’s Healthy Living Program (CHL) in Hawai‘i

Katalina McGlone, PhD, CHES; Claudio Nigg, PhD; Alvin Tachibana, BS; Christina Carran, MS; Rachel Novotny, PhD

October 10, 2012  Pacific Global Health Conference
Physical activity (PA) is an important determinant of health.

- Inactivity -- risk factor
- More children -- overweight / Type II diabetes
- Behavior patterns begin early in life
- Programs, like CHL, aim to increase PA in young children
- How to measure program success in young children?
- Need **objective** measure of PA for program impact
- **Accelerometers** are objective measure (Guimarães Vale et al, 2010; Sirard & Pate, 2001)
Research Questions

Will preschool-age children wear Accelerometers?
How acceptable are they to children?

What problems might arise?
How to improve acceptance of them by preschool children?
Accelerometer
What is an Accelerometer?

* Objective measure of physical activity (PA)
* Measures vertical, horizontal, and lateral acceleration
* Produces output on intensity, duration and frequency of PA throughout day
* Intensity -- Measures from sleep to vigorous
* Cost over $200
## Hawai‘i Sample

<table>
<thead>
<tr>
<th>Head Start site</th>
<th>Number of Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site A</td>
<td>17</td>
</tr>
<tr>
<td>Site B</td>
<td>16</td>
</tr>
<tr>
<td>Site C</td>
<td>18</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>51</strong> (of 55 possible)</td>
</tr>
</tbody>
</table>
### Ethnicity / Race of Sample

<table>
<thead>
<tr>
<th>100% Single Ethnic Group (13)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asian</strong></td>
<td></td>
</tr>
<tr>
<td>Filipino</td>
<td>5</td>
</tr>
<tr>
<td>Chinese</td>
<td>4</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
</tr>
<tr>
<td><strong>Pacific Islander</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>African American</strong></td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mixed Ethnicity (36)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hawaiian &amp; Other Mix</strong></td>
<td>23</td>
</tr>
<tr>
<td>Hawaiian + 2 groups (11), + 3 groups (8) of White, Asian, Hispanic, &amp;/or PI</td>
<td></td>
</tr>
<tr>
<td><strong>Pacific Islander Mix (not Hawaiian)</strong></td>
<td>6</td>
</tr>
<tr>
<td>Asian &amp; White</td>
<td>6</td>
</tr>
<tr>
<td>Asian (two Asian ethnicities)</td>
<td>1</td>
</tr>
<tr>
<td>Unknown heritage or no data</td>
<td>2</td>
</tr>
</tbody>
</table>

| Total Sample                 | 51 |
Methods

Wore accelerometer for two 1-week periods

* Tracking of Wearing Accelerometer and Comments

* Child’s Daily Experience
* Parent Feedback
* Staff available in class
Placement of accelerometers
(non-dominant)

- Child gave assent
- Child chose color of wristband
# Child’s Daily Experience

<table>
<thead>
<tr>
<th>Sun</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Sat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>
CHL Physical Activity Pilot Project
Feedback Questionnaire Week 2

1. **My child liked wearing the accelerometer**

   Please circle the number that most reflects your child’s experience over the 7 days of wearing the accelerometer.

   1  2  3  4  5  6  7  8  9  10
   Strongly disagree  
   Completely agree

2. **My child felt that wearing the accelerometer was**

   Please check ALL that apply:

   - Easy
   - Terrible
   - Annoying
   - Disturbing
   - Distracting
   - Barely noticeable
   - OK
   - Fun
   - Difficult
   - Something important
   - Heavy
   - Something he/she liked
   - Interesting, asked questions about it
   - Made him/her feel like a grown up
   - Tried to play with it
   - Tried to take it off
   - Tried to break it

   Other ____________________________________________________
Results
### Children wore Accelerometers

<table>
<thead>
<tr>
<th></th>
<th>Week 1</th>
<th>Week 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Children Starting Study Week</strong></td>
<td>51</td>
<td>47</td>
</tr>
<tr>
<td><strong>Wore accelerometers less than 1 day</strong></td>
<td>2*</td>
<td>3</td>
</tr>
<tr>
<td><strong>Lost accelerometers</strong></td>
<td>1*</td>
<td>1</td>
</tr>
<tr>
<td>*counted in both categories</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Children Wore Accelerometers

<table>
<thead>
<tr>
<th></th>
<th>Week 1</th>
<th>Week 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wore all days</td>
<td>72.5%</td>
<td>68.1%</td>
</tr>
<tr>
<td>possible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Came off</td>
<td>33.3%</td>
<td>40.4%</td>
</tr>
<tr>
<td>at some time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ended study</td>
<td>19.6%</td>
<td>25.5%</td>
</tr>
<tr>
<td>early</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Child’s Daily Experience
Wearing Accelerometer

Parents’ daily rating

Percent of days in each week

<table>
<thead>
<tr>
<th></th>
<th>Week 1</th>
<th>Week 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Happy or Neutral</td>
<td>93.1</td>
<td>96.2</td>
</tr>
<tr>
<td>Sad</td>
<td>2.9</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Week 1:
- 93.1% Happy or Neutral
- 2.9% Sad

Week 2:
- 96.2% Happy or Neutral
- 1.5% Sad
Parent Feedback Form

My child liked wearing the accelerometer:

* 1 strongly disagree to 10 completely agree

* Week 1: 7.5
* Week 2: 7.7
My child liked wearing accelerometer

Parent Feedback Form

<table>
<thead>
<tr>
<th></th>
<th>Completely agree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>7.5</td>
<td>6.3</td>
</tr>
<tr>
<td>Week 2</td>
<td>8.2</td>
<td>7.7</td>
</tr>
<tr>
<td></td>
<td>8.3</td>
<td>6.7</td>
</tr>
</tbody>
</table>

Stat. significant difference between Pacific Islanders and Not Pacific Islanders in Week 1 at $p = .01$ and in Week 2 at $p = .03$
Child’s Experience of Accelerometer

<table>
<thead>
<tr>
<th></th>
<th>Week 1</th>
<th>Week 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>57.1</td>
<td>73.9</td>
</tr>
<tr>
<td>Easy</td>
<td>44.9</td>
<td>58.7</td>
</tr>
<tr>
<td>Fun</td>
<td>36.7</td>
<td>43.5</td>
</tr>
<tr>
<td>Barely Noticeable</td>
<td>30.6</td>
<td>47.8</td>
</tr>
</tbody>
</table>

Statistically significant $p = .04$
Child’s Experience of Accelerometers

- Tried to take off accelerometer: Week 1: 26.5%, Week 2: 17.4%
- Annoying: Week 1: 22.4%, Week 2: 8.7%
- Disturbing: Week 1: 14.3%, Week 2: 4.3%
Ways to improve acceptance of wearing accelerometers

* Provide FAQs

* Educate parents, teachers, and staff about what to expect

* Train them how to remedy common concerns
Child likely will get used to it, and notice it less over time.

Child may focus on accelerometer at first.

Child may experience some discomfort at first.
How to remedy if child is bothered or uncomfortable

Training for Parents / Staff / Teachers

* Examine wrist and wristband fit
* Ask “How does it feel?”
* Wash and dry wrist and device, if needed
* Put a new band, if needed

Rare:
* If actual sore, broken skin, rash – tell designated person / IRB
Strategies to Improve Acceptance

What to ask if a child Is not wearing accelerometer

* Ask parent(s) for information
* Ask child why it was removed and then listen
* “Would you like me to put this back on for you, maybe with a different color?”
Strategies to Improve Acceptance

* **Give Attention / Reassure Child**
  * Tried to alleviate problems and reassure
  * Children appreciated attention, that we cared about how they felt
  * Would tell them, “Please come see me if it bothers you, OK?”
  * Children had the right at anytime to choose not to wear device
Tip about changing wristbands

- Changing a wristband attracted attention of children
- Soon, many children would “need” their wristbands changed sometimes to a different color.
- Try Not to attract attention
- Began changing wristbands when needed:
  - Before class
  - While other children were occupied in activity
  - At beginning of recess
Recommendations to improve acceptance of accelerometers by preschoolers

* Place accelerometers on children early in week (when peers, staff and/or teachers present)

* Use comfortable, durable wrist bands

* Examine, Change band and/or reassure

* Offer opportunity to put it on again
Over-enroll children into study to make up for children who take off accelerometer early
Conclusion

- It is feasible to use accelerometers with preschool-age children
  - as objective measure of physical activity
- Some factors improve acceptance of accelerometers by preschool-age children
Acknowledgements

Mahalo nui loa

* HCAP Head Start, Lynn Cabato, Director
* Robyn Antonucci, Assistant Director
* Head Start Managers, Teachers and Assistants
* Parents of Study Participants
* Children in study who wore accelerometers
* Dr. Yuhua Su
* Dr. Bret Luick
* Nate Black, Dr. Lynne Wilkens; Dr. Reynolette Ettienne-Gittens; Shelley Wong; Sandy Hung; Katherine Jones; Dr. Barbara DeBaryshe; Jobel Mercado; Joanne Avila

* Project supported by the Agriculture and Food Research Initiative Grant number 2011-68001-30335 from the **USDA National Institute of Food and Agriculture** Science Enhancement Coordinated Agricultural Program
Thank you!

What questions do you have?