Connecting you with experts. Exploring the latest childhood obesity news and research.

We will begin at 3:05 to allow participants time to join the webinar.
1. Spotlight
   • A Revised Youth Compendium of Physical Activities
   • Youth Compendium of Physical Activities: Data Sources, Activity Codes, and Metabolic Intensities
   • Use of the Compendium for Tracking Physical Activity in Youth

2. One on One

3. NCCOR Announcements
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Today’s Speakers

Elaine Arkin
National Collaborative on Childhood Obesity Research

Karin Pfeiffer
Associate Professor of Kinesiology
Michigan State University

Nancy Butte
Distinguished Emeritus Professor
Baylor College of Medicine

Scott Crouter
Associate Professor of Exercise Physiology
University of Tennessee, Knoxville
INTERACTIVE POLL
A Revised Youth Compendium of Physical Activities

Karin Allor Pfeiffer, PhD
Associate Professor of Kinesiology
Michigan State University
What is a Compendium of Physical Activities?

• A list of values noting energy cost of various physical activities
• Currency = Metabolic Equivalent (MET)
• MET values are presented as multiples of resting metabolic rate
• Created for adults (1993)
• Youth-based version published later (2008)
The Process

1. Establish the need
2. Determine the best units/metric AND determine how to represent any age factor
3. Data sources
4. Development of the Youth Compendium
5. Applications and limitations
Youth Compendium Workshop Participants 2012

- **Research Group** – Barbara Ainsworth, PhD, MPH (Arizona State University); David Bassett, PhD (University of Tennessee); David Berrigan, PhD (National Cancer Institute); Nancy Butte, PhD (Baylor College of Medicine); Scott Crouter, PhD (University of Tennessee); Janet Fulton, PhD (CDC); Steve Herrmann, PhD (Sanford Health Organization); Kate Heywood (Ridley), PhD (Flanders University, Australia); Karin Pfeiffer, PhD (Michigan State University); Stewart Trost, PhD (Queensland University of Technology); and Kathleen Watson, PhD (CDC)

- **Imputation** – Issa Zakeri, Zekarias Berhane, Alexander Long (Drexel)

- **FHI 360 Staff** – Todd Phillips, LaVerne Canady, Amanda Samuels, Adee Kennedy

- **Data and Bibliography** – Penny Randall-Levy, Kyle Sprow
Why not simply use the Adult MET?
What is a MET for Children?

Relationship Between Resting Metabolic Rate (RMR) and Age in Youth


![Graph showing the relationship between RMR (kcal/kg/h) and age (y) in youth.](image)
The Process

1. Establish the need
2. Determine the best units/metric AND determine how to represent any age factor
3. Data sources
4. Development of the Youth Compendium
5. Applications and limitations
Ideal Metric

• Age independent
• Mass specific
• Low variance
• Simple to use
• Composed of existing measurements
### Metrics Previously Reported in Literature

<table>
<thead>
<tr>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ml/min</td>
<td>Activity-related oxygen uptake (VO₂)</td>
</tr>
<tr>
<td>ml/kg/min</td>
<td>Activity VO₂ per unit body mass</td>
</tr>
<tr>
<td>ml/cm/min</td>
<td>Activity VO₂ per cm in height</td>
</tr>
<tr>
<td>mL/m²</td>
<td>Activity VO₂ per unit of body surface area</td>
</tr>
<tr>
<td>ml/kg⁰.⁶⁷/min</td>
<td>Activity VO₂ scaled to 0.67 of body mass</td>
</tr>
<tr>
<td>ml/kg⁰.⁷⁵/min</td>
<td>Activity VO₂ scaled to 0.75 of body mass</td>
</tr>
<tr>
<td>VO₂net</td>
<td>Activity Related VO₂ - Rest</td>
</tr>
<tr>
<td>Youth MET</td>
<td>(ml/kg/min)/Child-specific RMR</td>
</tr>
<tr>
<td>Adult MET</td>
<td>3.5 ml/kg/min for all</td>
</tr>
</tbody>
</table>
Total Variance ($R^2$) Accounted for the Effect of Age, Height, Mass, and Sex Presented by Each Metric
Example of Effects of Age Dependence of the MET$_y$ on Boys Basketball

Average MET Score = 6.9

Predicted METs by Age

<table>
<thead>
<tr>
<th>Age</th>
<th>MET$_y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>5.1</td>
</tr>
<tr>
<td>11</td>
<td>7.0</td>
</tr>
<tr>
<td>16</td>
<td>8.8</td>
</tr>
</tbody>
</table>

MET$_y$ = 2.9 + 0.37*Age
Conclusion Regarding Best Unit

• No one metric is optimal, but the preferred metric appears to be: YOUTH-MET

• No metric completely took away the effects of age.
Taking Remaining Age Differences into Account

- Three approaches to accounting for age
  1. Constant value
  2. Age group values: 6-9, 10-12, 13-15, 16-18 years
  3. Age-specific values: one-year increments
- Regression to estimate error for the two methods accounting for age versus the constant value
- Calculated percent reduction in residual variance for age groups and age in years
Walk at 2 MPH
Basketball
Summary of Best Unit and Accounting for Age Differences

Youth MET: \text{MET}_y

1. In general, lowest difference scores with measured energy expenditure (EE), particularly in models where age is considered
2. Best correlations with measured EE
3. Best approach for low-intensity activities
4. Takes age-associated change with resting EE into account
5. People fundamentally understand the value
6. Closer to how Adult Compendium is organized
QUESTIONS?

Please type your question(s) in the chat box located on the right.
Youth Compendium of Physical Activities

Data Sources, Activity Codes, and Metabolic Intensities

Nancy Butte, PhD
Distinguished Emeritus Professor
Baylor College of Medicine
The Process

1. Establish the need
2. Determine the best units/metric AND determine how to represent any age factor
3. **Data sources**
4. Development of the Youth Compendium
5. Applications and limitations
Data Sources for Youth Compendium

- Conducted a systematic literature review
  - Included about 90 studies
- Pooled individual dataset
  - Used energy costs of physical activities from 933 children from four studies
- Developed Journal of Physical Activity and Health Supplement
  - Used energy costs of physical activities from 17 articles
Systematic Literature Review

- 71 studies not included in 2008 Youth Compendium
- 347 new unique mean energy costs values

<table>
<thead>
<tr>
<th>Activity Category</th>
<th>Number of mean energy cost values</th>
<th>% of total new data points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active video games</td>
<td>79</td>
<td>22.8%</td>
</tr>
<tr>
<td>Sedentary screen time</td>
<td>61</td>
<td>17.6%</td>
</tr>
<tr>
<td>Lying/sitting/standing quietly</td>
<td>44</td>
<td>12.7%</td>
</tr>
<tr>
<td>Simulated sports/games</td>
<td>39</td>
<td>11.2%</td>
</tr>
<tr>
<td>Dance/aerobics/calisthenics/gymnastics</td>
<td>27</td>
<td>7.8%</td>
</tr>
<tr>
<td>Active outdoor play</td>
<td>18</td>
<td>5.2%</td>
</tr>
<tr>
<td>Chores</td>
<td>15</td>
<td>4.3%</td>
</tr>
<tr>
<td>Reading/writing/academic pursuits</td>
<td>15</td>
<td>4.3%</td>
</tr>
<tr>
<td>Sedentary play</td>
<td>15</td>
<td>4.3%</td>
</tr>
</tbody>
</table>

Note: Remaining ~10% of activities spread across remaining activity categories
## Pooled Individual Dataset

<table>
<thead>
<tr>
<th>Activity</th>
<th>Boys (n) / Girls (n)</th>
<th>Study Site Contributing Data*</th>
<th>Age Range (y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer games</td>
<td>210 / 174</td>
<td>B,M,MS,O</td>
<td>5 – 18</td>
</tr>
<tr>
<td>Television viewing</td>
<td>235 / 216</td>
<td>B,M,NC</td>
<td>5 – 18</td>
</tr>
<tr>
<td>Light-intensity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housework</td>
<td>127 / 116</td>
<td>M,MS,O</td>
<td>5 – 16</td>
</tr>
<tr>
<td>Sweeping</td>
<td>271 / 256</td>
<td>M,MS,NC,O</td>
<td>5 – 18</td>
</tr>
<tr>
<td>Wii* Play</td>
<td>108 / 81</td>
<td>B,M</td>
<td>5 – 18</td>
</tr>
<tr>
<td>Non-weight bearing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cycling ~10 mph</td>
<td>144 / 152</td>
<td>NC</td>
<td>5 – 18</td>
</tr>
<tr>
<td>Moderate-to-vigorous intensity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerobics</td>
<td>195 / 182</td>
<td>All</td>
<td>5 – 17</td>
</tr>
<tr>
<td>Dance</td>
<td>110 / 87</td>
<td>B,M</td>
<td>5 – 18</td>
</tr>
<tr>
<td>Walk - 2 mph</td>
<td>445 / 417</td>
<td>All</td>
<td>5 – 18</td>
</tr>
<tr>
<td>Walk - 3 mph</td>
<td>443 / 426</td>
<td>All</td>
<td>5 – 18</td>
</tr>
<tr>
<td>Run - 4 mph</td>
<td>235 / 223</td>
<td>All</td>
<td>5 – 18</td>
</tr>
<tr>
<td>Run - 5 mph</td>
<td>80 / 54</td>
<td>B,M,MS,O</td>
<td>6 – 18</td>
</tr>
<tr>
<td>Skilled</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basketball</td>
<td>161 / 123</td>
<td>MS,O,NC</td>
<td>7 – 16</td>
</tr>
<tr>
<td>Rope Skipping</td>
<td>145 / 133</td>
<td>NC</td>
<td>8 – 16</td>
</tr>
</tbody>
</table>

*Working data from Baylor Medical Center (B), Michigan State University (MS), Oregon State University (O), University of Massachusetts at Boston (M), and University of North Carolina at Chapel Hill (NC)
• About 250 activities reported
• Ages range from 3-18 years
• Sample sizes vary from 11-209 participants

<table>
<thead>
<tr>
<th>Study</th>
<th>Sample Size</th>
<th>Age Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40</td>
<td>5-12</td>
</tr>
<tr>
<td>2</td>
<td>28</td>
<td>3-6</td>
</tr>
<tr>
<td>3</td>
<td>37</td>
<td>5-15</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
<td>3-6</td>
</tr>
<tr>
<td>5</td>
<td>30</td>
<td>12</td>
</tr>
<tr>
<td>6</td>
<td>27</td>
<td>9-11</td>
</tr>
<tr>
<td>7</td>
<td>24</td>
<td>10-17</td>
</tr>
<tr>
<td>8</td>
<td>105</td>
<td>7-13</td>
</tr>
<tr>
<td>9</td>
<td>28</td>
<td>10-11</td>
</tr>
<tr>
<td>10</td>
<td>36</td>
<td>9-18</td>
</tr>
<tr>
<td>11</td>
<td>119</td>
<td>3-5</td>
</tr>
<tr>
<td>12</td>
<td>53</td>
<td>9-15.5</td>
</tr>
<tr>
<td>13</td>
<td>178</td>
<td>8-18</td>
</tr>
<tr>
<td>14</td>
<td>106</td>
<td>6-18</td>
</tr>
<tr>
<td>15</td>
<td>32</td>
<td>4th-5th grade</td>
</tr>
<tr>
<td>16</td>
<td>209</td>
<td>6-18</td>
</tr>
<tr>
<td>17</td>
<td>57</td>
<td>5-12</td>
</tr>
</tbody>
</table>
The Process

1. Establish the need
2. Determine the best units/metric AND determine how to represent any age factor
3. Data sources
4. Development of the Youth Compendium
5. Applications and limitations
Development of Youth Compendium

• **Step 1.** Classification of activities into 16 major categories by age groups

• **Step 2.** Profile plots constructed for 16 major categories

• **Step 3.** Multiple imputation of missing $\text{MET}_y$ values for specific activities within each activity category

• **Step 4.** Review of observed and imputed $\text{MET}_y$ values

• **Step 5.** Smoothing observed and imputed $\text{MET}_y$ values
Youth Compendium

- $\text{MET}_y$ for 196 physical activities
  - Extracted from 137 pediatric studies
  - Included 37,000 observations
## Major Activity Categories

<table>
<thead>
<tr>
<th>Lying</th>
<th>Playing and Sports</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sitting</strong></td>
<td>• Calisthenics/gymnastics</td>
</tr>
<tr>
<td>• Quiet play/schoolwork/TV</td>
<td>• Weight lifting</td>
</tr>
<tr>
<td>• Computer games</td>
<td>• Sports/games</td>
</tr>
<tr>
<td><strong>Standing</strong></td>
<td>• Dance/aerobics/steps</td>
</tr>
<tr>
<td>• Standing</td>
<td>• Bike/scooter riding</td>
</tr>
<tr>
<td>• Housekeeping/work</td>
<td>• Active play</td>
</tr>
<tr>
<td>• Active video games (upper body)</td>
<td>• Swimming</td>
</tr>
<tr>
<td>• Active video games (full body)</td>
<td><strong>Walking and Running</strong></td>
</tr>
<tr>
<td></td>
<td>• Walking 0.5-5 mph</td>
</tr>
<tr>
<td></td>
<td>• Running 3-8 mph</td>
</tr>
</tbody>
</table>
\[ \text{MET}_y = \frac{\text{EE}_{\text{activity}}}{\text{Basal Metabolic Rate (BMR)}} \]

BMR calculated using age-, sex-, and mass-specific Schofield equations:

- **Ages 3-10 years**
  - **Boys** BMR (kcal/min) = \( \frac{[22.706 \times \text{Weight (kg)} + 504.3]}{1440} \)
  - **Girls** BMR (kcal/min) = \( \frac{[20.315 \times \text{Weight (kg)} + 485.9]}{1440} \)

- **Ages 10-18 years**
  - **Boys** BMR (kcal/min) = \( \frac{[17.686 \times \text{Weight (kg)} + 658.2]}{1440} \)
  - **Girls** BMR (kcal/min) = \( \frac{[13.384 \times \text{Weight (kg)} + 692.6]}{1440} \)
### Examples of Missing MET<sub>y</sub> Data

<table>
<thead>
<tr>
<th>Activity</th>
<th>Mean</th>
<th>5-9</th>
<th>10-12</th>
<th>13-15</th>
<th>16-18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schofield RMR (ml/kg/min)</td>
<td>4.3</td>
<td>5.3</td>
<td>4.2</td>
<td>3.8</td>
<td>3.6</td>
</tr>
<tr>
<td>Aerobics</td>
<td>3.8</td>
<td>3.6</td>
<td>3.9</td>
<td>4.1</td>
<td></td>
</tr>
<tr>
<td>Basketball</td>
<td>5.6</td>
<td>5.1</td>
<td>5.6</td>
<td>6.4</td>
<td>7.4</td>
</tr>
<tr>
<td>Cycling 8-10 mph</td>
<td>5.1</td>
<td>5.1</td>
<td>5.5</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>Computer Games</td>
<td>1.2</td>
<td>1.2</td>
<td>1.2</td>
<td>1.2</td>
<td>1.4</td>
</tr>
<tr>
<td>Dance</td>
<td>3.4</td>
<td></td>
<td>3.2</td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td>Vacuuming</td>
<td>3.5</td>
<td></td>
<td></td>
<td>3.6</td>
<td>3.3</td>
</tr>
<tr>
<td>Roller Skating</td>
<td>7.1</td>
<td>6.0</td>
<td>6.7</td>
<td>7.8</td>
<td></td>
</tr>
<tr>
<td>Sweeping</td>
<td>2.9</td>
<td></td>
<td></td>
<td>2.9</td>
<td>2.8</td>
</tr>
<tr>
<td>Television</td>
<td>1.0</td>
<td>1.0</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
</tr>
<tr>
<td>WII® Interactive Games</td>
<td>2.5</td>
<td>2.6</td>
<td>2.4</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>Walk 2 mph</td>
<td>3.1</td>
<td>2.8</td>
<td>3.2</td>
<td>3.2</td>
<td>3.0</td>
</tr>
<tr>
<td>Walk 3 mph</td>
<td>4.3</td>
<td>4.2</td>
<td>4.4</td>
<td>4.4</td>
<td>4.7</td>
</tr>
<tr>
<td>Run 4 mph</td>
<td>7.6</td>
<td>6.62</td>
<td>8.30</td>
<td>7.93</td>
<td>6.24</td>
</tr>
<tr>
<td>Run 5 mph</td>
<td>8.5</td>
<td>7.53</td>
<td>8.37</td>
<td>9.00</td>
<td>8.90</td>
</tr>
</tbody>
</table>
Imputation

• Fit linear and quadratic regression models to fit MET_y values vs. age for each activity

• Adjusted \( r^2 \) used to compare linear and quadratic regression models

• Mixed linear regression model used to impute missing values for each of 16 major activity categories
Youth Compendium

- \( \text{MET}_y \) for 196 physical activities
  - 397 observed mean \( \text{MET}_y \) values (51%)
  - 380 imputed mean \( \text{MET}_y \) values (49%)
Sitting

**QUIET PLAY/SCHOOLWORK/TELEVISION (SITTING)**

**COMPUTER/VIDEO GAMES (SITTING)**

- • = Measured
- ▲ = Imputed

<table>
<thead>
<tr>
<th>Age Group Midpoint (y)</th>
<th>6</th>
<th>9</th>
<th>12</th>
<th>15</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean MET (_g)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Play and Sports

**ACTIVE PLAY**
- Measured
- Imputed

**BIKE/SCOOTER RIDING**
- Measured
- Imputed

**CALISTHENICS/GYMNASICS and WEIGHT LIFTING**
- Measured
- Imputed

**DANCE/AEROBICS/STEPS**
- Measured
- Imputed

**SPORT/GAMES**
- Measured
- Imputed

**SWIMMING**
- Measured
- Imputed
Walking and Running

Walking 0.5 - 5 mph
Running 3 - 8 mph
Observed and Imputed MET_y Values

Model-based Smoothed MET_y Values
Observed and Imputed $\text{MET}_y$ Values

Model-based Smoothed $\text{MET}_y$ Values
Future Research

• More $\text{MET}_y$ data from different populations
  • Young children < 6 years
  • Groups differing in function/biomechanics
  • Groups of varying body mass index (BMI)

• Novel $\text{MET}_y$ data
  • Occupational activities
  • Graded activities (e.g., walking and running)

• Enhanced modeling of $\text{MET}_y$ values based on additional child characteristics, performance, context
The Youth Compendium presents MET\textsubscript{y} values for 196 activities across four age group categories.

The Youth Compendium can be used to standardize scoring and interpretation of youth physical activity data in research and public health surveillance applications.
QUESTIONS?

Please type your question(s) in the chat box located on the right.
Use of Compendium for Tracking Physical Activity in Youth

Scott Crouter, PhD, FACSM
Associate Professor of Exercise Physiology
University of Tennessee, Knoxville
The Process

1. Establish the need
2. Determine the best units/metric AND determine how to represent any age factor
3. Data sources
4. Development of the Youth Compendium
5. Applications and limitations
Overview

• Who can use the Youth Compendium
• Youth Compendium layout
• How to use
  • Age groups
  • Finding activities
  • Limitations
  • Estimates of intensity and energy expenditure
Who Can Use the Youth Compendium?

- Researchers
- State and local health departments
- Clinicians
- Educators
- Fitness professionals
- Nutritionists
- Commercial sector
Example Uses of Youth Compendium

- Summarize energy expenditure from activities reported in physical activity questionnaires
- Contribute to the design of physical activity interventions via the selection of physiologically comparable programmatic elements
- Help in the design of fitness programs
  - Activities to help meet the physical activity guidelines
  - Clinical populations and monitoring intensity
- Aid in the comparison and evaluation of school- and community-based programs and activities
Youth Compendium Resources

- **Youth Compendium of Physical Activities: Activity Codes and Metabolic Intensities** – Butte et al. 2017 MSSE (published ahead of print)

- **Online Resource**: NCCOR Youth Compendium of Physical Activities 2017  
  [nccor.org/youthcompendium](http://nccor.org/youthcompendium)
The Youth Compendium of Physical Activities provides a list of 196 common activities in which youth participate and the estimated energy cost associated with each activity. It can be used by a wide variety of people—including researchers, health care professionals, teachers and coaches, and fitness professionals—and in a variety of ways—including research, public health policy making, education, and interventions to encourage physical activity in youth.

The Youth Compendium provides energy cost values for:

- Sedentary activities, such as lying down or watching TV
- Standing, doing household chores, and playing active video games
- Playing and participating in games and sports activities
- Walking and running

The youth MET (MET_y) values in the Youth Compendium were derived from literature reviews, data analysis, and imputation (Butte et al., 2017).
Youth Compendium Coding

- Codes = 6 digits
- First 2 digits = activity category
- Next 3 digits = specific activity
- Last digit = age group
  - 2 (6-9 years), 3 (10-12 years), 4 (13-15 years), and 5 (16-18 years)

<table>
<thead>
<tr>
<th>Code</th>
<th>Activity Category</th>
<th>Specific Activity</th>
<th>Age Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 160 4</td>
<td>80 (Walking)</td>
<td>160 (Walking 2.0 mph)</td>
<td>4 (13-15 years)</td>
</tr>
</tbody>
</table>
### Active Outdoor Play

### Active Video Games (Full Body)

### Active Video Games Upper Body

### Bike/Scooter

<table>
<thead>
<tr>
<th>MET₆ Code</th>
<th>Specific Activity</th>
<th>Ages 6-9</th>
<th>Ages 10-12</th>
<th>Ages 13-15</th>
<th>Ages 16-18</th>
</tr>
</thead>
<tbody>
<tr>
<td>25100X</td>
<td>Bike Riding - Fast Speed</td>
<td>..</td>
<td>7.3</td>
<td>7.4</td>
<td>7.8</td>
</tr>
<tr>
<td>25120X</td>
<td>Bike Riding - Medium Speed</td>
<td>4.4</td>
<td>5.9</td>
<td>6.2</td>
<td>6.3</td>
</tr>
<tr>
<td>25140X</td>
<td>Bike Riding - Slow Speed</td>
<td>3.6</td>
<td>3.9</td>
<td>3.9</td>
<td>4.0</td>
</tr>
<tr>
<td>25160X</td>
<td>Mini-Scooter Riding</td>
<td>5.3</td>
<td>4.6</td>
<td>4.9</td>
<td>4.8</td>
</tr>
<tr>
<td>25180X</td>
<td>Scooter Riding</td>
<td>5.0</td>
<td>5.9</td>
<td>5.6</td>
<td>6.3</td>
</tr>
</tbody>
</table>

### Calisthenics/Gymnastics

### Computer/Video Games (Sitting)
Downloads

Data

- Table format with columns for age just as on site (MS Excel)
- “Analysis Table” – one row per Met value with age column and imputation column
- File of all References
  - Text
  - End-note

Current Papers and Reports

- Ridley et al. reports
  - Diverse activities — Report 1
  - Walking and Running — Report 2
- McMurray et al.
- Pfieffer et al paper 2
- Butte et al. paper 3
- Past Adult and Youth Compendia
  - Ridley et al. 2008
  - Ainsworth et al. 2011

Other Relevant Resources

- Schofield Equation
Overlapping Age Groups

- When possible use the appropriate age category to assign $\text{MET}_y$ value
  - Example, you have a sample of 8-11 year-olds
    - Assign 8 and 9 year-olds the 6-9 age group value and 10 and 11 year-olds the 10-12 age group value

- If this is not possible, use the average of the two age categories that apply

<table>
<thead>
<tr>
<th>$\text{MET}_y$ Code</th>
<th>Activity Category</th>
<th>Specific Activity</th>
<th>Ages 6-9</th>
<th>Ages 10-12</th>
<th>Ages 13-15</th>
<th>Ages 16-18</th>
</tr>
</thead>
<tbody>
<tr>
<td>80160x</td>
<td>Walking</td>
<td>Walk 2.0</td>
<td>2.8</td>
<td>3.0</td>
<td>3.2</td>
<td>3.4</td>
</tr>
</tbody>
</table>
Cannot Find the Right Activity

• Search for a similar activity in terms of sitting/standing or active, and use the MET\textsubscript{y} value associated with that activity
  • Example: raking leaves
    • Could use sweeping as a substitute
Limitations

- Values should be used to track movement time during an activity not total activity time.
  - 60 minutes of playing soccer versus 30 minutes on the field and 30 minutes on the sideline.
- Estimates do not account for differences in body mass, adiposity, economy of movement, age-dependent levels of skill, etc.
Use of Energy Expenditure and Intensity

- Not developed to determine precise energy cost of physical activities within an individual
- Best used to classify intensity of activities at a group level
Calculation of Energy Expenditure

Total energy cost (kcal) = $\text{MET}_y \times \text{BMR (kcal/min)} \times \text{duration (min)}$

- **Example**
  - 14 year old girl (weighs 40 kg) walking at 3 mph for 20 minutes
  - $4.3 \times \text{BMR} \times 20$
    - Where $\text{BMR} = (13.384 \times 40 \text{ kg} + 692.6)/1440 = .853$
    - $4.3 \times .853 \times 20 = 73.3 \text{ kcal}$
Funding Agencies

Division of Nutrition, Physical Activity, and Obesity

National Collaborative on Childhood Obesity Research

Department of Health & Human Services, USA

National Institutes of Health

National Cancer Institute
QUESTIONS?

Please type your question(s) in the chat box located on the right.
ONE ON ONE
FURTHER QUESTIONS?

Other questions about NCCOR or upcoming activities?

Email the NCCOR Coordinating Center

nccor@fhi360.org
NCCOR is now on Facebook!

Follow and like the page

Facebook @NCCOR.org

Follow @NCCOR
WHAT'S HAPPENING IN
NCCOR NEWS

NCCOR, The JPB Foundation strengthen alliance to support Measures Registry

NCCOR hosts National Childhood Obesity Awareness Month social media activities

NCCOR helps communities evaluate their progress in reducing childhood obesity

Healthy Communities Study findings on relationship between community policies and programs and childhood obesity

U.S. Preventive Services Task Force update on obesity screening recommendation

Connect & Explore

Upcoming Webinars
Mark your calendar for these upcoming Connect & Explore webinars!

OCT 11 Built Environment Interventions to Increase Physical Activity: Community Preventive Services Task Force Recommendations

Archived Webinars
THANK YOU!