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- All lines will be in listen-only mode
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- This webinar is being recorded
Webinar Presenters

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NCI Behavioral Research Program
1. FLASHE Goals and Overview
2. GeoFLASHE Public Use Data
3. FLASHE Imputed Survey Data
4. FLASHE Adolescent Accelerometer Data
5. Q&A
Introduction

April Oh, Ph.D., M.P.H.

Program Director
Health Communication and Informatics Research Branch
Behavioral Research Program
National Cancer Institute
What is FLASHE?

- A cross-sectional study in 2014 to assess correlates of cancer-preventive behaviors among parent-adolescent dyads
- Parents and adolescents each completed:
  - Diet-focused survey
  - Physical activity-focused survey (also including sun safety, sleep, and tobacco use items)
  - Module assessing parenting style and demographics
- Some dyads also completed an adolescent accelerometer protocol.
- Home and school neighborhood locations were geocoded in a geoFLASHE dataset released in 2018.
FLASHE Conceptual Model

- The parent/adolescent dyadic relationship is a core feature of this framework and survey, which collected data from both dyad members.
FLASHE Study Design

- Core features:
  - Dyadic design
  - Random assignment to the survey-only group or motion study group
  - The analytic database includes individual-level data sets that can be merged by dyad and participant identifiers.

This figure shows dyad-level completion rates; sample sizes vary depending on specific analyses.
## FLASHE Data User Resources at [https://cancercontrol.cancer.gov/flashe](https://cancercontrol.cancer.gov/flashe)

<table>
<thead>
<tr>
<th>Data Resource</th>
<th>Description</th>
</tr>
</thead>
</table>
| Data sets     | Diet, physical activity, and demographic survey data sets  
New GeoFLASHE dataset |
| Annotated surveys and codebook | Documentation of survey items and corresponding variable names/labels  
Separate codebook for GeoFLASHE variables |
| Construct tables | Includes sources/references for survey items |
| Methodology reports | Summarizes the study recruitment and methods |
| Data users’ guide | Describes computation and recoding of variables and statistical weights  
Separate data users’ guide for GeoFLASHE |
| Linked dyadic analysis resource page | FLASHE dyadic analysis user’s guide and code |
| Linked FLASHE theme issue information | June 2017 issue of American Journal of Preventive Medicine |
FLASHE Data Access and Resources

- Earlier webinars provide more detail on some areas of FLASHE

**Dyadic analysis webinar**
- An introduction to cross-sectional dyadic analysis
- Uses data from the FLASHE study as an example
- Pairs with the annotated dyadic analysis sample code resource

**FLASHE overview webinar**
- Describes the study design, sample sizes, and participant characteristics
- Summarizes survey constructs and outcome measures
- Highlights example published findings using FLASHE
- [https://www.youtube.com/watch?v=X0pFMBmg r0M&feature=youtu.be](https://www.youtube.com/watch?v=X0pFMBmg r0M&feature=youtu.be)
FLASHE Data Sources
(Today’s content highlighted in red and *)

Surveys (Dyads)
- Physical activity survey
  - Imputed data for 8 variables *
- Diet survey
- Demographic module

Motion Study (Adolescents)
- Accelerometer *
- Activity log
- Youth activity profile

GeoFLASHE
- Dyads’ home neighborhood *
- Adolescents’ school neighborhood *
FLASHE Data Use Highlights

- FLASHE survey data continue to be used in 2018, including in publications, conference presentations, dissertations, and theses.
- Recent FLASHE publications feature individual- and dyad-level analyses and multiple outcomes, including:
  - fruit/vegetable intake,
  - energy-dense nutrient-poor foods and sugary beverages,
  - physical activity behaviors and barriers, and
  - indoor/outdoor tanning.
- This webinar’s purpose is to highlight additional ways that the FLASHE data can be used and new opportunities for linking the earlier survey data sets with new types of data.
GeoFLASHE Public Use Data

April Oh, Ph.D., M.P.H.

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Family Life, Activity, Sun, Health and Eating (FLASHE) Study: Conceptual Framework

GeoFLASHE: A geospatial extension of FLASHE

- Community/neighborhood environment
  - Physical characteristics
  - Social characteristics

- Parent/caregiver factors
  - Parenting style and other parental attributes
  - Parent diet and physical activity behaviors

- Adolescent factors
  - Decision-making process
  - Psychosocial factors
  - Attitudes toward food and physical activity
  - Peer influence and social support

- Home environment
  - Food availability
  - Family meal times
  - Physical activity equipment accessibility
  - Screen time

- Outcomes
  - Adolescent and parent/caregiver dietary behaviors
  - Adolescent and parent/caregiver physical activity

- Correlates
  - Sun-safety
  - Sleep
  - Tobacco

Geocoded Data

- The FLASHE demographic survey asked parents two sets of open-ended questions about the location of their home and their adolescent’s school:
  - Can you tell me just the name of the street/road you live on?
  - And what is the name of the nearest cross street/road?
  - Can you tell me just the name of the street/road teen's school is on?
  - And what is the name of the nearest cross street/road?
GeoFLASHE study

- Addresses geocoded for two data sets:
  - Parent **home** addresses (n=1,736, 90.9%)
  - Adolescents’ **school** addresses (n=1,580, 82.8%)
- Inclusion criteria: individuals who reported street name
- Exclusion criteria: no response or missing, homeschooling
- Buffers were generated based on assumptions of walking 10-15 minutes at an average pace of 20 minutes/mile (Bohannon, 1997)
Methods: Circular and Street Network Buffers

- 400, 500, 750, 800, 1,000 and 1,200 meters
- Census Tract
Neighborhood Measures

- Neighborhood SES: Yost Index
- Neighborhood measures: built environment characteristics
- UV exposure measures
- Urban-rural location
- Distance from home to school
Neighborhood Calculation of Measures: Step 1

Table 1 – Example of buffer percentage calculations

<table>
<thead>
<tr>
<th>DYAD ID</th>
<th>Location</th>
<th>Buffer Type</th>
<th>Buffer Size</th>
<th>Tract</th>
<th>Buffer Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>SCHOOL</td>
<td>CIRCULAR</td>
<td>400</td>
<td>36047076600</td>
<td>11.61%</td>
</tr>
<tr>
<td>N</td>
<td>SCHOOL</td>
<td>CIRCULAR</td>
<td>400</td>
<td>36047077000</td>
<td>17.36%</td>
</tr>
<tr>
<td>N</td>
<td>SCHOOL</td>
<td>CIRCULAR</td>
<td>400</td>
<td>36047077200</td>
<td>55.68%</td>
</tr>
<tr>
<td>N</td>
<td>SCHOOL</td>
<td>CIRCULAR</td>
<td>400</td>
<td>36047077400</td>
<td>8.71%</td>
</tr>
<tr>
<td>N</td>
<td>SCHOOL</td>
<td>CIRCULAR</td>
<td>400</td>
<td>36047078600</td>
<td>5.41%</td>
</tr>
<tr>
<td>N</td>
<td>SCHOOL</td>
<td>CIRCULAR</td>
<td>400</td>
<td>36047078800</td>
<td>1.24%</td>
</tr>
</tbody>
</table>
Neighborhood Calculation of Measures: Step 2

Table 2 – Example of a weighted neighborhood variable calculation

<table>
<thead>
<tr>
<th>Tract</th>
<th>Tract % Hispanic</th>
<th>Buffer Percentage</th>
<th>Weighted % Hispanic</th>
</tr>
</thead>
<tbody>
<tr>
<td>36047076600</td>
<td>11.55%</td>
<td>11.61%</td>
<td>1.34%</td>
</tr>
<tr>
<td>36047077000</td>
<td>15.69%</td>
<td>17.36%</td>
<td>2.72%</td>
</tr>
<tr>
<td>36047077200</td>
<td>12.20%</td>
<td>55.68%</td>
<td>6.79%</td>
</tr>
<tr>
<td>36047077400</td>
<td>12.46%</td>
<td>8.71%</td>
<td>1.09%</td>
</tr>
<tr>
<td>36047078600</td>
<td>8.25%</td>
<td>5.41%</td>
<td>0.45%</td>
</tr>
<tr>
<td>36047078800</td>
<td>4.40%</td>
<td>1.24%</td>
<td>0.05%</td>
</tr>
<tr>
<td>Total % Hispanic</td>
<td></td>
<td></td>
<td>12.44%</td>
</tr>
</tbody>
</table>

\[
\frac{\sum_{i=1}^{n} M_i w_i}{n}
\]

Where \(M_i\) is the census-based measure for tract \(i\) and \(w_i\) is the buffer percentage for tract \(i\).
Neighborhood Walkability Factors

High density
- Higher population density
- More attached units (apartments)
- Fewer detached homes
- Fewer owner-occupied homes

Older homes
- More homes built before 1950
- Fewer homes built after 1970
- Earlier median year structure was built

Short commutes
- More commutes <20 minutes
- Fewer commutes by public transportation
- Lower population density
Neighborhood Socioeconomic Status (SES)

SES Domain

- Occupation
- Unemployed
- Poverty
- Income
- Education
- Housing

US Census Variable*

- % Working Class
- % Unemployed
- % Persons below 150% Poverty line
- Median HH Income
- Education Index
- Median House Value
- Median Rent


GeoFLASHE data and resources

GeoFLASHE data are neighborhood characteristics calculated for use with FLASHE survey data. These data are available for data users to merge with FLASHE survey data to conduct analyses examining neighborhood characteristics and behavior.

- Codebook (XLS)
- GeoFLASHE methods report (PDF)
- GeoFLASHE data (SPSS, SAS) – Added August 2018


FLASHE Imputed Survey Data

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Mathematical Statistician
Statistical Research and Applications Branch
Surveillance Research Program
National Cancer Institute
The Missing Data

- Due to a system error, among the 1,802 final respondents in the Parent Physical Activity Survey, 951 respondents (53%) had eight variables all missing.
  - This missingness was accounted for in the group of parents that had received the Physical Activity Survey second, after completing the Diet Survey.
  - The identified system error did not enable those parents to access the eight questions.
- Multiple imputation was used to impute the missing data for the eight variables.
  - Before imputation, we tested whether the missing data are MCAR through cross-tabs and chi-square tests of the missing-skip and parent socio-demographics. The missing-skip was dependent to parent gender and work status.
# Variables to be Imputed

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Survey question</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPFEELLOVE</td>
<td>When my teenager is an adult, he/she will feel that there are people who really love him/her</td>
</tr>
<tr>
<td>PPOTHBETTER</td>
<td>The things my teenager will do as an adult will make other people's lives better</td>
</tr>
<tr>
<td>PPGETGDGRAD</td>
<td>My teenager will get good grades in school</td>
</tr>
<tr>
<td>PPATTRACTV</td>
<td>People will often comment about how attractive my teenager looks as an adult</td>
</tr>
<tr>
<td>PPJOBPAYWL</td>
<td>When my teenager is an adult, he/she will have a job that pays well</td>
</tr>
<tr>
<td>PPHCPALIMIT</td>
<td>Has a doctor or other healthcare professional ever told you that teen has any condition that could limit his/her ability to exercise, such as obesity, asthma, diabetes, high blood pressure, etc</td>
</tr>
<tr>
<td>PPHCPASPORT</td>
<td>Do medical, behavioral or other health conditions interfere with teen's ability to participate in sports, clubs or other organized physical activities</td>
</tr>
<tr>
<td>PPHCPAOUT</td>
<td>Do medical, behavioral or other health conditions interfere with teen's ability to go on things such as the park, library, zoo, shopping, church, restaurants or family gatherings</td>
</tr>
</tbody>
</table>
Multiple Imputation Methods Considered

- **Sequential regression imputation method (SRIM),** implemented using IVEware (http://www.isr.umich.edu/src/smp/ive/), to simultaneously fill in these item missing data.
  - Imputation models include multiple linear regressions for continuous variables, logistic regressions for binary variables, and polytomous regressions for categorical variables.

- **The Cox-Iannacchione Weighted sequential hotdeck (WSHD) imputation** (Cox, 1980; Cox & Folsom, 1981), implemented using SUDAAN 11.
  - It requires defining a set of categorical variables that determine the imputation classes.
Multiple Imputation Results (n=1,802)

- Sensitivity analysis based on 10, 20, and 50 sets of multiply imputed data indicated 20 sets of multiply imputed data is reasonable.

- With 20 sets of multiply imputed data from both imputation methods, the WSHD consistently showed better results in terms of several evaluation criterion compared to those of SRIM.

- Some of the very small categories in PPFEELLOVE, PPOTHONBETTER, PPGETGDGDGRAD, and PPJOBPAYWL at the lower end of the five-point Likert Scale were collapsed to increase the cell size for imputation. Similarly, category 3 (I don’t know) for PPHCPALIMIT was collapsed with category 2.
Multiple Imputation Evaluation (n=826)

- Simulation study using the 826 respondents with fully observed data was conducted.
- Simulated data mimicking the original missing patterns was generated and was repeated 100 times.
- The WSHD resulted in a smaller percentage of relative bias and coverage rate closer to the nominal value (0.95).

- The WSHD was finally used to create 20 sets of multiply imputed data.
  - The variable _mult_ (with values from 1 to 20) is used to separate the 20 sets.

How to Analyze the Multiply Imputed FLASHE Data

Three Steps:

1. Analyze each of the 20 completed data sets separately using methods and software appropriate for FLASHE data;

2. Extract the point estimate and the estimated standard error from each analysis;

3. Combine the estimates and standard errors using Rubin’s (1987) combining rules to arrive at a single point estimate, estimated standard error, and the associated confidence interval or significant test.

Rubin’s Combining Rule:

Let $\theta$ denote the statistics of interest. Let $\theta_i$ and $U_i$ denote the point estimate and associated variance computed from the $i$ – th multiply imputed data, $i = 1, \ldots, M$. The combined point estimate for $\theta$:

$$\bar{\theta} = \frac{1}{M} \sum_{i=1}^{M} \theta_i$$

The associated variance with $\bar{\theta}$ is:

$$T = \bar{U} + \left(1 + \frac{1}{M}\right)B,$$

Where the within imputation variance $\bar{U} = \frac{1}{M} \sum_{i=1}^{M} U_i$, the between imputation variance $B = \frac{1}{M-1} \sum_{i=1}^{M} (\theta_i - \bar{\theta})^2$.

The 95% confidence interval bounds for $\bar{\theta}$ is:

$$\bar{\theta} \pm 1.96 * \sqrt{T}$$

---

Example Code Using SAS-callable SUDAAN & SAS PROC MIANALYZE

```sas
proc crosstab data=parent_imp_WSHD20
filetype=sas design=wr; nest _one_
weight wt_p_pa;
class _mult_ PPFEELLOVE_R;
table _mult_*PPFEELLOVE_R;
*print / style=nchs;
output NSUM ROWPER
SEROW/filename=imp_WSHD_wgtfreq filetype=SAS replace;
run;
/*keep only percent & stderr by _mult_**/
data imp_WSHD_wgtfreq;
set imp_WSHD_wgtfreq;
if _mult_>0 and PPFEELLOVE_R>0;
keep _mult_ PPFEELLOVE_R NSUM ROWPER SEROW;
run;
```

```sas
proc sort data=imp_WSHD_wgtfreq; by
PPFEELLOVE_R; run;

ods trace on/listing;
proc mianalyze data=imp_WSHD_wgtfreq;
  modeleffects ROWPER;
  stderr SEROW;
  by PPFEELLOVE_R;
ods output VarianceInfo=PPF_Var_MI
ParameterEstimates=PPF_Freq_MI;
run;
ods trace off;
```

Other analysis procedures may be used depending on analysis plans, but the final combining procedure should be the same.
FLASHE Adolescent Accelerometer Data

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Assistant Professor
Department of Health, Kinesiology, and Recreation
College of Health
University of Utah
Overview of Motion Study

- 561 adolescents in the accelerometer data
- Actigraph GT3X+ data from the dominant wrist over 7 days
- Accelerometers were sent and received via mail.
- Sampling rate – 100 Hz
Accelerometer Data Processing

- Actigraph GT3X+ produces both **raw** and **activity counts** data
- All data processed in 5-sec epochs

**Raw mg data**
- GGIR

**Activity Counts data**
- CrouterVA
- CrouterVM
- ChandlerVA
- ChandlerVM
## Processing Methods Used

<table>
<thead>
<tr>
<th>Cut-points</th>
<th>GGIR (mg)</th>
<th>CrouterVA</th>
<th>CrouterVM</th>
<th>ChandlerVA</th>
<th>ChandlerVM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary behavior</td>
<td>mg ≤ 32.9</td>
<td>Counts/5s ≤ 35</td>
<td>VM/5s ≤ 100</td>
<td>Counts/5s ≤ 161</td>
<td>VM/5s ≤ 305</td>
</tr>
<tr>
<td>Light</td>
<td>32.9 &lt; mg ≤ 370</td>
<td>35 &lt; Counts/5s ≤ 360</td>
<td>100 &lt; VM/5s ≤ 609</td>
<td>162 ≤ Counts/5s ≤ 529</td>
<td>306 ≤ VM/5s ≤ 817</td>
</tr>
<tr>
<td>Moderate</td>
<td>370 &lt; mg ≤ 707.0</td>
<td>360 &lt; Counts/5s ≤ 1129</td>
<td>609 &lt; VM/5s ≤ 1809</td>
<td>530 ≤ Counts/5s ≤ 1461</td>
<td>818 ≤ VM/5s ≤ 1968</td>
</tr>
<tr>
<td>Vigorous</td>
<td>mg &gt; 707.0</td>
<td>Counts/5s &gt; 1129</td>
<td>VM/5s &gt; 1809</td>
<td>Counts/5s ≥ 1462</td>
<td>VM/5s ≥ 1969</td>
</tr>
</tbody>
</table>
4 Processed Data Sets to be Released

1. Least processed variables
2. Crouter variables (+ Least processed variables)
3. Chandler variables (+ Least processed variables)
4. GGIR variables (+ Least processed variables)
1. Least processed variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>AccID</td>
<td>Accelerometer ID</td>
</tr>
<tr>
<td>pid</td>
<td>Participants’ ID</td>
</tr>
<tr>
<td>timestamp</td>
<td>Time stamps from accelerometers</td>
</tr>
<tr>
<td>Date</td>
<td>Date information extracted from “timestamp”</td>
</tr>
<tr>
<td>dayofyear</td>
<td>A numeric variable indicating a specific day in a year (e.g., 1 for Jan 1st, 365 for Dec 31st)</td>
</tr>
<tr>
<td>Time</td>
<td>Time information extracted from “timestamp”</td>
</tr>
<tr>
<td>minofday</td>
<td>A numeric variable indicating a specific minute in a day (e.g., 0 for midnight, 1 for 00:01:00, and 2 for 00:02:00, etc.)</td>
</tr>
<tr>
<td>Axis1</td>
<td>Activity counts from Axis 1</td>
</tr>
<tr>
<td>Axis2</td>
<td>Activity counts from Axis 2</td>
</tr>
<tr>
<td>Axis3</td>
<td>Activity counts from Axis 3</td>
</tr>
<tr>
<td>VectorMagnitude</td>
<td>Vector Magnitudes</td>
</tr>
<tr>
<td>Lux</td>
<td>Lux</td>
</tr>
<tr>
<td>ENMO_average</td>
<td>An average value of ENMO during the 1-minute period; ENMO is a composite score of three axes based on raw acceleration data</td>
</tr>
<tr>
<td>Timezone_difference</td>
<td>Timezone difference in hours</td>
</tr>
</tbody>
</table>
## 2. Crouter variables (+ Least processed variables)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crouter_SED_VA</td>
<td>A proportion of the corresponding minute defined as sedentary time using Crouter’s vertical axis cut-points (e.g., 0.5 indicates that 30 seconds of the 1 minute period were considered sedentary)</td>
</tr>
<tr>
<td>Crouter_LPA_VA</td>
<td>A proportion of the corresponding minute defined as light PA time using Crouter’s vertical axis cut-points</td>
</tr>
<tr>
<td>Crouter_MVPA_VA</td>
<td>A proportion of the corresponding minute defined as MVPA time using Crouter’s vertical axis cut-points</td>
</tr>
<tr>
<td>Crouter_MPA_VA</td>
<td>A proportion of the corresponding minute defined as moderate PA time using Crouter’s vertical axis cut-points</td>
</tr>
<tr>
<td>Crouter_VPA_VA</td>
<td>A proportion of the corresponding minute defined as vigorous PA time using Crouter’s vertical axis cut-points</td>
</tr>
<tr>
<td>Crouter_SED_VM</td>
<td>A proportion of the corresponding minute defined as sedentary time using Crouter’s vector magnitude cut-points</td>
</tr>
<tr>
<td>Crouter_LPA_VM</td>
<td>A proportion of the corresponding minute defined as light PA time using Crouter’s vector magnitude cut-points</td>
</tr>
<tr>
<td>Crouter_MVPA_VM</td>
<td>A proportion of the corresponding minute defined as MVPA time using Crouter’s vector magnitude cut-points</td>
</tr>
<tr>
<td>Crouter_MPA_VM</td>
<td>A proportion of the corresponding minute defined as moderate PA time using Crouter’s vector magnitude cut-points</td>
</tr>
<tr>
<td>Crouter_VPA_VM</td>
<td>A proportion of the corresponding minute defined as vigorous PA time using Crouter’s vector magnitude cut-points</td>
</tr>
</tbody>
</table>
### 3. Chandler variables (+ Least processed variables)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chandler_SED_VA</td>
<td>A proportion of the corresponding minute defined as sedentary time using Chandler’s vertical axis cut-points</td>
</tr>
<tr>
<td>Chandler_LPA_VA</td>
<td>A proportion of the corresponding minute defined as light PA time using Chandler’s vertical axis cut-points</td>
</tr>
<tr>
<td>Chandler_MVPA_VA</td>
<td>A proportion of the corresponding minute defined as MVPA time using Chandler’s vertical axis cut-points</td>
</tr>
<tr>
<td>Chandler_MPA_VA</td>
<td>A proportion of the corresponding minute defined as moderate PA time using Chandler’s vertical axis cut-points</td>
</tr>
<tr>
<td>Chandler_VPA_VA</td>
<td>A proportion of the corresponding minute defined as vigorous PA time using Chandler’s vertical axis cut-points</td>
</tr>
<tr>
<td>Chandler_SED_VM</td>
<td>A proportion of the corresponding minute defined as sedentary time using Chandler’s vector magnitude cut-points</td>
</tr>
<tr>
<td>Chandler_LPA_VM</td>
<td>A proportion of the corresponding minute defined as light PA time using Chandler’s vector magnitude cut-points</td>
</tr>
<tr>
<td>Chandler_MVPA_VM</td>
<td>A proportion of the corresponding minute defined as MVPA time using Chandler’s vector magnitude cut-points</td>
</tr>
<tr>
<td>Chandler_MPA_VM</td>
<td>A proportion of the corresponding minute defined as moderate PA time using Chandler’s vector magnitude cut-points</td>
</tr>
<tr>
<td>Chandler_VPA_VM</td>
<td>A proportion of the corresponding minute defined as vigorous PA time using Chandler’s vector magnitude cut-points</td>
</tr>
</tbody>
</table>
## 4. GGIR variables (+ Least processed variables)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>GGIR_SED_ENMO</td>
<td>A proportion of the corresponding minute defined as sedentary time using ENMO cut-points</td>
</tr>
<tr>
<td>GGIR_LPA_ENMO</td>
<td>A proportion of the corresponding minute defined as light PA time using ENMO cut-points</td>
</tr>
<tr>
<td>GGIR_MVPA_ENMO</td>
<td>A proportion of the corresponding minute defined as MVPA time using ENMO cut-points</td>
</tr>
<tr>
<td>GGIR_MPA_ENMO</td>
<td>A proportion of the corresponding minute defined as moderate PA time using ENMO cut-points</td>
</tr>
<tr>
<td>GGIR_VPA_ENMO</td>
<td>A proportion of the corresponding minute defined as vigorous PA time using ENMO cut-points</td>
</tr>
</tbody>
</table>
Research Paper Using Accelerometer Data

Surveillance of Youth Physical Activity and Sedentary Behavior With Wrist Accelerometry

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Comparison of Raw vs. Counts Data

- Actigraph GT3X+ monitor on the **wrist** over 7 days
- Actigraph GT3X+ produces both raw and activity counts data

![Diagram](https://via.placeholder.com/150)

## Processing Methods Used

<table>
<thead>
<tr>
<th>Cut-points</th>
<th>Raw data</th>
<th>Activity counts data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GGIR (mg)</td>
<td>CrouterVA</td>
</tr>
<tr>
<td>Sedentary behavior</td>
<td>mg ≤ 32.9</td>
<td>Counts/5s ≤ 35</td>
</tr>
<tr>
<td>Light</td>
<td>32.9 &lt; mg ≤ 370</td>
<td>35 &lt; Counts/5s ≤ 360</td>
</tr>
<tr>
<td>Moderate</td>
<td>370 &lt; mg ≤ 707.0</td>
<td>360 &lt; Counts/5s ≤ 1129</td>
</tr>
<tr>
<td>Vigorous</td>
<td>mg &gt; 707.0</td>
<td>Counts/5s &gt; 1129</td>
</tr>
</tbody>
</table>
Data reduction

- 628 ActiGraph data files received
  - 14 no activity counts
  - 2 system errors from GGIR
  - 110 with no demographic information
  - 94 with wear time <10 hours/day on ≥4 days
- **408 adolescents** in the analyses

## Results

<table>
<thead>
<tr>
<th>Min/Day</th>
<th>Sex</th>
<th>GGIR</th>
<th>CrouterVA</th>
<th>CrouterVM</th>
<th>ChandlerVA</th>
<th>ChandlerVM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sedentary Behavior</strong></td>
<td>Boys</td>
<td>647.0</td>
<td>566.1</td>
<td>536.9</td>
<td>703.4</td>
<td>668.1</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>645.6</td>
<td>561.3</td>
<td>533.2</td>
<td>697.1</td>
<td>658.2</td>
</tr>
<tr>
<td><strong>MVPA</strong></td>
<td>Boys</td>
<td>12.4</td>
<td>107.5</td>
<td>123.4</td>
<td>52.8</td>
<td>65.1</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>8.4</td>
<td>106.5</td>
<td>129.0</td>
<td>51.2</td>
<td>68.8</td>
</tr>
</tbody>
</table>


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## Results

### Raw data

<table>
<thead>
<tr>
<th>Min/Day</th>
<th>Age (yrs)</th>
<th>GGIR</th>
<th>CrouterVA</th>
<th>CrouterVM</th>
<th>ChandlerVA</th>
<th>ChandlerVM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary Behavior</td>
<td>12-14</td>
<td>635.6</td>
<td>551.0</td>
<td>518.6</td>
<td>691.6</td>
<td>651.6</td>
</tr>
<tr>
<td></td>
<td>15-17</td>
<td>657.1</td>
<td>576.4</td>
<td>551.6</td>
<td>708.9</td>
<td>674.7</td>
</tr>
</tbody>
</table>

### Activity counts data

<table>
<thead>
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<th>Age (yrs)</th>
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### MVPA

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<thead>
<tr>
<th>Min/Day</th>
<th>Age (yrs)</th>
<th>GGIR</th>
<th>CrouterVA</th>
<th>CrouterVM</th>
<th>ChandlerVA</th>
<th>ChandlerVM</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-14</td>
<td>12.8</td>
<td>114.0</td>
<td>134.4</td>
<td>57.4</td>
<td>73.3</td>
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</tr>
<tr>
<td>15-17</td>
<td>8.0</td>
<td>100.0</td>
<td>117.9</td>
<td>46.6</td>
<td>60.7</td>
<td></td>
</tr>
</tbody>
</table>


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## Results

<table>
<thead>
<tr>
<th>Min/Day</th>
<th>Weight Status</th>
<th>GGIR</th>
<th>CrouterVA</th>
<th>CrouterVM</th>
<th>ChandlerVA</th>
<th>ChandlerVM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary Behavior</td>
<td>NW</td>
<td>646.3</td>
<td>565.2</td>
<td>537.0</td>
<td>700.6</td>
<td>664.2</td>
</tr>
<tr>
<td>OW/OB</td>
<td>646.4</td>
<td>562.1</td>
<td>533.2</td>
<td>699.9</td>
<td>662.0</td>
<td></td>
</tr>
</tbody>
</table>

**MVPA**

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<tr>
<th></th>
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<tbody>
<tr>
<td>NW</td>
<td>11.2</td>
<td>9.7</td>
</tr>
<tr>
<td>OW/OB</td>
<td>107.1</td>
<td>107.0</td>
</tr>
</tbody>
</table>


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References


- Family Life, Activity, Sun, Health, and Eating (FLASHE) Study Methodology Report.
Questions?

Linda Nebeling, Ph.D., M.P.H., R.D.
Deputy Associate Director
Behavioral Research Program
National Cancer Institute
Thank you!

- For questions about FLASHE, please contact: nciflashe@nih.gov

- To receive information about future FLASHE data releases, sign up for the NCI Behavioral Research Program’s e-newsletter: https://cancercontrol.cancer.gov/brpsubscribe

- Follow us on Twitter: @NCIBehaviors

- Today’s webinar and list of Q&As (asked both leading up to and following the webinar) will be posted online: https://cancercontrol.cancer.gov/brpwebinars
Appendix

- Is there a list of FLASHE projects or publications?
  - Email nciflashe@nih.gov for general information, questions about a specific topic area, or a pdf FLASHE publication list.

- 2018 FLASHE publications:
  
  Physical Activity:
  
  
Appendix

Diet:


- Cho D, Kim S. Interplay between self-efficacy and perceived availability at home and in the school neighborhood on adolescents’ fruit and vegetable intake and energy-dense, low-nutrient food and sugary drink consumption. J Nutr Educ Behav. 2018; 50(9):856-867.


Tanning:

Appendix

Dyadic:


Methods: