Data in Motion: Measuring Physical Activity Using Population-Based Data

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Agenda

• General Description of CA BRFSS
• History of CA BRFSS Physical Activity Questions
• Interactive Physical Activity Data Collection
• Physical Activity Break
• SAS Code for Physical Activity Questions
• Create Variables for Meeting/Not Meeting Physical Activity Guidelines
• Data Collection Results and Prevalence of Physical Activity Nationally and in CA
• Questions
California Behavioral Risk Factor Surveillance System (BRFSS)

- Part of the national BRFSS, which is the largest continuously conducted telephone health survey in the world
- Enables tracking of behaviors related to chronic diseases, injuries and death
- Coordinated by the Centers for Disease Control and Prevention, and the California Department of Public Health
How are the BRFSS data used?

- Identify differences in health behaviors and outcomes
- Measure trends
- Design and monitor public health and healthcare programs and services
- Formulate policy and propose legislation for health initiatives
- Measure progress toward achieving state and national health objectives
History of CA BRFSS Physical Activity Questions

- Physical activity data has been collected since 1984.
- Not all questions were asked each year.
- In CA, state-added questions on physical activity were included, in addition to national modules, in some years.
History of CA BRFSS Physical Activity Questions (continued)

  - During the past MONTH, did you participate in any PHYSICAL ACTIVITIES or EXERCISES such as running, calisthenics, golf, gardening or walking for exercise?
  - What type of physical activity or exercise?
    - How many minutes or hours?
    - How many times per week or per month?
- 1984-2000
  - How far did you usually jog, run, swim, or walk?
History of CA BRFSS Physical Activity Questions (continued)

- 2001-2010
  - In a usual week, do you do moderate activities for at least 10 minutes at a time?
  - In a usual week, do you do vigorous activities for at least 10 minutes at a time?
    - How many days per week and for how long?

- 2011-2013
  - How many times per week or per month did you do physical activities or exercises to strengthen your muscles?
History of CA BRFSS Physical Activity Questions

• In 2011, physical activity variables were calculated using activity Metabolic Equivalent Task (MET) values, which are physiological measures of the amount of energy the body uses during physical activity.
• MET values are calculated by age, gender, physical activity status and type of physical activity.
Web-based Data Collection

- Allows data collection at community-based sites where other methods (random-digit-dial, online via email invitation) wouldn’t be as useful
- Can collect data using Smartphones, tablets, computers, or other web-enabled device
- Programmed surveys assure that skip patterns are followed
- Platform allows programming of multiple languages in same survey
- Technology motivates some to participate in the survey
Web-based Data Collection – Technology

- Secure transmission of data collected (HTTPS)
- Session ID variable protects survey participants from seeing other participants' data
- All data is locally stored on in-house SRG servers, with physical and electronic safeguards
- Surveys can be controlled (closed) or open (like the one you’ll do today)
- Option to complete a survey later
Data Collection Activity

• To access the survey, you can use this secure URL:
  https://s.phi.org
• Or this shortcut, which redirects to the secure URL:
  s.phi.org
• Survey is completely anonymous
Physical Activity Break: Instant Recess
Calculated Variables from Physical Activity Questions

- Physical activity questions are used to create numerous calculated (aka constructed) variables.
- SAS code created by the Centers for Disease Control and Prevention has been adapted to use CA BRFSS data.¹

¹http://www.cdc.gov/brfss/data_documentation/statistic_brief.htm
The coding is done in this order:

1. Calculate **Metabolic Equivalent Task** (MET) values
2. Create variable for minutes and total **vigorous and/or moderate activity per week**
3. Assign physical activity level (**highly active > inactive**)
4. Calculate **frequency and total physical activity per week**
5. Create variable to indicate if meets 150+ mins (or vigorous equivalent) of **physical activity recommendation**
6. Create a variable to indicate if meets 2 or more muscle strengthening exercises per week.
7. Create variable to indicate if meets **physical activity aerobic and strengthening recommendation**
Physical Activity SAS Code: Create MET Values

• MET values are assigned based on the intensity of the activities mentioned during the survey.
• This example of the SAS code shows activities being converted to METs.
  o IF EXRACT01 IN (34,60,67,69) THEN METVAL1_ =0;
    • Pilates (34), Tai Chi (60), Weight Lifting (67), Yoga (69) = Zero METs
    • These are not considered Aerobic Activities
  o IF EXRACT01 IN (23,29,30,38,62) THEN METVAL1_ =8;
    • Hockey (23), Lacrosse (29), Mountain Climbing (30), Rock Climbing (38), Touch Football (62) = 8 METs
Physical Activity SAS Code: Moderate or Vigorous

• Age-Gender Maximum Oxygen Consumption And Functional Capacity.
  - The maximum amount of oxygen the body can use during a specified period of usually intense exercise that depends on body weight and the strength of the lung

• Relative Intensity: Vigorous, Moderate, Light/Not Aerobic
  - Vigorous Activity = > 6 METS
  - Moderate Activity = Approx. 3-6 METS*
  - Light/Not Aerobic = Approx. <3 METS
Physical Activity SAS Code: Moderate or Vigorous (continued)

- What do you think is the intensity level for each of these activities?
  - **Skating-Ice or Roller?**
    - 7.0 METS → Vigorous Activity
  - **Snorkeling?**
    - 5.0 METS → Moderate Activity
  - **Weight Lifting?**
    - 3.5 METS → Light/Not Aerobic Activity
  - **Handball?**
    - 12.0 METS → Vigorous Activity
  - **Mowing Lawn?**
    - 5.5 METS → Moderate Activity
Physical Activity SAS Code: Total Mins. Per Week Aerobic Activity

- Total minutes of aerobic physical activity per week is calculated using:
  - Duration (minutes) of activity(s)
  - Frequency of activity(s) per week
- Minutes of vigorous activity per week using the activities MET value calculated
- Weekly frequency of strength training exercise calculated
Physical Activity SAS Code: Levels of Activity

• Highly active, active, insufficiently active, inactive are determined by:
  o Any physical activity
  o Minutes of physical activity per week
  o Minutes of vigorous activity per week
    • Highly Active = More than 300 minutes per week or 150 minutes of vigorous per week
    • Active = Less than 300 minutes but more than 150 minutes per week
    • Insufficiently Active = Less than 150 minutes per week but more than 1 minute per week
    • Inactive = Less than 1 minute per week
Physical Activity SAS Code: Meeting Aerobic Recommendations

- CDC recommends\(^1\) that adults engage in:
  - 150 minutes of moderate aerobic activity every week and 2 days of muscle strengthening OR
  - 75 minutes of vigorous aerobic activity every week and 2 days of muscle strengthening OR
  - Combination of both moderate or vigorous aerobic activity every week and 2 days of muscle strengthening

\(^{1}\)http://www.cdc.gov/physicalactivity/everyone/guidelines/adults.html
Physical Activity SAS Code: Guidelines

- **Aerobic guidelines:**
  - Total minutes of activity per $\geq 150$

- **Strength guidelines:**
  - Total days of muscle strengthening $\geq 2$

- **Meeting both guidelines:**
  - Met aerobic and strength guidelines
  - Met aerobic but not strength
  - Met aerobic guidelines only
  - Did not meet aerobic but met strength
  - Did not meet any guidelines
Data Collection Results:

• 100% Participated in Physical Activity during the last month
• Level of Activity
  o 16.7% highly active
  o 25% active
  o 16.7% insufficiently active
  o 41.7% inactive
• 58.3% Met Aerobic Recommendations
• 66.7% Met Muscle Strengthening Recommendations
• 25% Met Both Guidelines
**Prevalence of Physical Activity:**

**Participated in Physical Activity During the Past Month**

<table>
<thead>
<tr>
<th></th>
<th>National 2011</th>
<th>California 2011</th>
<th>ALR Workshop Participants 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>73.8%</td>
<td>80.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>No</td>
<td>26.2%</td>
<td>24.7%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Workshop participants have a higher prevalence of physical activity participation than California and the Nation as a whole.
Workshop participants have a higher prevalence of participation in muscle strengthening exercises than California and the Nation as a whole.
Prevalence of Physical Activity: Meet 150 Mins or More Aerobic Physical Activity Per Week Recommendation

Workshop participants have a higher prevalence of meeting the aerobic recommendation than California and the Nation as a whole.
Prevalence of Physical Activity: Met Both Aerobic and Muscle Strengthening Exercise Guidelines

Workshop participants have a higher prevalence of meeting both the aerobic and muscle strengthening recommendation than California and the Nation as a whole.
Summary

• Possible to collect data via web-enabled devices in a community based setting, such as this workshop
• Described SAS code to create constructed variable that measure whether a population is meeting CDC’s physical activity guidelines
• Compared your physical activity habits to the nation and California
Questions?
Acknowledgements

- Centers for Disease Control and Prevention
- Active Living Research Conference
- ALR Workshop Participants
Thank you!

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