The Effects of Young Adults Eating and Active for Health (YEAH): a Theory Based Web-Delivered Intervention

Kendra Kattelmann, PhD, RDN, LN, FAND
Gemechis Djira, PhD
South Dakota State University
Session Objectives

✓ Understand the research design of Project YEAH.
✓ Develop an appreciation for the methods used to analyze large data sets and provide suggestions on where to start.
✓ Understand the advantages of using Mixed Methods in SAS for repeated measures analysis of variance for large data sets.
Location of the research
Why concerned about young adults?
Using the PRECEDE-PROCEED Health Program Planning Model for Obesity Prevention Among Young Adults
Figure 1. Phases of the Precede-Proceed Model as outlined by Green LW, & Kreuter MW, Health Program Planning, 4th ed., N.Y.: McGraw-Hill, 2005, Ch.1
Figure 1. Phases of the Precede-Proceed Model as outlined by Green LW, & Kreuter MW, *Health Program Planning*, 4th ed., N.Y.: McGraw-Hill, 2005, Ch.1
Young Adult Obesity Prevention Intervention

- Healthful Eating
- Environmental Supports
- Effective Stress Management
- Physical Activity/Exercise
**Description of intervention**

- 10 week, theory based, web-delivered intervention with 10 month follow-up
- Focused on constructs of:
  - healthful eating behaviors
  - physical activity
  - coping with stress
Description cont.

- Intervention group
  - staged for readiness to change for 3 behavior contracts
  - received weekly stage-tailored email “nudges” with short videos on healthful diet, physical activity, and coping with stress
  - were encouraged to visit website for new mini module “Activities” providing information on the 3 topics
  - encouraged to set weekly goals and review
- Website active for follow-up—continue to receive
Nudges

- Brief, stage-based, focused on 3 constructs
- Developed with input from target audience
- 3 messages/week reinforced content from mini-module “Activities” and a fourth message reminded to access the website during 10 week intervention
- 4 messages/month during follow up (3 stage-based and one reminder)
- Linked to a short video to capture attention
Y.E.A.H. Activities

Welcome to the activities page of Y.E.A.H. In the activities you will discover many things that will help you eat healthy, manage stress, and add physical activity.

The **Eating Activities** will help you to eat healthy and regularly, plan and prepare meals, eat a variety of foods, enjoy eating and identify hunger and fullness signals and be an “in tune” eater.

The **Exercise Activities** will help you to learn why physical activity is important, how to move your way, and how to stay active and have fun.

The **Stress Activities** will help you to define mindless eating, connect mind and body, learn time management, get a better night’s rest, and balance alcohol, friends, and classes.

The **My Healthy Weight** activities will help you learn about size acceptance, improve your healthy eating, and add physical activity to your schedule.
Eating Activities

Welcome to the YEAH activities on eating healthy. These activities will help you learn how to:

- Eat healthy
- Eat regularly
- Plan and prepare meals
- Enhance food variety
- Enjoy eating
- Identify hunger and fullness signals
- Identify factors that affect “in tune” eating

Being a healthy eater helps you feel healthier overall and lowers your risk for chronic disease. There are short quizzes and helpful links within each activity to help you become a healthier eater.
Exercise Activities

Welcome to the YEAH activities on exercise. Being physically active can help you manage stress, concentrate better in the classroom, have more energy, get a better night’s sleep, and prevent chronic diseases. In these activities you will discover...

- Why physical activity is important
- How to move your way
- How to Have fun and while staying fit
- Fitness Finesse

There are short quizzes and helpful links within each activity to help you become more physically active.
Stress Activities

Welcome to the YEAH activities on stress. Stress affects each one of us in different ways. These activities will help you to manage stress in your life by:

- Defining mindless eating
- Connecting your mind and body
- Teaching time management
- Getting a better night’s rest
- Balancing alcohol, friends, and classes

Managing stress can help you sleep better, have more time for the activities you enjoy, and lower your risk for chronic disease. There are short quizzes and helpful links within each activity to help you learn how to manage stress.
Managing Your Weight

Welcome to the YEAH activities on managing weight. In these activities you will learn about:

- Size acceptance
- Tips for managing your weight

Accepting your body type can help to reduce stress, manage your weight better, and accept others’ body types. Managing weight will help to reduce stress and may prevent chronic diseases like diabetes and high blood pressure. There are quick quizzes and additional information links within each activity to help you manage your weight.
Try something new this week!

Size acceptance is shown in a variety of ways.

- Think about your body as a tool, how efficient it is and the things you can do with it.
- Try doing something that shows you don’t prejudge people based on their size.
- Make a closet inventory. Do you wear clothes to hide your body or just to be in style?

Find out more, visit:

- Body Image Questionnaire: How to Love Your Body and Yourself
REMEMBER...

If you have not set a goal this week visit My Comparison and set a goal.

- Set a Goal Now.
- I do not want to Set a Goal Now. Take me to the Homepage.
## Outcomes

<table>
<thead>
<tr>
<th>Primary</th>
<th>Secondary</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ BMI</td>
<td>✓ Waist circumference</td>
</tr>
<tr>
<td>✓ Weight</td>
<td></td>
</tr>
<tr>
<td>✓ Fruit &amp; vegetable intake</td>
<td>✓ Fat, whole grain, and sweetened beverage intake</td>
</tr>
<tr>
<td></td>
<td>✓ Food self-regulation and instruction</td>
</tr>
<tr>
<td></td>
<td>✓ Weight related eating behaviors</td>
</tr>
<tr>
<td>✓ Minutes of physical activity</td>
<td>✓ Physical activity related behaviors</td>
</tr>
<tr>
<td>✓ Coping with stress</td>
<td>✓ Hours of sleep</td>
</tr>
</tbody>
</table>

Measurements conducted baseline, post intervention, and post follow-up.
So now I have the data data—what do I do with it?

- Calculate the variables i.e. cups fruit and vegetable, minutes of physical activity.

- Assess for outliers

- Check for normality and if necessary transform non-normal continuous prior to analysis
Baseline assessment

✓ Sample was stratified to experimental or control group by location and gender.

✓ Determined if differences in outcome variables
  ✓ One-way analysis of variance for continuous variables
  ✓ Chi-square analysis for categorical variables
Table 1. Comparison of Project YEAH Experimental and Control Study Participants at Baseline

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Control (n=815)</th>
<th>Experimental (n=824)</th>
<th>Total (n=1639)</th>
<th>p*</th>
<th>Completers (n=973)</th>
<th>Non-completers (n=666)</th>
<th>p#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment Group Assignment, %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completers</td>
<td>51.1</td>
<td>49.1</td>
<td></td>
<td>0.348</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-completers</td>
<td>48.9</td>
<td>50.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEMOGRAPHICS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (mean ±SD)</td>
<td>19.3±1.1</td>
<td>19.4±1.1</td>
<td>19.3±1.1</td>
<td>0.415</td>
<td>19.3±1.1</td>
<td>19.4±1.1</td>
<td>0.269</td>
</tr>
<tr>
<td>Year in School, %</td>
<td></td>
<td></td>
<td></td>
<td>0.987</td>
<td></td>
<td></td>
<td>0.079</td>
</tr>
<tr>
<td>1st year students</td>
<td>38.3</td>
<td>38.2</td>
<td>38.3</td>
<td></td>
<td>37.9</td>
<td>38.8</td>
<td></td>
</tr>
<tr>
<td>2nd year students</td>
<td>34.8</td>
<td>35.0</td>
<td>34.9</td>
<td></td>
<td>35.3</td>
<td>34.3</td>
<td></td>
</tr>
<tr>
<td>3rd year students</td>
<td>25.2</td>
<td>24.8</td>
<td>25.0</td>
<td></td>
<td>25.5</td>
<td>24.3</td>
<td></td>
</tr>
<tr>
<td>4th year students</td>
<td>1.7</td>
<td>1.9</td>
<td>1.8</td>
<td></td>
<td>1.2</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>Female, %</td>
<td>67.3</td>
<td>67.1</td>
<td>67.2</td>
<td>0.955</td>
<td>70.4</td>
<td>60.7</td>
<td>0.001</td>
</tr>
<tr>
<td>Race, %</td>
<td></td>
<td></td>
<td></td>
<td>0.301</td>
<td></td>
<td></td>
<td>0.095</td>
</tr>
<tr>
<td>White</td>
<td>70.2</td>
<td>74.0</td>
<td>72.1</td>
<td></td>
<td>73.7</td>
<td>69.3</td>
<td></td>
</tr>
<tr>
<td>African-American/Black</td>
<td>13.0</td>
<td>13.2</td>
<td>13.1</td>
<td></td>
<td>12.3</td>
<td>14.3</td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>11.1</td>
<td>7.7</td>
<td>9.4</td>
<td></td>
<td>9.1</td>
<td>10.1</td>
<td></td>
</tr>
<tr>
<td>Native Hawaiian/Pacific Islander</td>
<td>0.7</td>
<td>0.4</td>
<td>0.5</td>
<td></td>
<td>0.4</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>American Indian</td>
<td>0.7</td>
<td>0.8</td>
<td>0.7</td>
<td></td>
<td>0.3</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>4.4</td>
<td>3.8</td>
<td>4.1</td>
<td></td>
<td>4.1</td>
<td>4.1</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>6.4</td>
<td>5.0</td>
<td>5.7</td>
<td>0.130</td>
<td>5.7</td>
<td>4.7</td>
<td>0.603</td>
</tr>
<tr>
<td>Residence Location, %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.192</td>
</tr>
<tr>
<td>On Campus</td>
<td>72.6</td>
<td>75.1</td>
<td>73.8</td>
<td></td>
<td>74.1</td>
<td>73.6</td>
<td>0.850</td>
</tr>
<tr>
<td>Off Campus</td>
<td>24.8</td>
<td>20.9</td>
<td>22.8</td>
<td></td>
<td>22.6</td>
<td>23.1</td>
<td></td>
</tr>
<tr>
<td>Never Used Cigarettes, %</td>
<td>69.3</td>
<td>69.1</td>
<td>69.2</td>
<td>0.435</td>
<td>71.7</td>
<td>65.6</td>
<td>0.006</td>
</tr>
<tr>
<td>Never Used Smokeless Tobacco, %</td>
<td>94.0</td>
<td>92.6</td>
<td>93.3</td>
<td></td>
<td>93.9</td>
<td>92.3</td>
<td>0.248</td>
</tr>
<tr>
<td>Fruit and Vegetable Intake ≥ 5 cups/day, %</td>
<td>11.5</td>
<td>11.5</td>
<td>11.5</td>
<td>0.956</td>
<td>11.4</td>
<td>11.7</td>
<td>0.075</td>
</tr>
<tr>
<td>Meeting Physical Activity Recommendations, %</td>
<td>82.2</td>
<td>80.8</td>
<td>81.5</td>
<td>0.703</td>
<td>81.2</td>
<td>82.0</td>
<td>0.352</td>
</tr>
</tbody>
</table>
Testing hypothesis

- To determine differences between experimental and control outcome variables

- Repeated measures analysis using mixed models (PROC MIXED) in SAS
  - Conducted on sample who completed physical assessments at baseline and follow-up
  - Missing data points
Unique abilities of mixed model

- Characterize group and individual behavior patterns in a formal way
- Acknowledge both group and individual differences
- Incorporate additional covariates
- Accommodate a dataset with a large portion missing
Methods of modeling repeated measures data:

i. Classical methods (e.g., univariate ANOVA)

ii. Response profile analysis

iii. Linear mixed effects model
Analysis Methods ...

- We employed **response profile analysis**
  - Imposes minimal structure on the mean response over time and the covariance among the repeated measures.
  - Appropriate covariance structure selected via information criteria.
PROC MIXED procedure of SAS is flexible and has a number of options for modeling repeated measures data.

Publication:

Acknowledgements

• Project Y.E.A.H. funded by National Research Initiative Grant 2009-55215-05460 USDA/NIFA

• Contact information:
  kendra.kattelmann@sdstate.edu
  Gemechis.djira@sdstate.edu

• Principal Investigators and graduate students from Health Communities Research Consortium (NC 1193 Multistate team).
Research Partners

- Kendra Kattelmann, SD State Univ, Educ & Res
- Adrienne White, U of Maine, Educ & Research
- Sarah Colby, U of Tennessee, Educ & Research
- Geoff Greene, U of Rhode Island, Educ & Res
- Tanya Horacek, Syracuse Univ, Educ & Res
- Carol Byrd-BredBenner, U of NJ, Extension & Res
- Tandaylo Kidd, Kansas State U, Extension & Res
- Susan Nitzke, U of Wis, Retired Extension & Res
- Sharon Hoerr, Michigan State U, Educ & Res
- Beatrice Phillips, Tuskegee U, Educ & Res
- Onikia Brown, Purdue U (now at Auburn), Educ & Res
- Melissa Olfert, U of West Virginia, Educ & Res
- Karla Shelnutt, U of Florida, Ext & Res
- Jesse Morrill, U of New Hampshire, Educ & Res