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

We will begin at 4:05 to allow participants time to join the webinar.
1. Spotlight: Innovations in Behavioral Design to Enhance Active Living and Healthy Eating
   • NCCOR Behavioral Design Overview
   • School Design Strategies to Promote Physical Activity
   • Cafeteria Assessment for Elementary Schools
   • Behavioral Design Updates

2. One on One

3. NCCOR Announcements
Need technical assistance?
Have a question for our speakers?

Type your question(s) in the chat box located on the right and a representative will respond shortly.
Join the conversation on social media

#ConnectExplore

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Today’s Speakers

Elaine Arkin
National Collaborative on Childhood Obesity Research

Jeri Brittin
HDR

Joel Kimmons
Centers for Disease Control and Prevention

Kimberly Rollings
University of Notre Dame
INTERACTIVE POLL
NCCOR Workgroup
Health, Behavioral Design, and the Built Environment

Joel Kimmons, PhD
Senior Scientist
Division of Nutrition, Physical Activity, and Obesity
Centers for Disease Control and Prevention
Purpose

- Behavioral design (BD) is the science and practice of how the physical and informational environments influence decisions and actions.
- Explore and develop BD as a field
- Conduct workshops:
  - Facilitate cross talk among disciplines and practices
  - Develop BD strategies to facilitate active living and healthy eating
- Disseminate findings to inform and improve research and practice
  - Practice-based evidence is critical in BD
Activities

- Held virtual focus groups and think tank (2015-16)
- Published *Health, Behavioral Design, and the Built Environment* White Paper (March 2017)
- Sponsored symposium at the Environmental Design Research Association 48th Conference (June 2017)
- Published Behavioral Design as an Emerging Theory for Dietary Behavior Change chapter in *Food and Public Health*, an Oxford University Press book (August 2018)
  
QUESTIONS?

Please type your question(s) in the chat box located on the right.
Active School Design Impacts on Sedentary Behavior and Physical Activity

Jeri Brittin, PhD
Director of Research
HDR
“Health and salvation can only be found in motion.”

- Søren Kierkegaard
01 Behavior and the School Environment
Theoretical Systems Framework for Environmental Design and Health

- Environmental Design
- Experiential and Behavioral Change
- Social and Cultural Transformation
- Health Outcomes

Time series quasi-experimental designs can be a powerful tool to test this framework.
Engage Public Health in Architectural Planning

A Natural Experiment
Rural Communities in Virginia and New York State
## Physical Activity Design Guidelines for School Architecture

| 01 | School Siting + Community Connectivity |
| 02 | Building Massing + Programming |
| 03 | Smart Fitness Facilities |
| 04 | Active Classrooms |
| 05 | Outdoor Learning Areas |
| 06 | Active Play + Leisure Areas |
| 07 | Active Navigation Areas |
| 08 | Wayfinding + Motivational Signage |
| 09 | Dynamic Furniture |
| 10 | Emerging Technologies |

HOP ON UP!

Get out of your chairs!
Jump up! Jump down!
And hop on up the stairs!

Using the stairs burns twice as many calories as walking!
Research Approach

Elementary School Design Conditions
- Intervention: New school facility explicitly designed to promote movement throughout the day
- Comparison/control: Traditional school facilities

Control Variables
- Gender
- Race/ethnicity

Accelerometer-Measured PA Outcomes
- Time in sedentary behavior (SB)
- Breaks from SB
- Length of SB bouts
- Time in light physical activity (LPA)
- Time in moderate to vigorous physical activity (MVPA)

Quantitative Analysis
## Results: Within-Subject Change

<table>
<thead>
<tr>
<th>Outcome Variable</th>
<th>Model Output¹</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Parameter Estimate</td>
<td>SE</td>
<td>p-Value</td>
</tr>
<tr>
<td>Daily Minutes in Sedentary Behavior</td>
<td>-81.2</td>
<td>11.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Group*Time (DD effect)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length of a Sedentary Bout</td>
<td>-1.08²</td>
<td>0.11²</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Group*Time (DD effect)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily Number of Breaks from Sedentary Behavior</td>
<td>23.4</td>
<td>2.6</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Group*Time (DD effect)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily Minutes in LPA</td>
<td>67.7</td>
<td>10.7</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Group*Time (DD effect)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily Minutes in MVPA</td>
<td>-10.3</td>
<td>2.3</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Group*Time (DD effect)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ Difference in difference (DD) linear mixed models of outcomes with group (intervention, control), time (baseline, follow-up), and interaction, controlling for differences in accelerometer wear time, gender, race/ethnicity, and time in MVPA.

² Natural log variable transformation.

# Results: Differences between Same-Age Groups

<table>
<thead>
<tr>
<th>Outcome Variable and Groups</th>
<th>Model Output¹</th>
<th>SE</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Minutes in Sedentary Behavior</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade-Matched Groups</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old School Mean (SD)</td>
<td>265.2 (39.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New School Mean (SD)</td>
<td>214.9 (37.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parameter Est. (New vs. Old School)</td>
<td>-90.5</td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Length of a Sedentary Bout</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade-Matched Groups</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old School Mean (SD)</td>
<td>9.2 (4.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New School Mean (SD)</td>
<td>4.4 (1.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parameter Est. (New vs. Old School)</td>
<td>-0.95²</td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Daily Number of Breaks from Sedentary Behavior</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade-Matched Groups</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old School Mean (SD)</td>
<td>30.4 (6.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New School Mean (SD)</td>
<td>49.0 (18.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parameter Est. (New vs. Old School)</td>
<td>21.1</td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Daily Minutes in LPA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade-Matched Groups</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old School Mean (SD)</td>
<td>129.8 (34.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New School Mean (SD)</td>
<td>167.2 (35.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parameter Est. (New vs. Old School)</td>
<td>64.5</td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Daily Minutes in MVPA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade-Matched Groups</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old School Mean (SD)</td>
<td>25.0 (9.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New School Mean (SD)</td>
<td>11.2 (4.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parameter Est. (New vs. Old School)</td>
<td>-13.0</td>
<td></td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

¹ Linear models of outcomes with independent groups, gender, race/ethnicity, and time in MVPA for other outcomes.
² Natural log variable transformation.

Locations of High-Activity Destinations
QUESTIONS?

Please type your question(s) in the chat box located on the right.
CAFES
Cafeteria Assessment for Elementary Schools

Kimberly Rollings, PhD
Assistant Professor
School of Architecture; Psychology
University of Notre Dame
krolling@nd.edu
Introduction

CAFES Tool

• Reliable, valid, objective assessment tool
• Quantifies physical attributes of cafeteria environments and suggests improvements

Background & Rationale

• Elementary schools
  • Lack of evidence
  • Pricing, choice/variety, portion size

• Behavioral economics and environmental psychology
  • “Nudging” and affordances (Thaler & Sunstein, 2008; Gibson, 1977)

• The physical environment matters
  • Scale: Room, furniture, plate, and food (Sobal & Wansink, 2007)
  • Few design guidelines & standards
Introduction

Research Questions

1. What physical environment attributes should be included in the CAFES tool at the scale of room, table/display, plate, and food?

2. What is the reliability of CAFES?

3. What is the predictive validity of CAFES?

4. What low- and no-cost interventions are related to the resulting CAFES scores?
   - CAFES mobile application: coming soon (CAFES.CRC.ND.edu)

5. What are the resulting evidence-based design guidelines for school and design professionals?
Methods

Participants: CAFES development
- 50 low-income schools: NY, WA, IA, AR [+11 for tool/app testing]
  - >3,000 2nd, 4th, and 5th grade students (2 classes of ~20/school)
  - At least 50% free/reduced-price lunch eligibility
  - 29 schools (1500 students) → CAFES predictive validity analysis

Procedures
- CAFES development
  - Item selection (lit review, existing assess., expert panel; observations/interviews)
  - Pilot testing, data collection, and coding
  - Reliability and validity analysis
- Intervention development (lit review)
- Mobile app development & testing
- Intervention testing
- Design guideline development
Methods

Analysis

• CAFES development
  • Item selection & score calculation (0/1)
  • Reliability: Internal consistency (KR-21), inter-item correlation, inter-rater reliability (% agreement)
  • Predictive validity: Multilevel modeling (MLM) + FV serving & consumption data from lunch tray photography (R. Echon)

• Mobile app testing
  • Reliability: Inter-rater & test-retest

• Future intervention testing
  • Pre/post study design
Methods

Constructs & measures

**Student level data**
- Gender, grade level*, FRPM eligibility, ethnicity, age, BMI
- FV servings & consumption

**School level data**
- CAFES items & scores*
- Student population (school size)
- FRPM students (%)*
- Minority student population (%)*
- Rural, urban, or suburban location

* = included in predictive validity analysis
### CAFES items: 198 total points

(Rollings & Wells, 2018)

#### ROOM Scale: Prep, Serving, & Eating Areas (50 points)

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient Env.</td>
<td>Eating area temp. (2), odor, crowding (2), ceiling height, lighting, noise, music</td>
</tr>
<tr>
<td>Appearance (9)</td>
<td>Eating area attractiveness, physical condition, furniture condition, clutter, cleanliness; serving area attractiveness, physical condition, clutter, cleanliness</td>
</tr>
<tr>
<td>Windows (8)</td>
<td>Eating area window presence, view of nature, operability, condition, quantity, transparency; window screen presence; window treatment presence</td>
</tr>
<tr>
<td>Layout &amp; Visibility (8)</td>
<td>Circulation, obstructions, menu location, visibility, display space, &amp; prep area availability</td>
</tr>
<tr>
<td>Healthy Signage (2)</td>
<td>Presence of healthy &amp; unhealthy diet or physical activity promotional signage</td>
</tr>
<tr>
<td>Kitchen &amp; Serving Area (14)</td>
<td>Lunch prepped at school/not; serving area equipment condition, lighting; kitchen presence, clutter, attractiveness, cleanliness, lighting, physical condition, equipment condition &amp; availability, window presence, storage space availability</td>
</tr>
</tbody>
</table>

#### TABLE/DISPLAY Scale: Serving & Eating Areas (133 points)

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furniture (4)</td>
<td>Eating area furniture attractiveness, table shape; seating (bench or individual seats; attached or moveable)</td>
</tr>
<tr>
<td>Availability (77)</td>
<td>Weekly availability: food items (55), a la carte items (6), beverage items (10); fundraisers (2); vending availability (2); age appropriate portion sizes; ice cream cooler availability</td>
</tr>
<tr>
<td>Display Layout &amp; Presentation (14)</td>
<td>Fruit presentation (1), FV close to register (1), FV in first 3 visible items (1), milk layout (2), menu item naming (1), food item labeling (1), serving area food attractiveness (1), milk location (4), ice cream lid transparency (1), out of reach/by request only items</td>
</tr>
<tr>
<td>Serving Method (19)</td>
<td>Tray rest available, serving tray use, self-serve option &amp; for which items (4); large trays or premeasured portions (3), packaging transparency (3); sharing table availability, second servings allowed (2), offer vs. serve (4)</td>
</tr>
<tr>
<td>Variety (19)</td>
<td>Weekly availability: more than one main course (6), fruit (6), vegetable (6) offered; milk quantities offered</td>
</tr>
</tbody>
</table>

#### PLATE Scale: Lunch Tray (4 total points)

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serving tray area (1), color choice (1), &amp; material (Styrofoam/weak plastic containers/not; 1); utensil availability/not (1)</td>
<td></td>
</tr>
</tbody>
</table>

#### FOOD Scale: Individual Food Items (11 total points)

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reheat frequency (6), avg # F/meal (1), avg # V/meal (1), # meals w/ breaded/fried item (1); % raw FV (1); fresh F whole or sliced (1)</td>
<td></td>
</tr>
</tbody>
</table>

(FV=fruits (F) & vegetables (V))
**Results: Scoring**

**CAFÉS DATA ENTRY & SCORING INSTRUCTIONS**

Green text on the CAFÉS form indicates the number of points awarded for each CAFES response, as well as instructions for calculating points for some items. After completing CAFES and all scoring calculations, enter the number of points obtained for each CAFES item in Column "AS" of this spreadsheet. Enter a "1" in column AT for CAFES items marked as "not applicable" (* N/A). CAFES scores are calculated in tables at the right of this spreadsheet, but are displayed in the "CAFES Score Chart Results" tab (click on the tab at the bottom of the screen). A CAFES description is also available via the third tab, "CAFES description."

<table>
<thead>
<tr>
<th>CAFES item #</th>
<th>CAFES Item</th>
<th>CAFES SCALE/SUBSCALE</th>
<th>ENTER CAFES ITEM POINTS HERE</th>
<th>N/A (enter 1 here if question = N/A*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F0</td>
<td>Please rate the following for the CAFETERIA/EATING AREA. Remember to complete separate CAFES evaluations if there are multiple cafeterias/eating areas.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1</td>
<td>Cafeteria/eating area TEMPERATURE</td>
<td>Ambient</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>F2</td>
<td>Is AIR CONDITIONING available in the cafeteria/eating area?</td>
<td>Ambient</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>F3.2</td>
<td>Cafeteria/eating area LIGHTING</td>
<td>Ambient</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>F4.1</td>
<td>When evaluating cafeteria/eating area ODOR, is food present?</td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>F4.2</td>
<td>Cafeteria/eating area ODOR</td>
<td>Ambient</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>F5.2</td>
<td>Cafeteria/eating area NOISE</td>
<td>Ambient</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>F5</td>
<td>Is MUSIC played in the cafeteria/eating area during lunch?</td>
<td>Ambient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G0</td>
<td>Please rate the following for the CAFETERIA/EATING AREA. Remember to complete separate CAFES evaluations if there are multiple cafeterias/eating areas.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G1</td>
<td>Cafeteria/eating area ATTRACTIVENESS</td>
<td>Appearance</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

(Rollings & Wells, 2018)
Results: Scoring

CAFES items are scored with either a 0 or 1. The sum of the scores in each CAFES category, listed below, are divided by the total number of items in a category to yield a percentage (out of 100%). The following table presents scores from your school’s cafeteria. For comparison, the average scores calculated from observations of 50 CAFES schools in four states are also displayed.

<table>
<thead>
<tr>
<th>CAFES Category</th>
<th>School</th>
<th>Average Score</th>
<th>Average SD</th>
<th>Average Range (Lower - Upper)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room: Prep, serving, &amp; eating areas</td>
<td>68.0%</td>
<td>70.1%</td>
<td>10.1%</td>
<td>43.9% - 87.5%</td>
</tr>
<tr>
<td>Ambient environment</td>
<td>55.6%</td>
<td>61.8%</td>
<td>19.8%</td>
<td>28.6% - 100.0%</td>
</tr>
<tr>
<td>Appearance</td>
<td>100.0%</td>
<td>76.0%</td>
<td>23.4%</td>
<td>12.5% - 100.0%</td>
</tr>
<tr>
<td>Windows</td>
<td>62.5%</td>
<td>53.5%</td>
<td>31.7%</td>
<td>0.0% - 100.0%</td>
</tr>
<tr>
<td>Layout &amp; visibility</td>
<td>62.5%</td>
<td>91.3%</td>
<td>17.0%</td>
<td>37.5% - 100.0%</td>
</tr>
<tr>
<td>Signage</td>
<td>50.0%</td>
<td>86.5%</td>
<td>34.7%</td>
<td>0.0% - 100.0%</td>
</tr>
<tr>
<td>Kitchen and serving areas</td>
<td>64.3%</td>
<td>63.7%</td>
<td>14.7%</td>
<td>25.0% - 85.7%</td>
</tr>
<tr>
<td>Table/Display: Serving &amp; eating areas</td>
<td>48.8%</td>
<td>42.6%</td>
<td>06.8%</td>
<td>29.6% - 62.4%</td>
</tr>
<tr>
<td>Furniture (eating area)</td>
<td>25.0%</td>
<td>33.1%</td>
<td>25.7%</td>
<td>0.0% - 75.0%</td>
</tr>
<tr>
<td>Availability</td>
<td>59.2%</td>
<td>40.5%</td>
<td>08.2%</td>
<td>25.9% - 62.5%</td>
</tr>
<tr>
<td>Display layout &amp; presentation</td>
<td>33.3%</td>
<td>39.9%</td>
<td>23.0%</td>
<td>0.0% - 85.7%</td>
</tr>
<tr>
<td>Serving method</td>
<td>55.6%</td>
<td>64.9%</td>
<td>13.5%</td>
<td>36.4% - 90.9%</td>
</tr>
<tr>
<td>Variety</td>
<td>15.8%</td>
<td>40.1%</td>
<td>20.4%</td>
<td>18.8% - 93.3%</td>
</tr>
<tr>
<td>Plate: Lunch tray</td>
<td>25.0%</td>
<td>51.4%</td>
<td>44.2%</td>
<td>0.0% - 100.0%</td>
</tr>
<tr>
<td>Food: Individual food items</td>
<td>45.5%</td>
<td>51.7%</td>
<td>20.9%</td>
<td>20.0% - 100.0%</td>
</tr>
<tr>
<td>TOTAL CAFES SCORE</td>
<td>53.1%</td>
<td>50.5%</td>
<td>6.0%</td>
<td>34.5% - 64.3%</td>
</tr>
</tbody>
</table>

a = Note that a CAFES score of 100%, in any category, may not be necessary for desired fruit and vegetable selection and consumption.
b = Average CAFES scores, from observations of 50 schools in four U.S. states, are presented for comparison.
c = SD indicates standard deviation and is a measure of how much the CAFES scores from all 50 schools varied from the average CAFES score. Lower scores indicate that there was little variation across schools.

(Rollings & Wells, 2018)
## Results: CAFES Internal Consistency

<table>
<thead>
<tr>
<th>CAFES Score (Subscale)</th>
<th>CAFES Score</th>
<th>CAFES Score</th>
<th>CAFES Score</th>
<th>CAFES Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Range</td>
<td>KR-21</td>
</tr>
<tr>
<td>TOTAL SCORE</td>
<td>50.54%</td>
<td>5.96%</td>
<td>34.57% - 64.34%</td>
<td>0.88</td>
</tr>
<tr>
<td>Room scale</td>
<td>70.10%</td>
<td>10.13%</td>
<td>43.90% - 87.50%</td>
<td>0.80</td>
</tr>
<tr>
<td>Ambient</td>
<td>61.84%</td>
<td>19.82%</td>
<td>28.57% - 100.00%</td>
<td>0.75</td>
</tr>
<tr>
<td>Appearance</td>
<td>75.98%</td>
<td>23.36%</td>
<td>12.50% - 100.00%</td>
<td>0.71</td>
</tr>
<tr>
<td>Windows</td>
<td>53.48%</td>
<td>31.71%</td>
<td>0.00% - 100.00%</td>
<td>0.81</td>
</tr>
<tr>
<td>Layout</td>
<td>91.29%</td>
<td>16.98%</td>
<td>37.50% - 100.00%</td>
<td>0.83</td>
</tr>
<tr>
<td>Kitchen/Serve</td>
<td>63.71%</td>
<td>14.67%</td>
<td>25.00% - 85.71%</td>
<td>0.71</td>
</tr>
<tr>
<td>Table scale</td>
<td>42.64%</td>
<td>6.78%</td>
<td>29.58% - 62.29%</td>
<td>0.72</td>
</tr>
<tr>
<td>Furniture</td>
<td>33.10%</td>
<td>25.70%</td>
<td>0.00% - 75.00%</td>
<td>0.52</td>
</tr>
<tr>
<td>Availability</td>
<td>40.48%</td>
<td>8.17%</td>
<td>25.93% - 62.50%</td>
<td>0.71</td>
</tr>
<tr>
<td>Display</td>
<td>39.90%</td>
<td>22.95%</td>
<td>0.00% - 85.71%</td>
<td>0.80</td>
</tr>
<tr>
<td>Serving method</td>
<td>64.90%</td>
<td>13.47%</td>
<td>36.36% - 90.91%</td>
<td>0.64</td>
</tr>
<tr>
<td>Variety</td>
<td>40.09%</td>
<td>20.42%</td>
<td>18.75% - 93.33%</td>
<td>0.82</td>
</tr>
<tr>
<td>Plate scale</td>
<td>51.35%</td>
<td>44.16%</td>
<td>0.00% - 100.00%</td>
<td>0.83</td>
</tr>
<tr>
<td>Food scale</td>
<td>51.73%</td>
<td>20.94%</td>
<td>20.00% - 100.00%</td>
<td>0.58</td>
</tr>
</tbody>
</table>

(Rollings & Wells, 2018)
Results: Reliability & Validity

CAFES inter-rater reliability*
- >90%, final CAFES version, after training
  - Percent agreement

CAFES predictive validity*
- Total CAFES scores & % FV consumed
  - +1% pt CAFES → +0.92% FV consumed
    - (1.62 g of FV, on average)

- CAFES scale scores
  - 1% pt ROOM increase → 0.72%
  - 1% pt TABLE increase → 1.34%
  - 1% pt PLATE increase → 0.24%
  - 1% pt FOOD increase → 0.44%

* = controlling for % FRPM & % minority population; all results significant at 0.05 alpha level

Room layout, kitchen/serving area, and plate scale significantly predicted FV servings

(Rollings & Wells, 2018)
**Room Scale Examples**

*Ambient Environment*
$  Play soft music and encourage students to be quiet enough so that they can hear it. Include students in selecting music.

*Appearance*
$/$$  Improve serving area attractiveness by brightening the space, cleaning, and/or updating serving displays.
$/$$  Add real and/or artificial plants, trees, and other greenery. If using real greenery, consider cost, maintenance, and allergies.

*Windows*
$/$$  Plant trees/other greenery within the view of cafeteria windows.

*Healthy Signage*
$  Add healthy eating promotional signage to the cafeteria, serving areas, and hallways leading to the cafeteria.
$  Ensure that all healthy eating promotional signage is up-to-date & culturally relevant to students.

*Layout & Visibility*
$  Arrange the cafeteria & serving areas such that permanent obstructions (e.g., columns, pipes) support rather than interfere with student circulation.

(Rollings & Wells, 2018)
Intervention Suggestions

Table/Display Scale Examples

Display Layout & Presentation

$ Create and display signage for creatively named, individually labeled healthy meal options (e.g. "Power Punch Broccoli").

Cafeteria Furniture

$$ Replace existing rectangular tables with/add round or square tables to facilitate social interaction.

Variety

$ Arrange milk so that at least, but preferably more than, 50% of all milk is low-fat, unflavored milk.

$ Ensure that low-fat, unflavored milk is replenished in coolers so containers always appear "full."

Plate Scale Example

$$ Offer students multiple tray colors and permit choice ($).
Discussion

Strengths and implications
- Comprehensive assessment of physical factors
- Suggests low/no cost interventions; many immediate
- Addition to policy, economic, and socio-cultural factors

Limitations
- Cross-sectional
- Moderators excluded (food quality; Cohen et al., 2015)
- In-depth kitchen analysis excluded

Current/future work
- Mobile application (coming soon: CAFES.CRC.ND.edu)
  - Automates scoring and intervention output
- Intervention testing
- Evidence-based design guidelines

Thanks to participating schools, Cooperative Extension Educators, panel experts, the Healthy Gardens, Healthy Youth team, & funding agencies
QUESTIONS?

Please type your question(s) in the chat box located on the right.
Behavioral Design Updates

Joel Kimmons, PhD
Senior Scientist
Division of Nutrition, Physical Activity, and Obesity
Centers for Disease Control and Prevention
On-going Efforts—CDC Highlights

- Small Business Innovation Research (SBIR) Program:
  - Web-based application enabling healthy behaviors through behavioral design
    - Funded two grants for this effort
  - Community-based worksite wellness app linking employees to wellness resources
    - Announcement recently closed
- [www.Fitwel.org](http://www.Fitwel.org) uses, creates, and innovates BD strategies as building requirements
  - Continues to expand – over 0.5 million people currently impacted
- CDC is developing BD theory and application
  - Partners include the Department of Defense, Veterans Affairs, and Georgia Tech
  - Tools include X Reality
- All NCCOR partners are currently supporting BD research
QUESTIONS?

Please type your question(s) in the chat box located on the right.
ONE ON ONE
UPCOMING EVENTS
Connect & Explore Webinar

• America’s Eating Habits: Food Away From Home
  • The next Connect & Explore will highlight several findings from USDA Economic Research Service’s new report *America’s Eating Habits: Food Away From Home*
  • November 6 at 2 p.m. ET
  • Speakers:
    • Abigail Okrent, PhD, *USDA*
    • Michelle Saksena, PhD, *USDA*
• Tools of the Trade: NCCOR Resources for Evidence-Based Practice in Diet and Physical Activity
  • This session will provide an overview of several NCCOR tools and provide case studies on how the tools can be used in real-world contexts.
  • November 13 at 3 p.m. PT
• Speakers:
  • Laura Kettel Khan, PhD, Centers for Disease Control and Prevention
  • James Sallis, PhD, University of California, San Diego
  • Jamie F. Chriqui, PhD, MHS, University of Illinois, Chicago
  • Barbara Ainsworth, PhD, Arizona State University
FURTHER QUESTIONS?

Other questions about NCCOR or upcoming activities?

Email the NCCOR Coordinating Center

nccor@fhi360.org
Connect & Explore

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