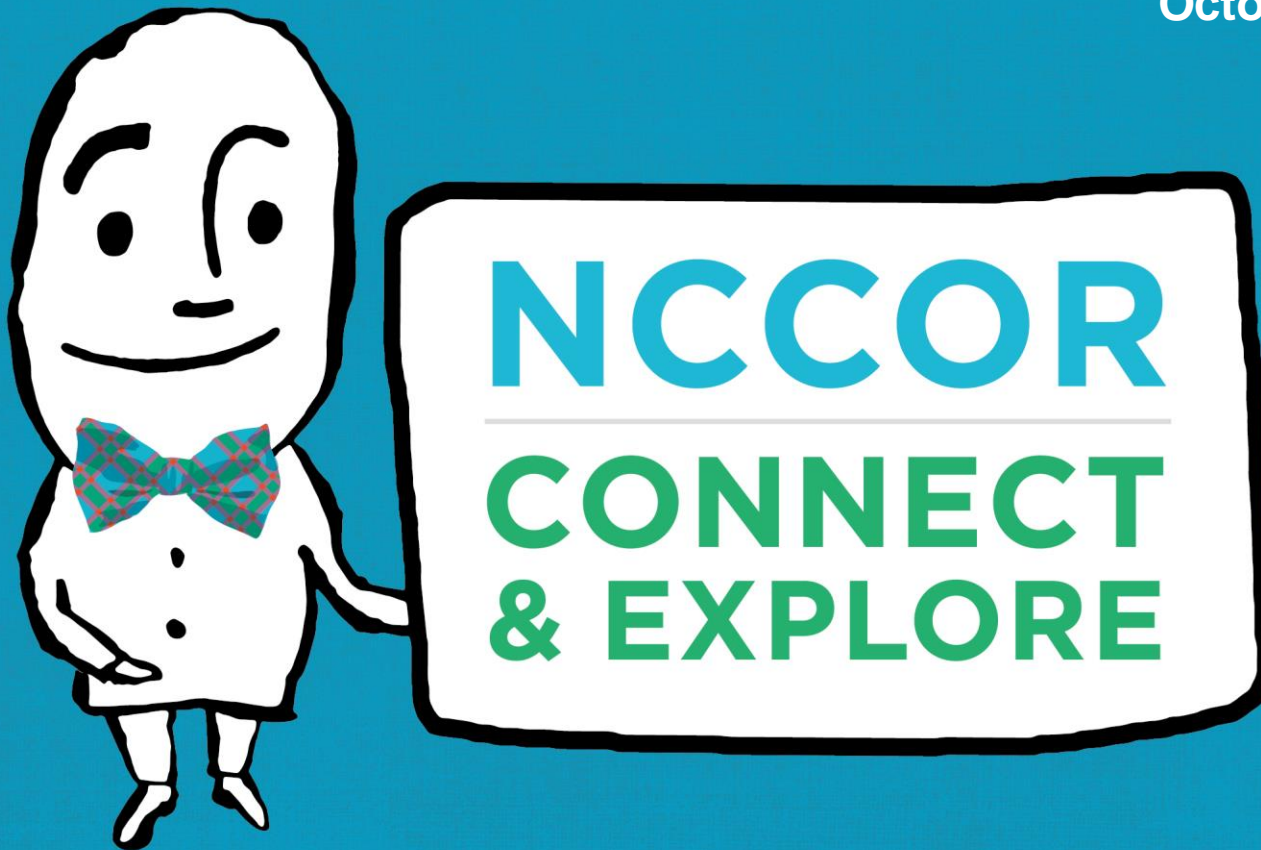


October 23, 2018



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.

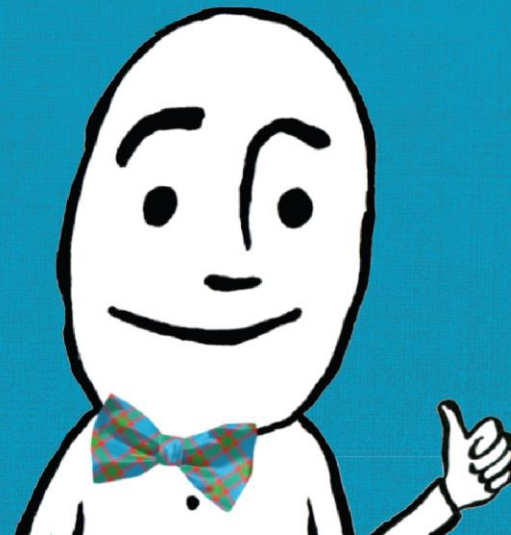
1. Spotlight: Innovations in Behavioral Design to Enhance Active Living and Healthy Eating

- NCCOR Behavioral Design Overview
- School Design Strategies to Promote Physical Activity
- Cafeteria Assessment for Elementary Schools
- Behavioral Design Updates

2. One on One

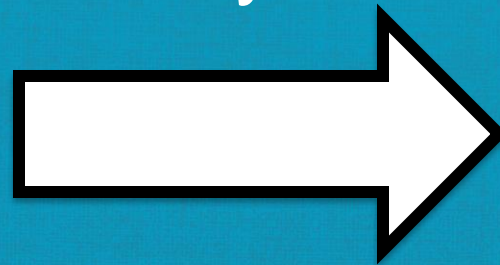
3. NCCOR Announcements

TODAY'S PROGRAM



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



Follow @NCCOR

NCCOR
CONNECT
& EXPLORE

Today's Speakers



Elaine Arkin

National Collaborative
on Childhood Obesity
Research



Jeri Brittin

HDR



Joel Kimmons

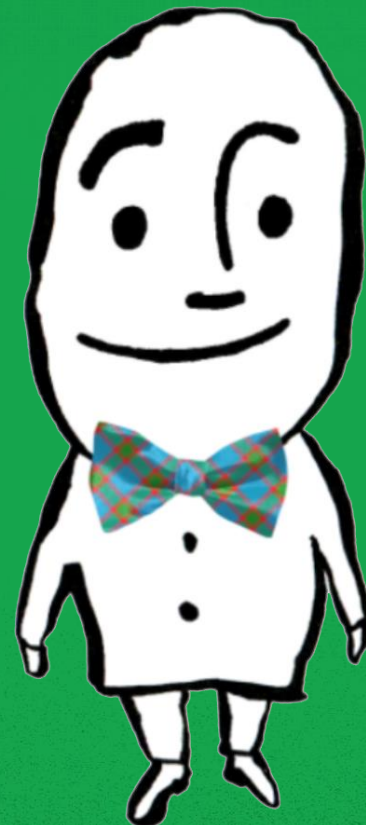
Centers for Disease
Control and Prevention



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

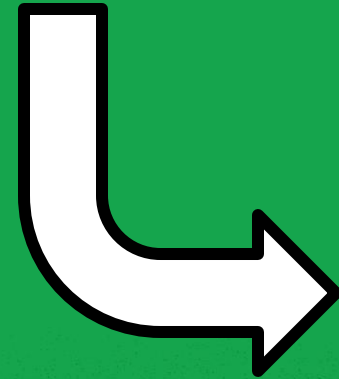
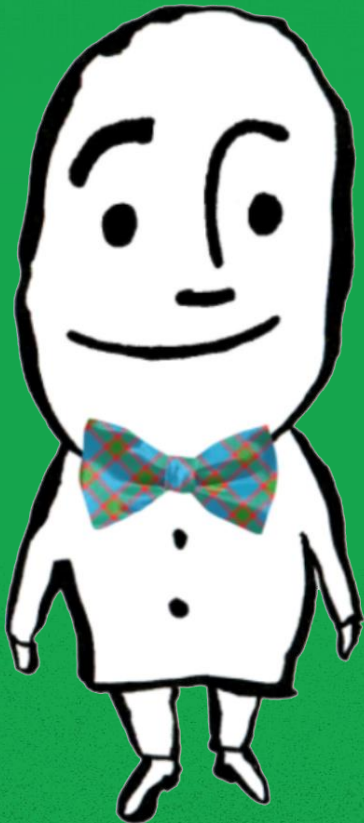
- Behavioral design (BD) is the science and practice of how the physical and informational environments influence decisions and actions.
- Explore and develop BD as a field
- Conduct workshops:
 - Facilitate cross talk among disciplines and practices
 - Develop BD strategies to facilitate active living 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)
 - <https://global.oup.com/academic/product/food-and-public-health-9780190626686?lang=en&cc=gb>

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.”***

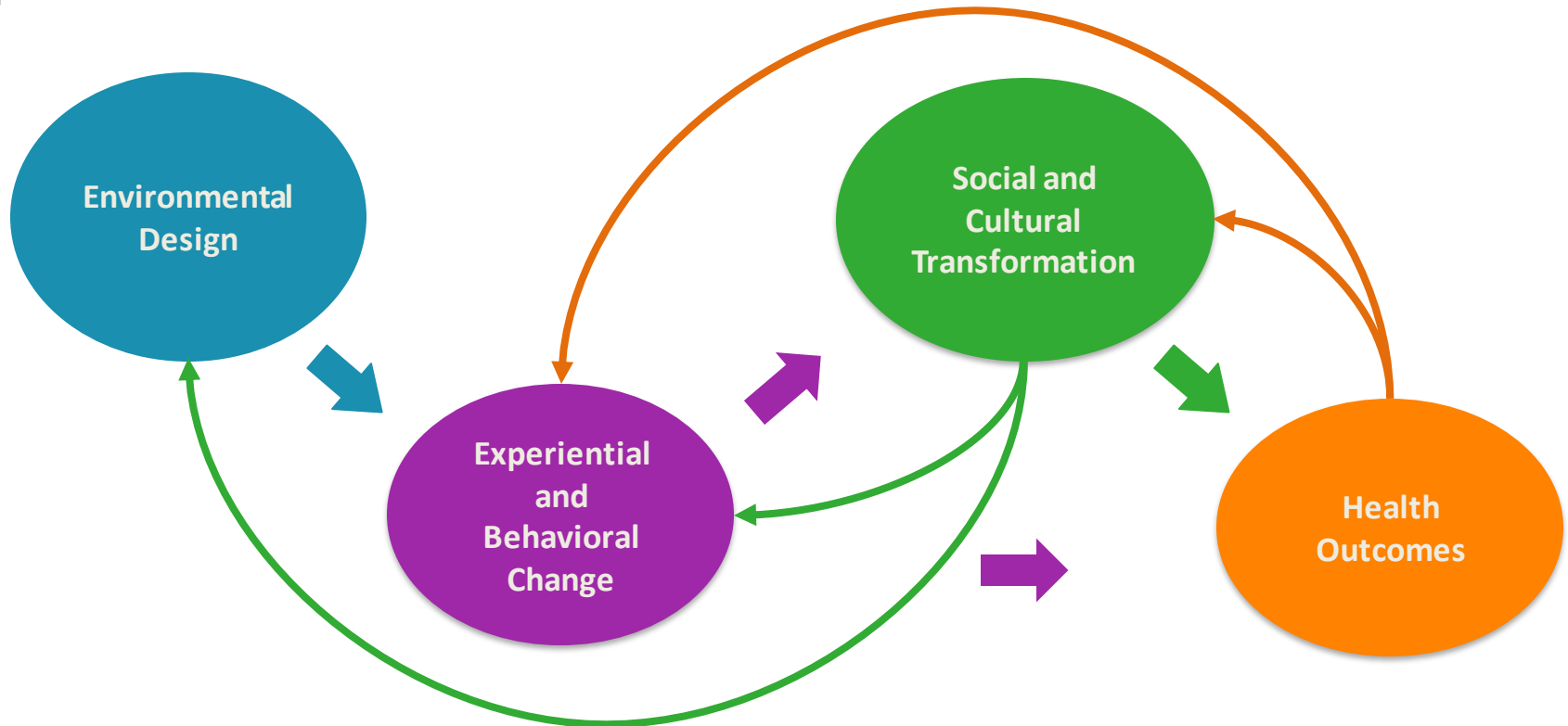
- Kirkegaard





01 Behavior and the School Environment

Theoretical Systems Framework for Environmental Design and Health



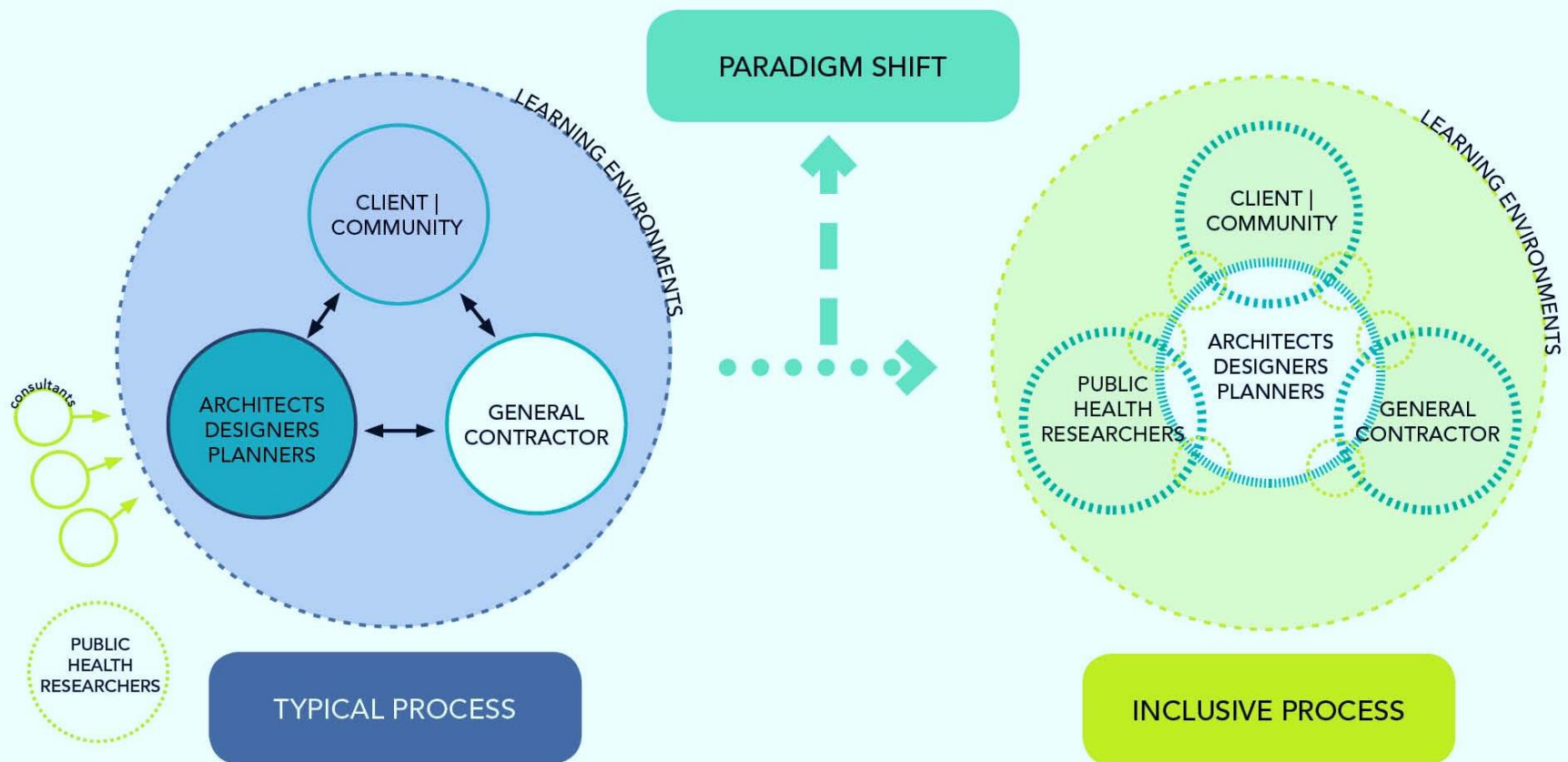
Time series quasi-experimental designs can be a powerful tool to test this framework





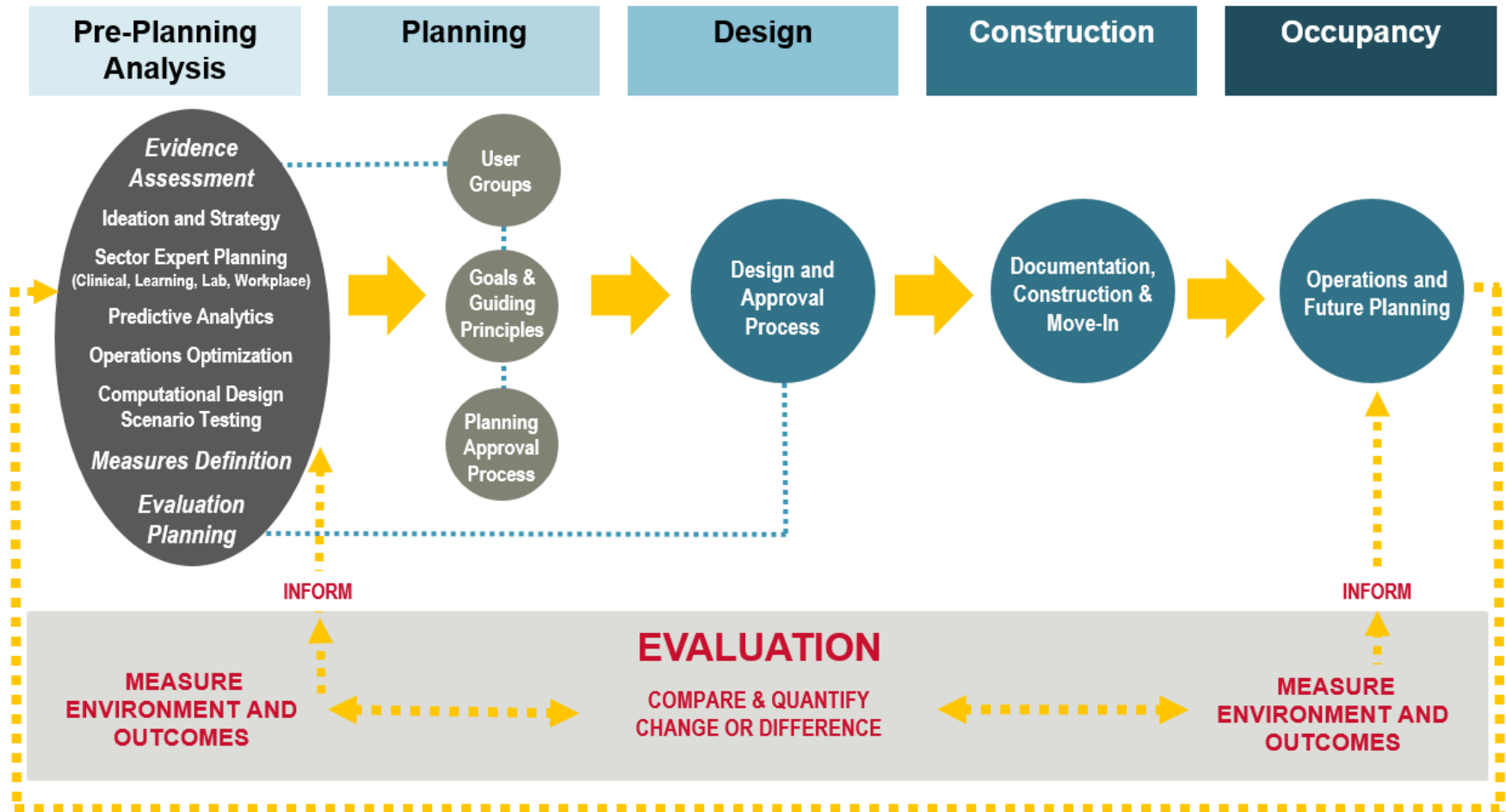


Engage Public Health in Architectural Planning



(Brittin J, Sorensen D, Trowbridge MJ, Lee KK, Breithecker D, Frerichs L, Huang T. 2015. *PLoS One*. DOI: 10.1371/journal.pone.0132597)

Progress in Practice





02 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

(Brittin J, Sorensen D, Trowbridge MJ, Lee KK, Breithecker D, Frerichs L, Huang T. 2015. *PLoS One*. DOI: 10.1371/journal.pone.0132597)













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!**

Image: VMDO Architects

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

Outcome Variable	Model Output ¹		
	Parameter Estimate	SE	p-Value
Daily Minutes in Sedentary Behavior			
Group*Time (DD effect)	-81.2	11.4	<0.001
Length of a Sedentary Bout			
Group*Time (DD effect)	-1.08 ²	0.11 ²	<0.001
Daily Number of Breaks from Sedentary Behavior			
Group*Time (DD effect)	23.4	2.6	<0.001
Daily Minutes in LPA			
Group*Time (DD effect)	67.7	10.7	<0.001
Daily Minutes in MVPA			
Group*Time (DD effect)	-10.3	2.3	<0.001



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

Outcome Variable and Groups			Model Output ¹		
	Old School Mean (SD)	New School Mean (SD)	Parameter Est. (New vs. Old School)	SE	p-Value
Daily Minutes in Sedentary Behavior					
Grade-Matched Groups	265.2 (39.7)	214.9 (37.6)	-90.5	16.1	<0.001
Length of a Sedentary Bout					
Grade-Matched Groups	9.2 (4.2)	4.4 (1.0)	-0.95 ²	0.13 ²	<0.001
Daily Number of Breaks from Sedentary Behavior					
Grade-Matched Groups	30.4 (6.6)	49.0 (18.6)	21.1	2.7	<0.001
Daily Minutes in LPA					
Grade-Matched Groups	129.8 (34.2)	167.2 (35.3)	64.5	14.8	<0.001
Daily Minutes in MVPA					
Grade-Matched Groups	25.0 (9.6)	11.2 (4.9)	-13.0	2.7	<0.001

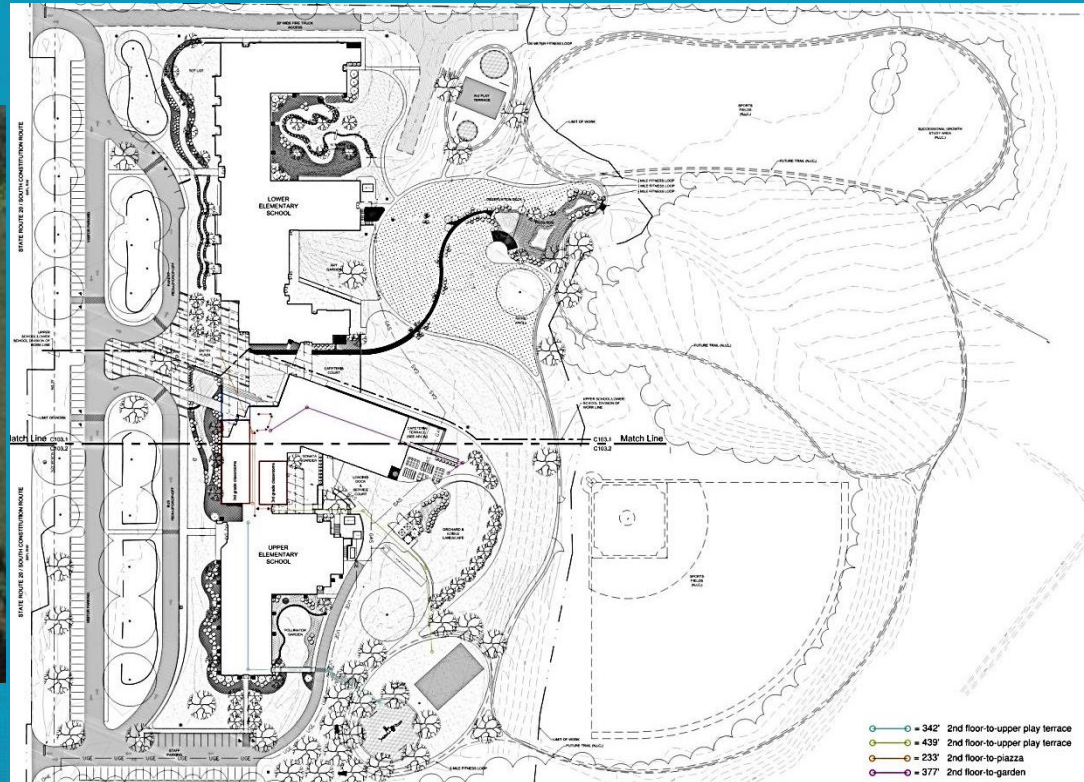


¹ Linear models of outcomes with independent groups, gender, race/ethnicity, and time in MVPA for other outcomes.

² Natural log variable transformation.

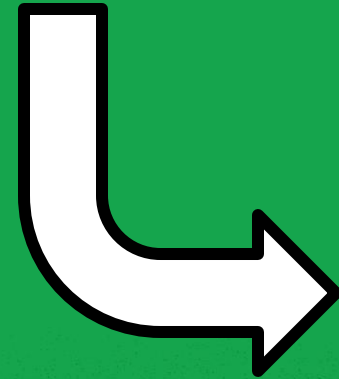
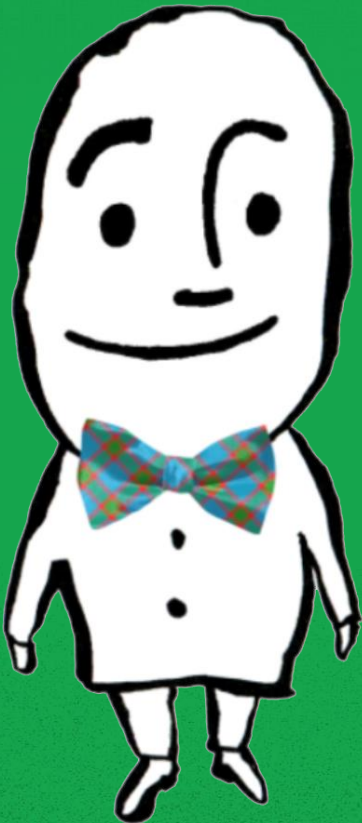
(Brittin J, Frerichs L, Sirard JR, Well NM, Myers B, Garcia J, Sorensen D, Trowbridge MJ, Huang T. 2017. *PLoS One*. DOI: 10.1371/journal.pone.0189236)

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?**
 - Rollings, K.A. & Wells, N.M. (2018). Cafeteria assessment for elementary schools (CAFES): Development, reliability testing, and predictive validity analysis. *BMC Public Health*, 2018(18):1154. doi: 10.1186/s12889-018-6032-2
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

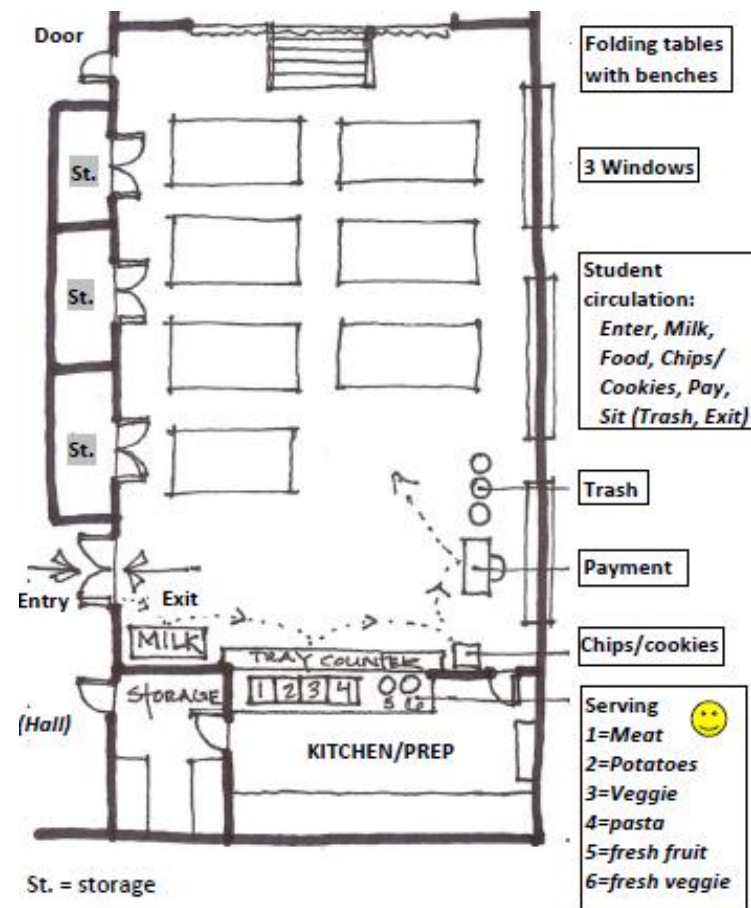


Methods

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)

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

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

Furniture (4) Eating area furniture attractiveness, table shape; seating (bench or individual seats; attached or moveable)	Availability (77) 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	Display Layout & Presentation (14) 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	Serving Method (19) Tray rest available, serving tray use, self-serve option & for which items (4); large trays or premeasured portions (3), packaging transparency (3); sharing table availability, second servings allowed (2), offer vs. serve (4)	Variety (19) Weekly availability: more than one main course (6), fruit (6), vegetable (6) offered; milk quantities offered
--	--	--	---	--

PLATE Scale: Lunch Tray (4 total points)

Serving tray area (1), color choice (1), & material (Styrofoam/weak plastic containers/not; 1); utensil availability/not (1)

FOOD Scale: Individual Food Items (11 total points)

FV=fruits (F) & vegetables (V)

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)

Results: Scoring

CAFES DATA ENTRY & SCORING INSTRUCTIONS

Green text on the CAFES 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."

CAFES item #	CAFES Item	CAFES SCALE/SUBSCALE				ENTER CAFES ITEM POINTS HERE	N/A (enter 1 here if question = N/A*)
		ROOM	TABLE	PLATE	FOOD		
F0	Please rate the following for the CAFETERIA/EATING AREA. Remember to complete separate CAFES evaluations if there are multiple cafeterias/eating areas.						
F1	Cafeteria/eating area TEMPERATURE	Ambient				1	
F2	Is AIR CONDITIONING available in the cafeteria/eating area?	Ambient				0	
F3.2	Cafeteria/eating area LIGHTING	Ambient				1	
F4.1	When evaluating cafeteria/eating area ODOR, is food present?					Yes	
F4.2	Cafeteria/eating area ODOR	Ambient				1	
F5.2	Cafeteria/eating area NOISE	Ambient				0	
F6	Is MUSIC played in the cafeteria/eating area during lunch?	Ambient				0	
G0	Please rate the following for the CAFETERIA/EATING AREA. Remember to complete separate CAFES evaluations if there are multiple cafeterias/eating areas.						
G1	Cafeteria/eating area ATTRACTIVENESS	Appearance				1	

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.

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

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.

Results: CAFES Internal Consistency

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

(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



Intervention Suggestions



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.



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 (\$).



Food Scale Examples

- \$ Creatively name and label fruit/vegetable options.
- \$ Use verbal prompts to encourage raw fruit/vegetable selection.
- \$\$ Offer at least two raw fruit/vegetable options daily.
- \$\$ Allow students to select more than one fruit/vegetable per meal.

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

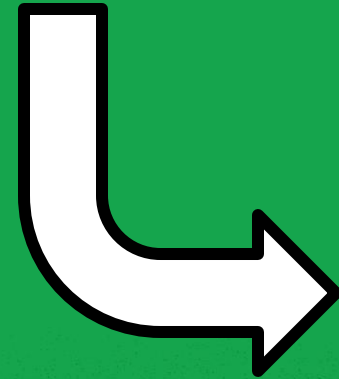
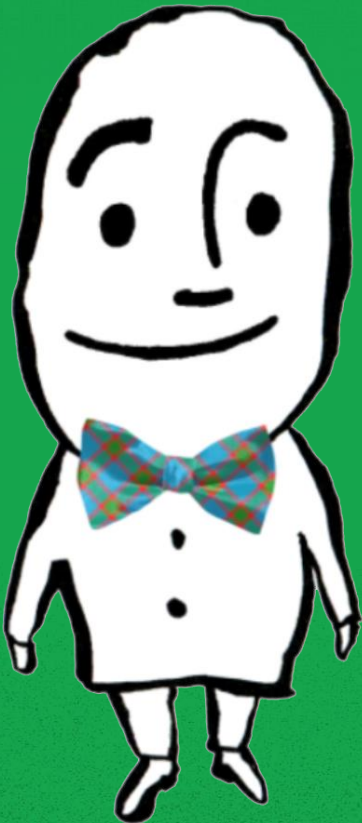
- Cross-sectional
- Moderators excluded (food quality; Cohen et al., 2015)
- In-depth kitchen analysis excluded

Current/future work

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

QUESTIONS?

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



Behavioral Design Updates

Joel Kimmons, PhD
Senior Scientist

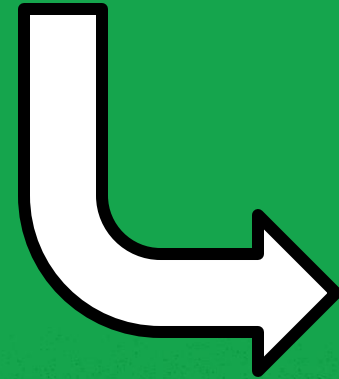
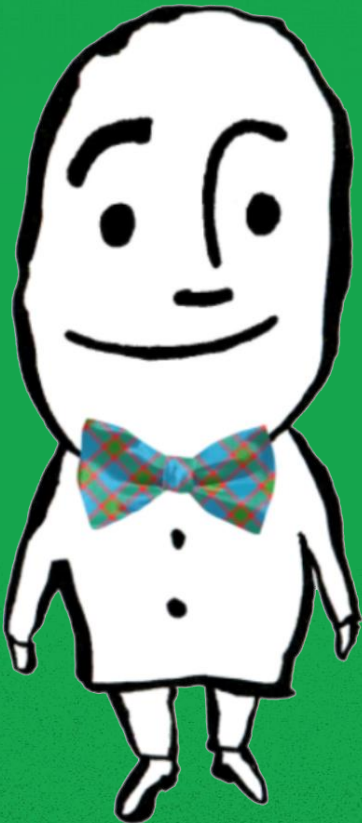
Division of Nutrition, Physical Activity, and Obesity
Centers for Disease Control and Prevention

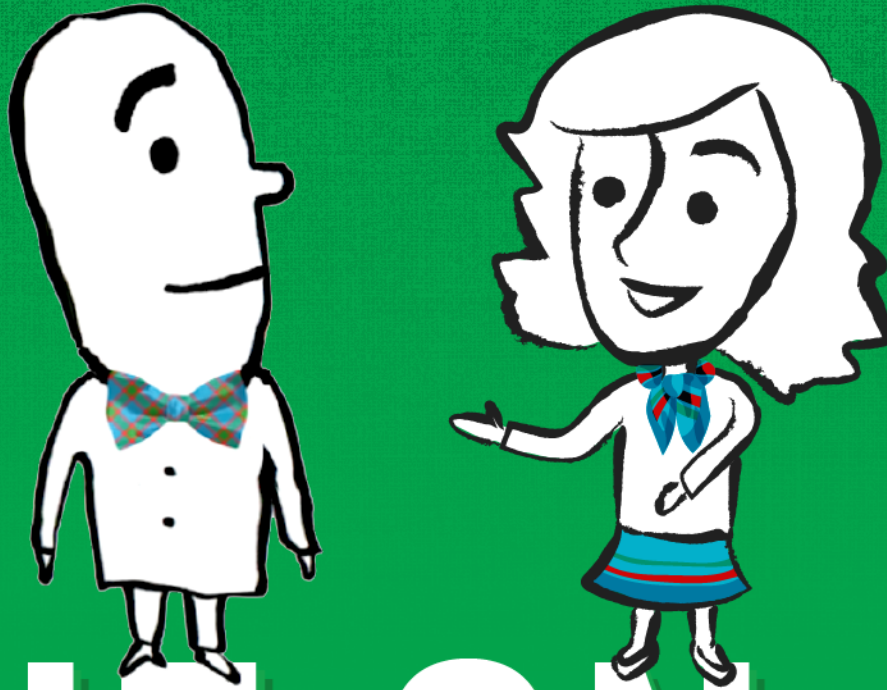
On-going Efforts—CDC Highlights

- 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 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?

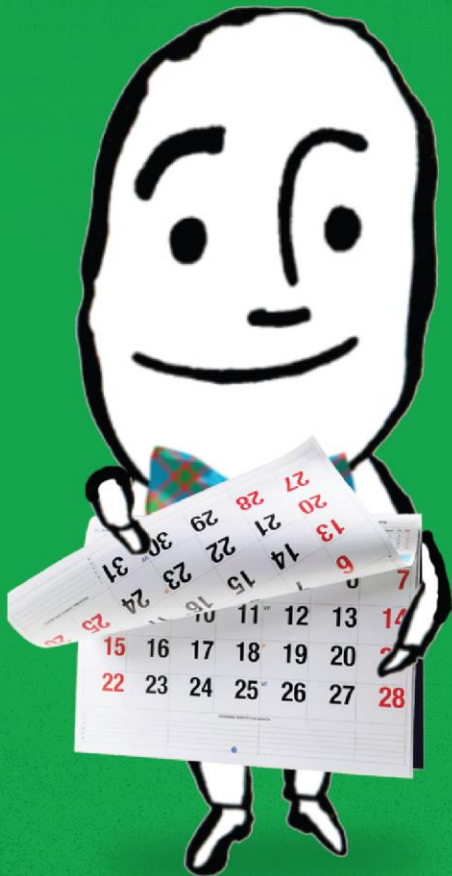
Please type your question(s) in the chat box located on the right.





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*

NCCOR Session at APHA

- **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. Chiqui, 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

WHAT'S HAPPENING IN **NCCOR NEWS**

NCCOR publishes chapter: Behavioral Design as an Emerging Theory for Dietary Behavior Change

NCCOR is highlighting multidisciplinary partnerships to celebrate National Childhood Obesity Awareness Month 2018!

Utility of the Youth Compendium of Physical Activities

NCCOR to present at the Society for Prevention Research and the American College of Sports Medicine 2018 Annual Meetings

NCCOR updates the Catalogue of Surveillance Systems and seeks recommendations for new systems

Connect & Explore



Upcoming Webinars

Mark your calendar for these upcoming Connect & Explore webinars!

THANK YOU!



NCCOR
CONNECT
& EXPLORE