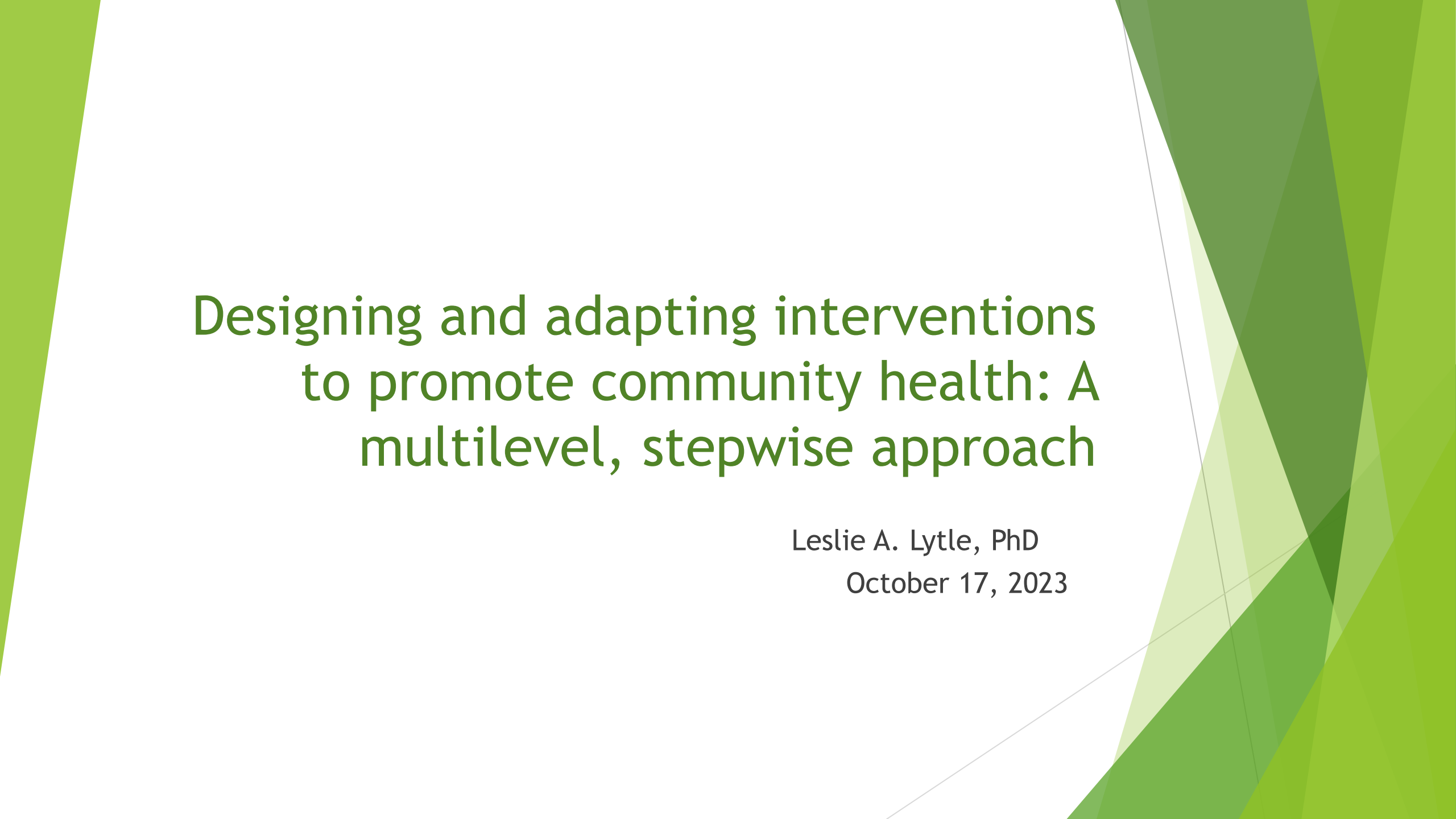


Methods: Mind the Gap
Webinar Series

Designing and Adapting Interventions to Promote Community Health: A Multilevel, Stepwise Approach

Presented by:
Leslie Lytle, Ph.D.
University of North Carolina
at Chapel Hill



The background features abstract, overlapping green geometric shapes in various shades, creating a modern and dynamic feel. The shapes are primarily triangles and polygons, some semi-transparent, layered on a white background.

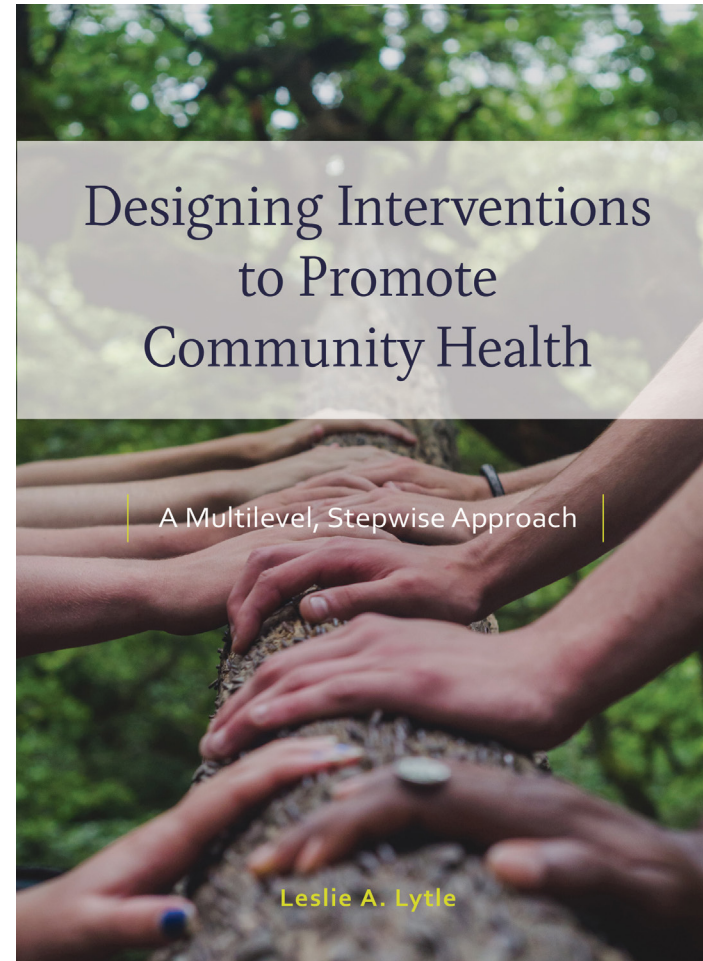
Designing and adapting interventions to promote community health: A multilevel, stepwise approach

Leslie A. Lytle, PhD

October 17, 2023

Why THIS book?

- ▶ Community-based health promotion and prevention approaches are more:
 - ▶ Equitable
 - ▶ Cost effective
 - ▶ Sustainable



Why NOW?

- ▶ Commitment to equitable approaches to healthy communities
- ▶ Call for the dissemination of effective interventions



Why ME?

- ▶ Public health researcher designing and evaluating community-based interventions for three decades
- ▶ PI of the some of the largest youth and young adult community interventions funded by NIH
- ▶ Three decades of training masters and doctoral level students





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Why do I have to
learn about
intervention
design???



- ▶ What is my destination?
- ▶ What are the protective and risk factors associated with the health outcome?
- ▶ How do I use behavioral theory?
- ▶ What intervention approaches will I use?
- ▶ How will I know if and how the intervention worked?
- ▶ How do I maximize what I can learn?

PLAN

1. Identify a behavior-based community health problem
2. Choose the relevant behavioral determinants
3. Create a conceptual model
4. Review model with Evaluation Team, Community



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5. Write intervention objectives and identify components
6. Design intervention strategies
7. Create a logic model
8. Share the logic model with Evaluation Team, Community



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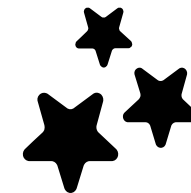
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9. Develop process evaluation measures
10. Finalize intervention protocol, training, materials



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9. Develop process evaluation measures
10. Finalize intervention protocol, training, materials

EVALUATE

11. Evaluate the effectiveness of the intervention
12. Prepare for the next iteration or dissemination



Community engagement in each phase is crucial...

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- ▶ The health issue is a priority for the community

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- ▶ The determinants targeted reflect determinants that are relevant to this community

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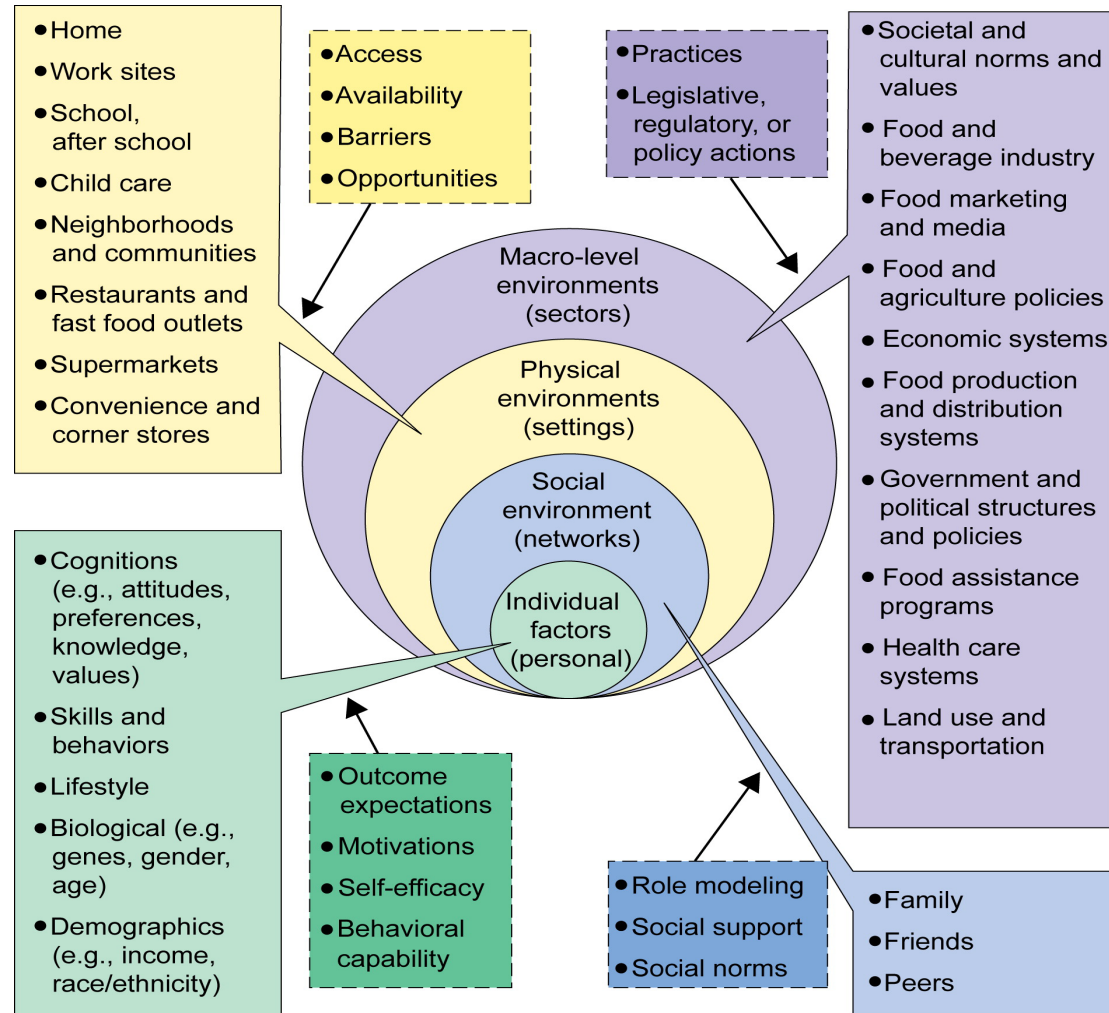
- ▶ The health issue is a priority for the community
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- ▶ The intervention reflects community values, builds on community assets, and increases community capacity

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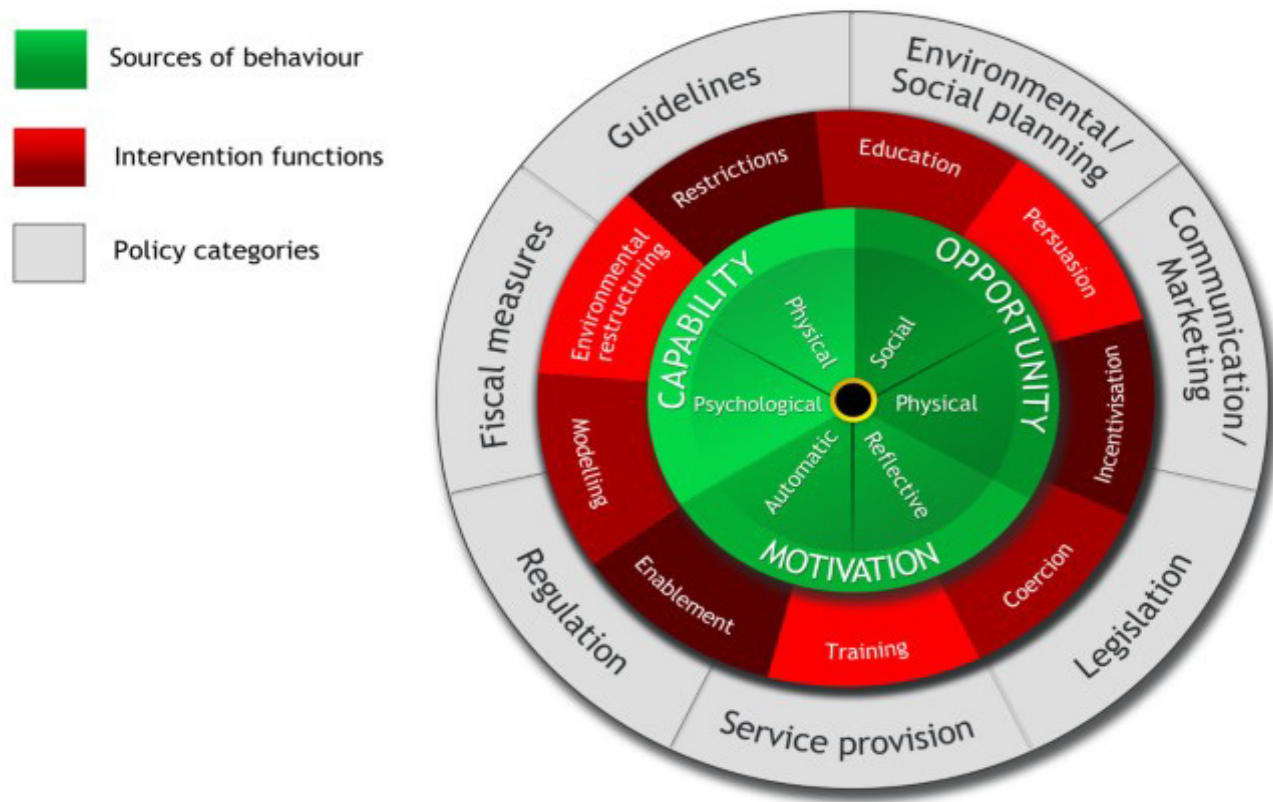
- ▶ The health issue is a priority for the community
- ▶ The determinants targeted reflect determinants that are relevant to this community
- ▶ The intervention reflects community values, builds on community assets, and increases community capacity
- ▶ The evaluation and results are meaningful to the community



Ecological model of obesity



Michie's Behavior Change Wheel



Limitations of ecological models: They do not...

- ▶ Prioritize factors to change

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- ▶ Limit consideration to factors that are mutable

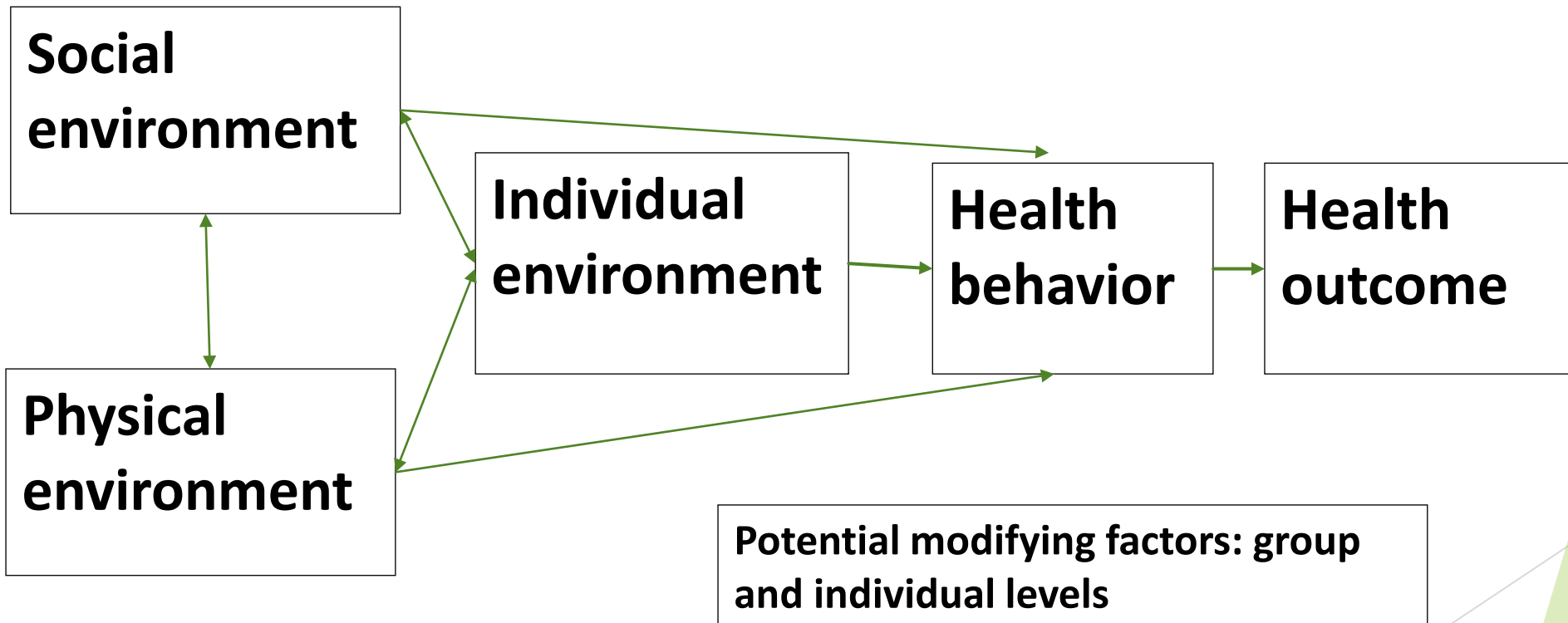
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- ▶ Prioritize factors to change
- ▶ Limit consideration to factors that are mutable
- ▶ Suggest a mechanism for change
- ▶ Suggest causality

Framework for designing multilevel interventions





Individual environment

- ▶ **Environment**
“between our ears”
- ▶ Knowledge, attitudes, perceptions of risk, cost/benefit analysis

Social environment

- ▶ How others influence our behavior
- ▶ Social support, role modeling of behaviors, social norms, vicarious learning, social reinforcement



Physical environment

- ▶ Aspects of place that influences our behavioral choices
- ▶ Availability, access, environmental cues and reinforcers
- ▶ Places without people





A multilevel intervention:

- Targets at least two environments
- Requires building multiple interventions
- For Multiple targets
- Often delivered by multiple actors

Determining the focus of the intervention

- ▶ Identify the determinants to target in an intervention in a specific community

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Determining the focus of the intervention

- ▶ Identify the determinants to target in an intervention in a specific community
- ▶ Determinant = Protective or risk factors that are related to the health outcome of interest
- ▶ The intervention will be designed to positively impact those determinants



- ▶ NHLBI-funded, multilevel intervention trial
- ▶ Goal: Evaluate the effectiveness of an intervention linking schools to communities to reduce the age-related decrease in moderate to vigorous physical activity in adolescent girls
- ▶ Primary outcome: Minutes of physical activity measured using accelerometers



- ▶ Randomized control trial
- ▶ 6 Field centers
- ▶ 36 schools
- ▶ Coordinating Center
- ▶ Three cross-sectional samples of girls recruited for measurement activities

Three ways to identify behavioral determinants

- ▶ Examine the **empirical evidence**
- ▶ Conduct a **formative evaluation** in the target community
- ▶ Consider **behavioral theory**

Evidence Table

Evidence Table: Shell

Behavior: _____ : Target Population: _____

Individual-Level Environment

Determinant	Specific Behavior	Type of Evidence	Population	Sample Size	Findings	Reference	Notes	Scoring
								Specific behavior= Evidence= Population= Sample size= Findings= Changeability= <hr/> Total score=

Social-Level Environment

Determinant	Specific Behavior	Type of Evidence	Population	Sample Size	Findings	Reference	Notes	Scoring
								Specific behavior= Evidence= Population= Sample size= Findings= Changeability= <hr/> Total score=

Physical-Level Environment

Determinant	Specific Behavior	Type of Evidence	Population	Sample Size	Findings	Reference	Notes	Scoring
								Specific behavior= Evidence= Population= Sample size= Findings= Changeability= <hr/> Total score=

Sample evidence table: Increasing physical activity in adolescent girls

Individual-level determinants

Determinant	Specific Behavior	Type of Evidence	Population	Sample Size	Findings	Reference	Notes	Scoring
Perceived barriers	Minutes of MVPA as measured via accelerometers	Longitudinal	Adolescent girls: mean age, 14.6 years Sample from urban area, Minnesota	291	Barriers scale (includes 12 items that include questions such as "I don't like to sweat; It would make me embarrassed) at baseline predicted MVPA 24 months later (B=-0.32; p<0.05)	Hearst et al, 2012	Barriers scale adapted from Dishman et al (2005)	
Habits	Minutes of MVPA as measured via accelerometers	Longitudinal	Adolescent girls: mean age, 14.6 years Sample from urban area, Minnesota	291	MVPA at baseline predicted MVPA 24 months later (B=0.58; p<0.01)	Hearst et al, 2012		
Self-efficacy	Minutes of MVPA after school, measured with accelerometers	Mediation analysis examining intervention effects	36 schools (T1 and T2) 34 schools (T3) Sample from 6 geographical areas in USA	1721 girls (T1); 3085 girls (T2); 3378 girls (T3)	Self-efficacy, as measured using a scale including 8 items, was a significant mediating variable between the TAAG intervention and MVPA minutes after school	Lytle et al, 2009	Self-efficacy scale adapted from Dishman et al (2002) Two cohorts of girls from 34-36 schools TAAG (Webber et al, 2009)	

Sample evidence table: Increasing physical activity in adolescent girls

Social-level determinants

Determinant	Specific Behavior	Type of Evidence	Population	Sample Size	Findings	Reference	Notes	Scoring
Content of PE class/ Observational learning and role modeling	Activity levels as assessed through an observational method (SOFIT)	Cross-sectional	36 schools in the USA (average enrollment=1027 students;47% non-white; 34% qualify for free or reduced lunches)	431 lessons observed	The proportion of vigorous activity seen during PE class varied by class content: Fitness activities: (36% VPA) Skill drills: (22.2% VPA) Game play: (13.6% VPA) Free play: (12.4% VPA) Management: (2.3% VPA) Knowledge-related : (0.6% VPA)	McKenzie, 2006	Only observations from adolescent girls included in the analysis	
Providing social support for PA to friends	Minutes of MVPA after school, measured with accelerometers	Mediation analysis examining intervention effects	36 schools (T1 and T2) 34 schools (T3)	1721 girls (T1); 3085 girls (T2); 3378 girls (T3)	Frequency of encouraging friends to do physical activity or play sport was a significant mediating variable between the TAAG intervention and MVPA minutes after school	Lytle et al, 2009	Two cohorts of girls from 34-36 schools TAAG (Webber et al, 2009)	
Receiving social support for PA from friends	Minutes of MVPA after school, measured with accelerometers	Mediation analysis examining intervention effects	36 schools (T1 and T2) 34 schools (T3)	1721 girls (T1); 3085 girls (T2); 3378 girls (T3)	A 3-item scale assessing the frequency of receiving encouragement from friends to be active was a significant mediating variable between the TAAG intervention and MVPA minutes after school	Lytle et al, 2009	Two cohorts of girls from 34-36 schools TAAG (Webber et al, 2009)	

Sample evidence table: Increasing physical activity in adolescent girls

Physical-level determinants

Determinant	Specific Behavior	Type of Evidence	Population	Sample Size	Findings	Reference	Notes	Scoring
Distance between home and school	MVPA as measured via accelerometer	Cross-sectional	Adolescent girls-mean age, 15.3 Sample from urban area, Minnesota	N=145	Controlling for demographics and a wide range of factors at the individual, social and physical environment levels, the only statistically significant association with MVPA was the distance between the home and school environment (B=-20, p<0.05)	Patnode et al, 2010	Environment measured using GIS	
Availability of PA equipment in the home	MVPA as measured via accelerometer	Cross-sectional	Adolescent girls, mean age 14.5 Sample from urban area, Minnesota	N=289,	The association between the presence of PA equipment in the home and MVPA was statistically and positively significant (B=1.16. P<0.01)	Sirard, et al, 2010	Measured using a validated home inventory (Sirard, 2008)	
Difficulty getting to and from community activities	Minutes of MVPA after school, measured with accelerometers	Mediation analysis examining intervention effects	36 schools (T1 and T2) 34 schools (T3)	1721 girls (T1); 3085 girls (T2); 3378 girls (T3)	3 items asking about perceived difficulty in getting to and from community activities mediated the relationship between the TAAG intervention and MVPA minutes after school	Lytle, et al, 2009	Two cohorts of girls from 34-36 schools TAAG (Webber et al, 2009)	

Possible determinants from empirical literature

Source	Individual	Social	Physical
Empirical evidence	<ul style="list-style-type: none">• Perceived barriers• Habits• Self-efficacy	<ul style="list-style-type: none">• Observational learning-PE class• Providing social support• Receiving social support	<ul style="list-style-type: none">• Distance between home and school• Availability of PE equipment• Transportation difficulties
Formative work			
Theory			

Use of formative assessment:

- ▶ Any data collection done to help ‘inform’ the intervention
- ▶ Helps answer the question, “What determinants may drive this behavior in this community?”
- ▶ *Important when creating a new intervention and adapting an existing intervention*

Formative Assessment

- ▶ Principal survey
- ▶ PE teachers
- ▶ Community agency survey
- ▶ Parent interviews
- ▶ Adolescent girls



Possible determinants from empirical literature and formative work...

Source	Individual	Social	Physical
Empirical evidence	<ul style="list-style-type: none"> • Perceived barriers • Habits • Self-efficacy 	<ul style="list-style-type: none"> • Observational learning-PE class • Providing social support • Receiving social support 	<ul style="list-style-type: none"> • Distance between home and school • Availability of PE equipment • Transportation difficulties
Formative work	<ul style="list-style-type: none"> • Perceived barriers • Self-identify • Self-efficacy • Lack of knowledge 	<ul style="list-style-type: none"> • Lack of social connection between schools and community • Social norms/expectations 	<ul style="list-style-type: none"> • Transportation issues • Availability of PE equipment • Access to non-sports afterschool activities
Theory			

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Theory			

The use of behavioral theory in designing interventions

Theories that help explain how change occurs

Theories that identify constructs related to a behavior

The use of behavioral theory in designing interventions

Theories that explain how change occurs

- Stages of Change
- Diffusion of Innovation
- Kingdon's Policy Stream

The use of behavioral theory in designing interventions

Theories that identify constructs related to health behavior

- Theory of Planned Behavior
- Health Belief Model
- Social Cognitive Theory

Possible determinants: All sources

Source	Individual	Social	Physical
Empirical evidence	<ul style="list-style-type: none"> • Perceived barriers • Habits • Self-efficacy 	<ul style="list-style-type: none"> • Observational learning-PE class • Providing social support • Receiving social support 	<ul style="list-style-type: none"> • Distance between home and school • Availability of PE equipment • Transportation difficulties
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Theory	<ul style="list-style-type: none"> • Outcome expectations/benefits-barriers 	<ul style="list-style-type: none"> • Social norms • Vicarious learning 	<ul style="list-style-type: none"> • Cues and reinforcements

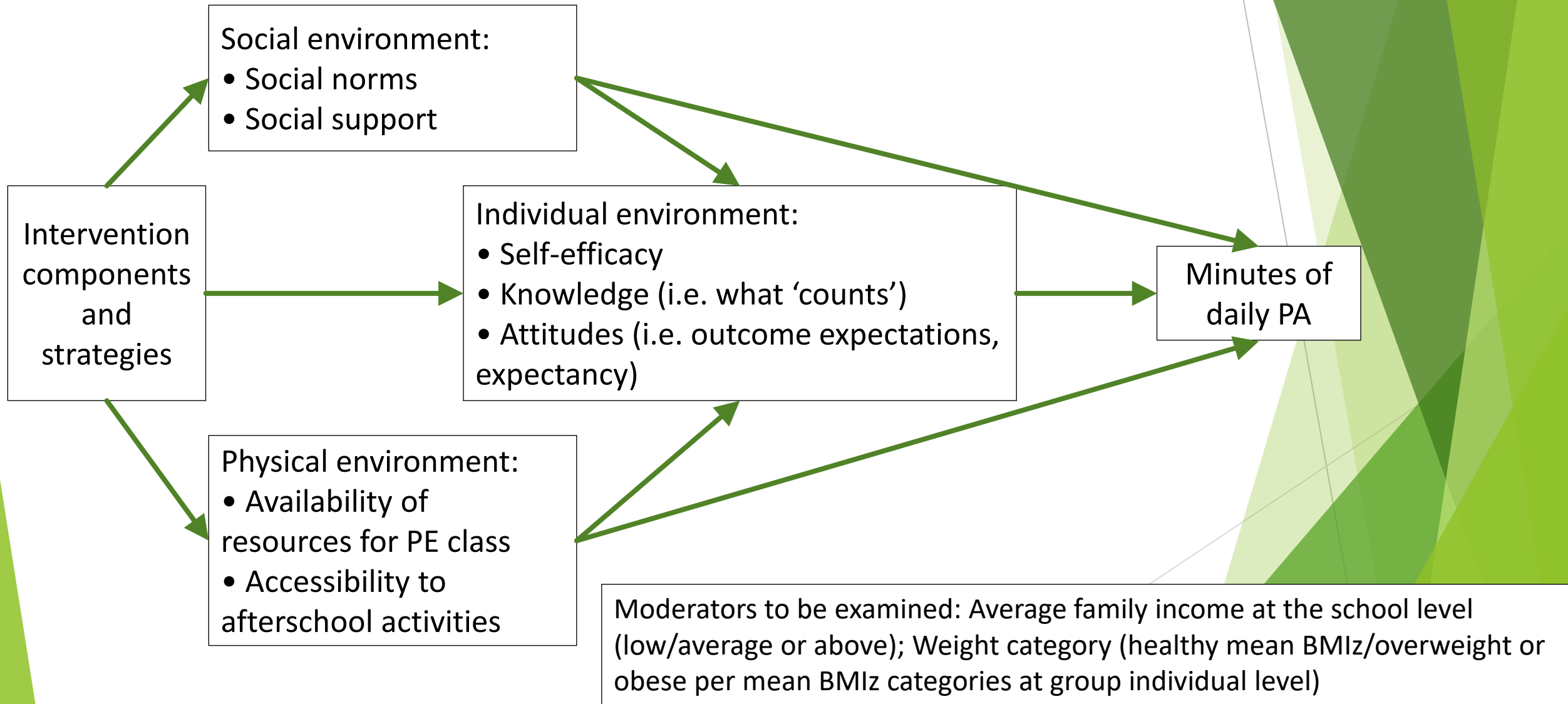
Choosing the most relevant determinants:

- ▶ Choose between 6-10 determinants from at least two environments
- ▶ Are there determinants that show up from more than one source?
- ▶ How strong is the relationship between the behavior and the determinant?
- ▶ Have other intervention studies been successful in changing the determinant?

Choosing the most relevant determinants:

- ▶ What determinants can most realistically be changed by this team, at this time, in this community, with the amount of resources available?
- ▶ Does targeting change in certain determinants complement the work and missions of community partners?

Conceptual Model: Increase Adolescent Girls' Levels of Physical Activity





Writing intervention objectives

DETERMINANT	INTERVENTION OBJECTIVE	INTERVENTION COMPONENT
Self-efficacy	Develop behavioral skills related to being active in order to increase self-efficacy	
Social Norms	Increase social norms around girls being active by exposing the school community to examples of all types of girls enjoying being active	
Accessibility to afterschool activities	Increase non-sports activities available to girls after school in school and community	

Matching components to environments

- ▶ Individual environment: classes, curricula, individual or group counseling, and health communication directed to individuals
- ▶ Social environment: social marketing or media campaigns, policy and practice changes that impact the social experience
- ▶ Physical environment: policies and practices that impact the availability and accessibility of choices, environmental cues and incentives



TAAG Primary intervention components

- ▶ TAAG PE
- ▶ Health Education with Activity Challenges
- ▶ Programs for Physical Activity
- ▶ TAAG Promotions



DETERMINANT	INTERVENTION OBJECTIVE	INTERVENTION COMPONENT
Self-efficacy	Develop behavioral skills related to being active in order to increase self-efficacy	<ul style="list-style-type: none"> • TAAG PE • Health education • TAAG Promotions
Social Norms	Increase social norms around girls being active by exposing the school community to examples of all types of girls enjoying being active	<ul style="list-style-type: none"> • TAAG Promotions • TAAG PE • Programs for Physical Activity
Accessibility to afterschool activities	Increase non-sports activities available to girls after school in school and community	<ul style="list-style-type: none"> • Programs for Physical Activity

Intervention strategies:

- ▶ Makes the intervention unique and tailored to the audience
- ▶ Enhanced by having team members with creative skills and experience
- ▶ Where BCTs are considered

Activity Challenge #1
CHALLENGE THE MYTH

NAME _____ CLASS _____ DUE DATE _____

My Activity Challenge Goal:

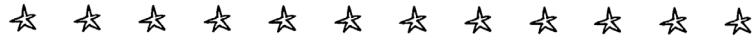
- I will try a physical activity I usually don't do or have never tried during the next week.

What to do:

1. The physical activity I will try:

2. Do I have a myth about this physical activity?

- Yes: _____
- No



Goal check:

☉ Did you meet your Activity Challenge goal?

- Yes **GREAT JOB!**
- No **KEEP ON TRYING!**



T/AH-1b

Health Education Activity Challenge





Ashley.
Got up & jogged before school.



Just aced her math test.
Coincidence?

TAAG. Real girls. Real activities. Real fun.

TAAG. Real girls. Real activities. Real fun.



Yer

Tiffany

Best friends.

Marathon phone calls.

Tried kickboxing for fun.

Can't believe how awesome they feel!



After school step class at a local community center



Kick Boxing- In School, After School



Looking for the Active Ingredients...

Defining 'Active ingredient'



Susan Michie: Behavior Change Techniques (BCTs)

Defining 'Active Ingredient'



Susan Michie: Behavior Change Techniques (BCTs)



Linda Collins: MOST Framework

Defining 'Active Ingredient'



Susan Michie: Behavior Change Techniques (BCTs)



Linda Collins: MOST Framework



PCORI: "Core Functions" versus "Form"

Defining ‘Active Ingredient’



Susan Michie: Behavior Change Techniques (BCTs)



Linda Collins: MOST



PCORI: “Core Function” versus “Form”



National Cancer Institutes: Content, Delivery, Change strategies

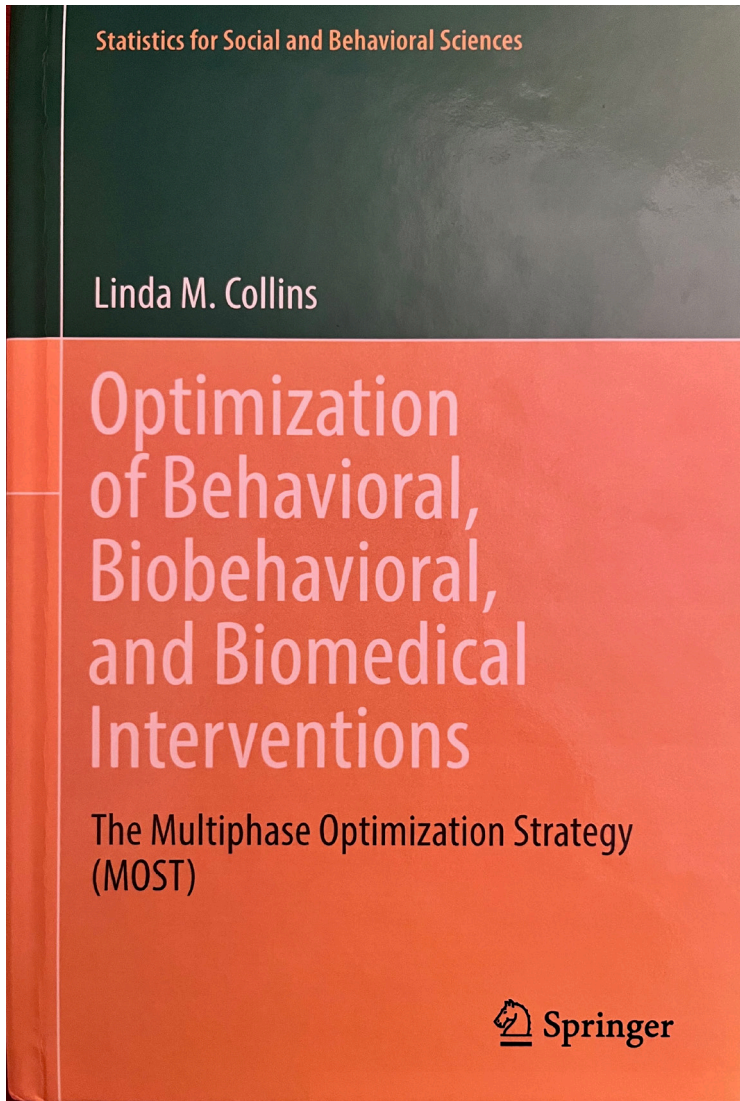
Types of Interventions

Fixed Interventions: All participants are offered the same set of intervention components in a uniform manner

Adaptative interventions: Aspects of an intervention (content, dose, or general approach) may be altered at critical decision points, based on pre-specified triggers, as a way to achieve or maintain a good outcome for participants

Quantitative approaches to identify the active ingredient of an MLI

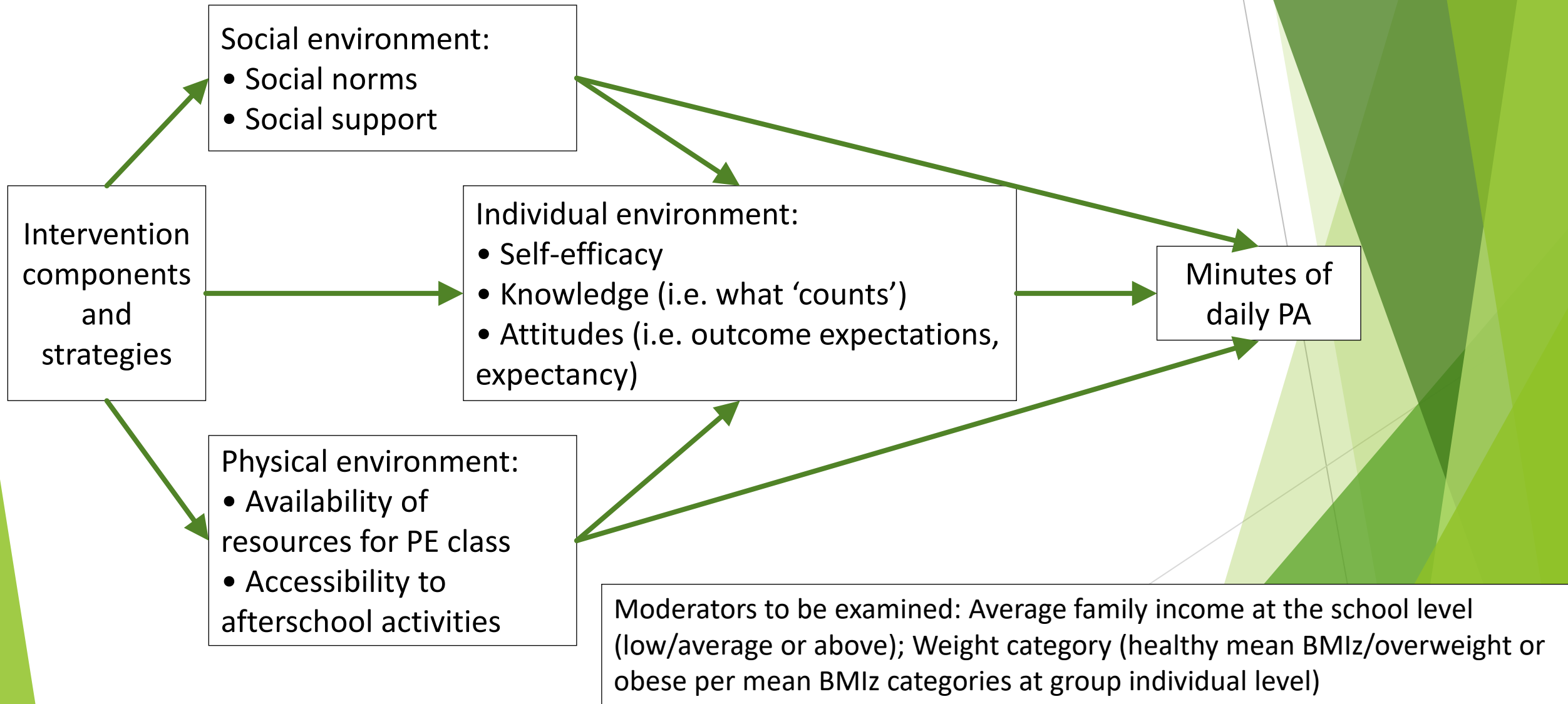
- ▶ MOST
- ▶ Mediation analysis
- ▶ Comparative effectiveness analysis



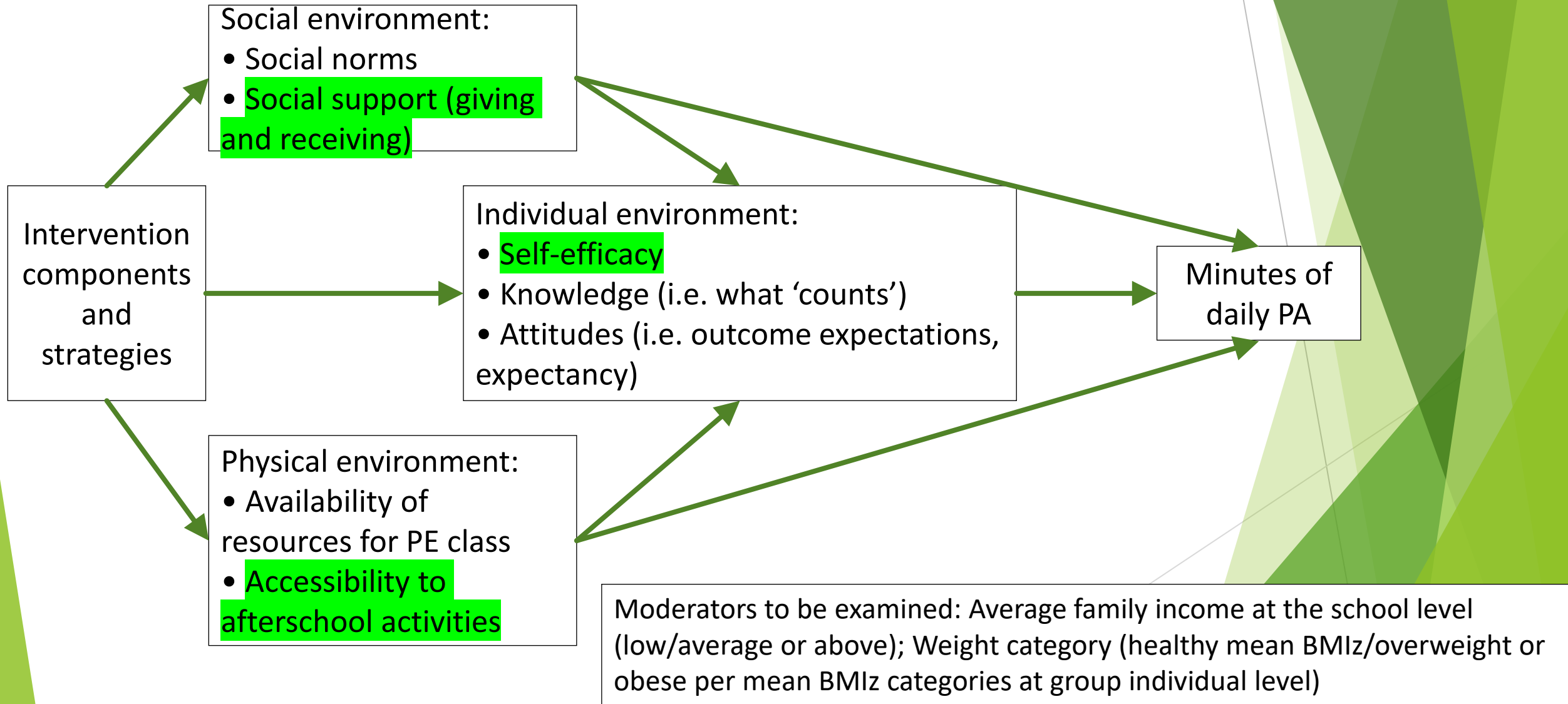
MOST

- ▶ Identify active ingredients prior to an RCT
- ▶ Investigators suggest pre-specified criteria
- ▶ “Optimized intervention” is built to be tested in an RCT

Conceptual Model: Increase Adolescent Girls' Levels of Physical Activity



Conceptual Model: Increase Adolescent Girls' Levels of Physical Activity



Child and Adolescent Trial for Cardiovascular Health (CATCH)

Evaluated the comparative effectiveness of school and family approaches to reduce CVD risk in children

Followed a cohort of third graders for three years (3-5th grade) in four states (CA, LA, MN, TX)

Primary outcome: Serum cholesterol

Secondary outcomes: Students health behavior; School-level changes

Hearty Heart & Friends



3rd Grade
Workbook

Go for Health Series

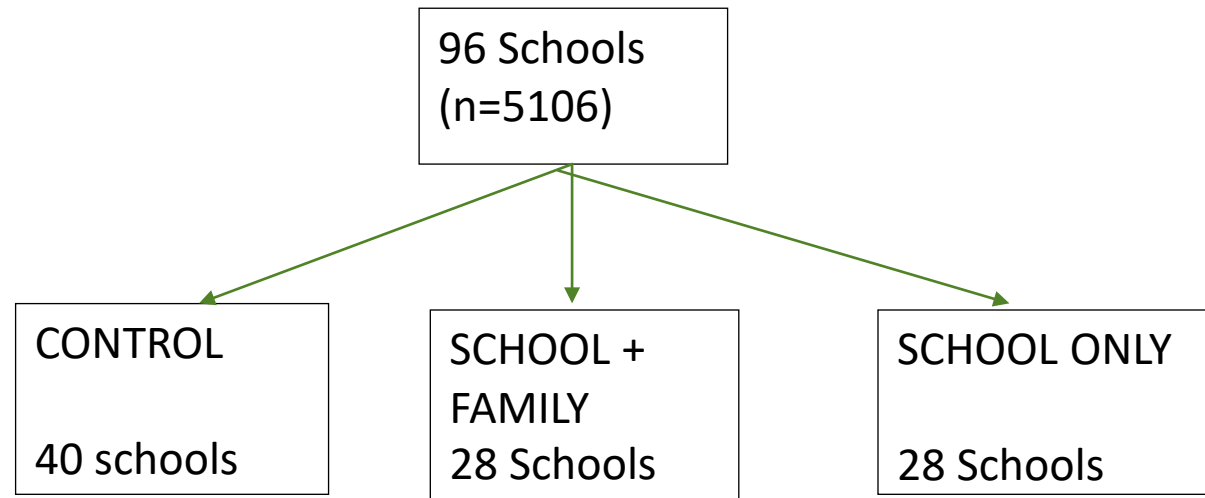








Example of a comparative effectiveness trial: CATCH



CATCH: Findings

Child level: • Improved eating and activity behaviors

School level: • Reduced fat content of school lunches

- Increased the time spent in MVPA during PE class

Family level: • Only modest benefits in dietary knowledge



- ▶ Disseminated as “Child Approaches To Cardiovascular Health”
- ▶ 15,000 school and childcare sites
- ▶ Reaching over 3 Million PreK to Grade 12 students annually





COMMUNITY



COMMUNITY



SCIENCE





Questions?

Contact: [*llytle@email.unc.edu*](mailto:llytle@email.unc.edu)