IMPLEMENTATION SCIENCE INTRODUCTION
TAREN SWINDLE, PHD
OBJECTIVES FOR THIS SESSION

- Describe the language of Implementation Science (IS).
- Identify key elements of IS designs.
- Describe 3 applications of IS in the nutrition education and behavior field.
IMPLEMENTATION SCIENCE DEFINED

“Implementation Science is the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practice into routine practice, and, hence, to improve the quality and effectiveness…”

-Eccles & Mittman, Implementation Science, 2006
IS “IS” REALLY SOMETHING NEW?

Familiar Concepts

- Formative Research
  - Contextual Assessment
  - Stakeholder Engagement
- Theory-Driven Intervention
- Process Evaluations

New(er) Concepts

- Linking implementation outcomes to health outcomes
- Focus on testing manipulations to implementation process
- Comparing implementation approaches on fidelity, costs, sustainability, etc.

KEY IMPLEMENTATION SCIENCE TERMS

Innovation
- The evidence-based "thing" you are trying to get people/systems to do

Implementation Strategies
- Action taken to get people/systems to do the innovation

Implementation Context
- Setting for implementing the innovation; Inner and outer environmental factors influencing implementation
WHAT WILL YOU “DO” TO GET PEOPLE TO USE THE “THING”?

- G. CURRAN
IN THIS PICTURE…

Innovation – the thing!

An implementation strategy

Context
KEY IMPLEMENTATION SCIENCE OUTCOMES

Adoption
- Initial uptake of the innovation

Fidelity
- Quality or integrity of delivery of the innovation

Sustainability
- Continued use of the innovation; integration into the context

WHICH IMPLEMENTATION STRATEGY (OR STRATEGIES) WILL PROMOTE ADOPTION, FIDELITY, AND SUSTAINABILITY OF THE INNOVATION GIVEN FEATURES OF THE CONTEXT?
THEORIES, MODELS, AND FRAMEWORKS

Theories
- Propose causal mechanisms
- Imply prediction
- Classic and Implementation

Models
- Propose guidance for implementation process
- Provide research to practice steps/strategies

Frameworks
- Propose factors that could influence implementation
- Determinant and evaluation

OPPORTUNITIES IN IS FOR NUTRITION EDUCATION & BEHAVIOR

Apply Implementation Science
- Choose implementation strategies based on context.

Integrate Implementation Science Approaches in Research
- Measure implementation outcomes and delivery of implementation strategies.

Contribute to Implementation Science Knowledge
- Conduct comparative effectiveness implementation trials.
  - Test implementation theories.
Do model-suggested strategies outperform a standard implementation for improving implementation and child outcomes?

Do stakeholder-selected strategies outperform a standard implementation for improving implementation and child outcomes?

What determinants influence implementation outcomes at three levels: client, provider, and organization?
Applying Implementation Science Theories, Models, and Frameworks to Study Go NAPSACC in Kentucky

Amber Vaughn
July 29, 2019
Funding

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- CDC, U48DP005017
- The content is solely the responsibility of the authors and does not necessarily represent the official views of any funders.
Overview

The Thing
- Go NAPSACC

Theory/Strategies
- Quality Implementation Framework
- Consolidated Framework for Implem. Research
- REAIM

Design
- Type 3 hybrid with RCT

Outcomes
Go NAPSACC
Go NAPSACC

PURPOSE
Support improvements to child care environments that foster healthy eating, physical activity, and overall development in children

- Original NAPSACC = delivered to child care programs in person by NAPSACC Consultant using paper-based tools
- Go NAPSACC = translated tools into interactive online format, streamlined support required from NAPSACC Consultant
Go NAPSACC

PURPOSE
Support improvements to child care environments that foster healthy eating, physical activity, and overall development in children
Go NAPSACC

PURPOSE
Support improvements to child care environments that foster healthy eating, physical activity, and overall development in children
Common Barriers to Implementation

- Variation in background/experience of Go NAPSACC Consultants
- Unable to convert child care programs to active users
- Lack of adherence to 5-step improvement process
- Lack of director motivation
- Lack of engagement of child care staff
- Turnover in program management
- Lack of opportunities for peer learning to share ideas
- Lack of funding

Theories, Models, and Frameworks
Summative Articles

  - Identify theories and frameworks commonly used in dissemination and implementation research
  - 61 models identified

  - Purpose/use of theories:
  - How should we implement the innovation?
  - What will influence the success of implementation?
  - How do we evaluate implementation success?
How to Implement

How do we improve Go NAPSACC implementation to address common barriers?

Quality Implementation Framework (QIF)

- Synthesis of implementation literature
- Critical steps for high-quality implementation
- Four phases
Quality Implementation Framework

Assessment, Adaptation, Capacity Building

Creating Structure for Implementation

Applying Lessons Learned

Ongoing Implementation Support
Quality Implementation Framework

Phase 1
- Identify staff for implementation team
- Assess needs, fit, and capacity/readiness
- Identify needed adaptations

Phase 2
- Facilitate center capacity building (general and intervention specific)
- Develop a plan for Go NAPSACC implementation

Phase 3
- Implement Go NAPSACC
- Use online tools work through two cycles of the 5-step improvement process

Phase 4
- Participate in cross-center team meetings to share experiences learn from other centers

Assessment, Adaptation
Capacity Building, Plan for Implementation
Applying Lessons Learned
Ongoing Implementation Support

Identify/prepare champions
Assess readiness/barriers
Conduct educational outreach visits
Tailor content to address priority needs

Implementation team meetings
Reminders
Facilitation

What Influences Implementation

What contextual factors may be barriers or facilitators to Go NAPSACC implementation?

Consolidated Framework for Implementation Research (CFIR)
- Outer setting
- Inner setting
- Individuals involved
- Innovation characteristics
- Implementation process
Consolidated Framework for Implementation Research

Inner Setting
- Communication
  - Culture
- Implementation climate
- Readiness

Individuals Involved
- Knowledge and beliefs
  - Self-efficacy

EXAMPLES:

Communication: adequacy of efforts using formal or informal methods for two-way communication between admin, staff, and families

Knowledge and beliefs: Staff are knowledgeable about how to support healthy eating and physical activity; they believe these efforts are worthwhile
How to Evaluate Implementation

How do we identify and evaluate important implementation outcomes?

RE-AIM

- Adoption
  - Number
  - Representativeness

- Implementation fidelity

- Efficacy
- Maintenance
Research Design
Study Design

- Type 3 hybrid effectiveness-implementation trial with a cluster-randomized design.

- Participants:
  - 18 Child Care Aware Coaches
  - 97 Child Care Centers, 1 director and 1 teacher from each
  - 485 Children, about 5 per center, 3-4 years old, at two timepoints

- Randomize coaches following baseline data collection
  - Basic Go NAPSACC or Enhanced Go NAPSACC

- Implement Basic or Enhanced Go NAPSACC for 12 months
Outcomes
Implementation Outcomes

- Centers’ implementation of evidence-based nutrition and physical activity practices (assessed via EPAO)
- Centers’ successful completion of key steps of Go NAPSACC participation (assessed via website use)
  - Registration
  - Self-assessment
  - Setting goals and creating action plans
  - Completing action plans
  - Completing trainings
  - Repeating the self-assessment
Implementation Outcomes (cont.)

- Coaches’ successful delivery of key components of their assigned implementation approach, Basic or Enhanced (assessed via TA Activity log on website)
- Centers’ and coaches’ perspectives of the implementation context (assessed via survey)
- Cost of implementation from the perspective of Child Care Aware
Health Outcomes

- Children’s diet quality for meals and snacks eaten at child care
- Children’s physical activity at child care
- Children’s BMI
Project Team

- PI = Dianne S. Ward, EdD
- Co-Investigators = Alice Ammerman, Geoffrey Curran, Derek Hales, Byron Powell, Christina Studts, Justin Trogden, Amber Vaughn
- Project Managers = Regan Burney, Julie Jacobs
- Community Partners = Child Care Aware of Kentucky, Kentucky Department for Public Health
SELECTING IMPLEMENTATION STRATEGIES WITH STAKEHOLDER INPUT

TAREN SWINDLE, PHD
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NIH NIDDK R03 DK117197-01
Arkansas Biosciences Institute
Lincoln Health Foundation

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The content is solely the responsibility of the authors and does not necessarily represent the official views of the funding agencies.
The Thing

Theory

Integrated Promoting Action on Research Implementation in Health Services (i-PARIHS)

Strategies

Multi-faceted bundle with 7 discrete strategies

Outcomes

Re-AIM Child Health
THE THING

TOGETHER, WE INSPIRE SMART EATING
### THE “THING”

<table>
<thead>
<tr>
<th>Evidence Based Practice</th>
<th>Behaviors</th>
<th>References and Guidelines</th>
</tr>
</thead>
</table>
| Engaging mascot                          | - Uses mascot during activity.  
| Multiple, hands-on exposures             | - Completes lesson in prescribed group size.  
| Role Modeling                            | - Eats food with the children.  
| Positive feeding practices               | - Cues hunger and satiety.  
- Encourages food exploration.  
WISE RESULTS

- Sustained improvements in educator knowledge
- Outperformed standard for improving child diet (FFQ)
- Improvements supported by biomarker measure

THE THEORY

I-PARIHS
THE IMPLEMENTATION THEORY FRAMEWORK

Facilitation

Successful Implementation

Context

Innovation

Recipient

i-PARIHS Framework
THE RESEARCH QUESTIONS

Will stakeholder-selected strategies outperform a basic implementation approach on implementation and child outcomes?

- What barriers and facilitators do stakeholders prioritize?
- What strategies do stakeholders see as most feasible and important to address prioritized barriers and facilitators?
THE RESEARCH DESIGN

Cluster, Randomized Hybrid III Trial

• Evidence-Based Quality Improvement Panels
• Concept Mapping
• Liberating Structures

Develop Enhanced WISE strategy with stakeholders through EBQI to address Barriers/Facilitators (Aim 1)*)

Randomize ECEs

Basic WISE (N = 20)*

Enhanced WISE (N = 20)*

Monitor Implementation Outcomes
Fidelity, Acceptability, Feasibility, Feeding Practices*

Monitor Child Outcomes
FFQ, BMI, RRS

Compare Implementation and Child Outcomes (Aim 2)*
EVIDENCE-BASED QUALITY IMPROVEMENT

- Rate most important barriers and facilitators
- Link priorities to possible ERIC strategies
- Rate potential strategies on importance & feasibility
- Gather feedback to improve

Set priorities

Map to Possible Strategies

Concept Mapping

Present draft materials

### THE BARRIERS & FACILITATORS PRIORITIZED

<table>
<thead>
<tr>
<th>Context</th>
<th>Innovation</th>
<th>Recipients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership Support</td>
<td>Time</td>
<td>Classroom Skills</td>
</tr>
<tr>
<td>Capacity &amp; climate for change</td>
<td>Perception of fit &amp; advantage</td>
<td>Beliefs</td>
</tr>
</tbody>
</table>
CONCEPT MAPPING

Date of Concept Mapping Ratings: Hands on Support

Rating Date
2017-11-04

Note: Please choose the date of the survey
Generate Plot

Survey Questions
1. Educational Materials (e.g., handout) that provides tips on structuring the classroom for small groups and the benefits of small groups.
2. A Change in the Physical Environment (e.g., classroom visit template) that helps educators set up their classroom to accommodate small group.
3. Create opportunities to Model the Change (e.g., teacher visits to classrooms using small groups).
4. Promote Adaptability through materials/conversation guides that emphasize how educators can tailor small groups to fit their needs.
5. Offer incentives to teachers who try it a set number of times.
6. Develop a Resource Sharing Agreement to design who will do what (e.g., rotate children, clean up, prep supplies).
7. Ongoing Trainings throughout the school year that emphasize the research evidence and local successes stories about conducting WISE in small groups.

Powell, B. J., Beidas, R. S., Lewis, C. C., Aarons, G. A., McMillen, J. C., Proctor, E. K., & Mandell, D. S., 2017
IMPLEMENTATION STRATEGIES

MULTIFACETED PACKAGE
THE STRATEGIES SELECTED

1. Obtain formal commitments.
2. Develop an implementation blueprint.
3. Remind implementers.
4. Identify and prepare champions.
5. Facilitation
6. Develop educational materials.
7. Alter incentive structures.

THE MULTI-FACETED IMPLEMENTATION STRATEGY
<table>
<thead>
<tr>
<th>Strategy</th>
<th>Actor</th>
<th>Action</th>
<th>Temporality</th>
<th>Dose</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify &amp; prepare champions</td>
<td>Volunteer or designated at each enhanced site</td>
<td>Provide 3 hour training in how to advocate, educate, and navigate for WISE</td>
<td>Within 2 months of teacher training</td>
<td>One-time training with facilitator contacts</td>
<td>Provide local contact to increase capacity for change.</td>
</tr>
<tr>
<td>Incentives</td>
<td>Classroom teacher pairs will receive incentives (i.e., classroom supplies) from WISE staff</td>
<td>Provide tailored incentives reflective of use of 4 key practices.</td>
<td>Educators can earn new incentives each quarter</td>
<td>Varies by teacher (0 – 8 incentives may be earned)</td>
<td>Increase likelihood educators will try WISE practices &amp; create first-hand experience with advantages; leverage social norms.</td>
</tr>
</tbody>
</table>

OUTCOMES
IMPLEMENTATION AND HEALTH
### The Implementation Outcomes

<table>
<thead>
<tr>
<th>Construct</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reach</td>
<td>Number of Lessons delivered</td>
</tr>
<tr>
<td>Effectiveness</td>
<td>Child Food Frequency; Child BMI; Child RRS scan</td>
</tr>
<tr>
<td>Adoption</td>
<td>Food purchase records; Organizational Readiness for Implementing Change¹</td>
</tr>
<tr>
<td>Implementation</td>
<td>WISE fidelity, Acceptability, Feasibility²</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Fidelity in following school year</td>
</tr>
</tbody>
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RESULTS
PRELIMINARY!
QUALITATIVE FEEDBACK

“I was very pleased with how they would come out to the center and talk with me to see if there was anything I needed. They went to the classrooms to check on the teachers to see how things were going… I just couldn’t believe how they just tagged on to us ….I just don’t think there was anything lacking that we didn’t get here that we needed or I needed.”

– Center director

“When we had our teacher meeting, I had them watch the videos. And they got some stuff from the videos. I liked the videos y’all sent. I got to learn more stuff and then pass it on to them.”

– WISE Champion

“She came back and gave the other classes a reward. We did all this and you still gave us a bad report? Nah. Something is wrong with this picture.”

– Assistant Teacher
PRELIMINARY QUANTITATIVE RESULTS

- $215 per classroom to deliver enhanced support for one year

- Significant treatment effects for:
  - Fidelity to Role Modeling
  - Fidelity to Engaging Mascot

- Marginal treatment effects for:
  - Fidelity to Hands-On Exposure
THANK YOU!

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Disseminating and Implementing a Lifestyle-based Healthy Weight Program for Mothers in a National Organization

Rachel Tabak, PhD, RD
Washington University in St. Louis

July 29, 2019
Disclosures

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  - R01HL143360
  - R01DK121475
  - Washington University Center for Diabetes Translation Research (P30DK092950)
  - Washington University Institute of Clinical and Translational Sciences (UL1 TR000448)
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Overview

The Thing

HEALTH

Theory

Consolidated Framework For Implementation Research

RE-AIM (Reach, Effectiveness, Implementation, Adoption, Maintenance)

Strategies

Develop and distribute HEALTH educational materials

Make parent educator training dynamic

Provide ongoing consultation

Outcomes

RE-AIM

Mom's weight
The Things (i.e., innovation or evidence-based intervention)
Partnership with Parents as Teachers

- In 2016-2017, PAT served:
  - 190,000 families
  - 227,000 children
# History of our 20 year partnership with PAT

<table>
<thead>
<tr>
<th>Phase</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>High 5 Low Fat</td>
<td>1998-2001</td>
</tr>
<tr>
<td>High 5 for Kids</td>
<td>2001-2005</td>
</tr>
<tr>
<td>BALANCE</td>
<td>2005-2011</td>
</tr>
<tr>
<td>LIFE-Moms</td>
<td>2011-2018</td>
</tr>
<tr>
<td>HEALTH</td>
<td>2011-2018</td>
</tr>
<tr>
<td>HEALTH D&amp;I</td>
<td>2018-2023</td>
</tr>
<tr>
<td>LIFE-Moms D&amp;I</td>
<td>2019-2024</td>
</tr>
</tbody>
</table>

**Context assessment pilot**
Healthy Eating & Active Living Taught at Home (HEALTH)

- Embedded lifestyle intervention
- Within curriculum for Parents as Teachers
- Simplified content – dietary behaviors most likely to impact weight
- Mothers (n=179) of preschool children with overweight or obesity

Maternal Weight Change over 24 Months in HEALTH Effectiveness Trial by Randomization Assignment

-2 -0.7 0 2 3.2
Weight Change (kg)

Baseline 12-month 24-month

0 2 3.2
Months after randomization

-2 -0.7 0 2 3.2
Weight Change (kg)

Baseline 12-month 24-month

R18DK089461, Haire-Joshu P(I)
HEALTH Dissemination & Implementation

- Research design: Cluster randomized
- 28 sites (532 moms) nationwide
  - Randomized: HEALTH or Usual care
- Effectiveness on weight and behaviors (e.g., soda intake)
- Mother, sites, parent educators
  - Implementation outcomes (RE-AIM)
  - Context (CFIR)

R01HL143360, Tabak (PI)

The Implementation theory frameworks
The Implementation theory frameworks: RE-AIM (Reach, Effectiveness, Implementation, Adoption, Maintenance)

The Implementation theory frameworks: Consolidated Framework For Implementation Research (CFIR)

https://implementationscience.biomedcentral.com/articles/10.1186/1748-5908-4-50
Understanding implementation context

- 10 site leaders and 6 parent educators in 8 states
- Semi-structured interviews and a survey
- Positive perspectives of LIFE-Moms
  - Recommended materials be highly visual, low literacy, Spanish
  - Flexibility to tailor to family’s needs and context
  - Prefer virtual training to avoid travel
Implementation strategy
HEALTH Training Curriculum

- Develop and distribute HEALTH educational materials
- Make parent educator training dynamic
- Provide ongoing consultation
Implementation outcomes
<table>
<thead>
<tr>
<th>RE-AIM Outcome</th>
<th>Definition</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reach/Representativeness</strong></td>
<td>Absolute number, proportion, and representativeness of individuals who participate in HEALTH</td>
<td>• PAT site</td>
</tr>
<tr>
<td><strong>Effectiveness</strong></td>
<td>Impact of HEALTH on weight and important lifestyle behaviors (e.g., diet and activity)</td>
<td>• Individual participant</td>
</tr>
<tr>
<td><strong>Adoption</strong></td>
<td>Intention, initial decision, or action to try or employ HEALTH; “uptake”</td>
<td>• PAT site</td>
</tr>
<tr>
<td><strong>Appropriateness</strong></td>
<td>Perceived fit, relevance, and compatibility of HEALTH for PAT and parent educators; and perceived fit of HEALTH to address weight</td>
<td>• Parent educator</td>
</tr>
<tr>
<td><strong>Feasibility</strong></td>
<td>Extent to which HEALTH can be successfully used or carried out within a given agency or setting</td>
<td>• Parent educator</td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Acceptability</strong></td>
<td>Perception among implementation stakeholders that HEALTH is agreeable, palatable, or satisfactory</td>
<td>• Individual participant • Parent educator • PAT site</td>
</tr>
<tr>
<td><strong>Fidelity</strong></td>
<td>Degree to which HEALTH was implemented as prescribed in the original protocol or as it was intended by the program developers</td>
<td>• Parent educator</td>
</tr>
<tr>
<td><strong>Adaptation</strong></td>
<td>Planned or purposeful changes and unintentional deviations to the design or delivery of HEALTH</td>
<td>• Parent educator</td>
</tr>
<tr>
<td><strong>Maintenance/Sustainability</strong></td>
<td>Extent to which HEALTH is maintained or institutionalized within PAT’s ongoing, stable operations</td>
<td>• PAT site • PAT National Center</td>
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*aIncludes qualitative measures*
Acknowledgements

Thanks to: Ross Brownson, Debra Haire-Joshu, Stephanie Mazzucca, Enola Proctor, Cindy Schwarz, Ronni Byrth, Allison Kemner, Allie Phad, Shelly Johnston, Brad Evanoff, Jaime Strickland, and Washington University Network for D&I Research (WUNDIR)
Resources for D&I research
Textbooks
D&I Resources

- **Washington University in St. Louis - DIRC toolkits**
  - Intro to D&I, Aims, Barriers & Facilitators, Implementation Outcomes, Designs, Implementation Organizational Measures, Implementation Strategies, Guidelines, Checklist for writing IR proposals
  - [https://sites.wustl.edu/wudandi/di-toolkits/](https://sites.wustl.edu/wudandi/di-toolkits/)

- **Veteran Affairs’ Quality Enhancement Research Initiative**
  - [http://www.queri.research.va.gov/implementation/quality_improvement/default.cfm](http://www.queri.research.va.gov/implementation/quality_improvement/default.cfm)

- **National Cancer Institute’s Implementation Science Team**
  - [http://cancercontrol.cancer.gov/is/](http://cancercontrol.cancer.gov/is/)

- **Canadian Knowledge Translation Clearinghouse website**
  - [http://ktcanada.net/](http://ktcanada.net/)

- **Grid-Enabled Measures developed by the National Cancer Institute**

- **Training Institute on Dissemination and Implementation Research (TIDIRH), National Institutes of Health**
  - [https://obssr.od.nih.gov/training/training-supported-by-the-obssr/training-tidirh/](https://obssr.od.nih.gov/training/training-supported-by-the-obssr/training-tidirh/)

- **ACCORDS – University of Colorado**
  - [http://www.ucdenver.edu/academics/colleges/medicalschool/programs/ACCORDS/sharedresources/DandI/Pages/Resources.aspx](http://www.ucdenver.edu/academics/colleges/medicalschool/programs/ACCORDS/sharedresources/DandI/Pages/Resources.aspx)
NIH Funding Opportunities

- Dissemination and Implementation Research in Health
  - R01 PAR-19-274
  - R21 PAR-19-275
  - R03 PAR-19-276
- Standing study section