Multilevel, Adaptive, Implementation Strategies (MAISYs)

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Outline

• Implementers Have to Make Many Decisions @ Many Levels

• Multilevel Adaptive Implementation Strategies
  What? Why? Who?

• Using Randomization to Construct an Optimized MAISY

I rarely get through the third part.
Evidence-based practices fail to be implemented or sustained due to barriers at multiple levels. For example:

@System Level
- Ineffective communication, monitoring practices, policies

@Clinic Level
- Lack of support, workflow processes

@Clinician Level
- Lack of skills
Determinants to Implementation at Multiple Levels

Evidence-based practices fail to be implemented or sustained due to barriers at multiple levels. For example,

@System Level  Ineffective communication, monitoring practices, policies
@Clinic Level  Lack of support, workflow processes
@Clinician Level  Lack of skills
Implementation Strategies at Multiple Levels

A growing cadre of implementation strategies can help mitigate these challenges. For example,

@System Level
Audit \( \text{Feedback}_S \)

Ineffective monitoring practices

@Clinic Level
Facilitation\(_\text{CC} \)

Lack of support

@Clinician Level
Coaching\(_\text{CN} \)

Lack of skills
Quick Review: What is an Implementation Strategy?

- Implementer
- Levels
- Targets
- Action
- Outcomes
- Rationale

Proctor, Powell, McMillen (2013), *Impl Sci*
From the Perspective of the Implementer

What works for one target may not work for another target

What works in the short-run may not work in the longer-run, or vice-versa

Between-target Heterogeneity

Within-target Heterogeneity
From the Perspective of the Implementer

I took the idea for a slide like this from Byron Powell.
From the Perspective of the Implementer

But a Decision is Not Just Any Action
What if we do this, instead?
This strategy has these extra components

- Implementer
- Levels
- Targets
- Action Options
- Baseline Status
- Decision Rule
- Outcomes
- Rationale
This strategy has these extra components

- Implementer
- Levels
- Targets
- Action Options
- Baseline Status
- Decision Rule
- Outcomes
- Rationale

The “determinant” here is the measure (the variable), which takes on different values.
Between-target Heterogeneity @ Baseline ✔
Within-target Heterogeneity ✗
In many settings, what implementers will need is
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One that guides how best to adjust strategies given **both baseline and ongoing needs** of targets at the multiple levels of implementation.
Outline

• Many Decisions at Many Levels

• Let’s Close this Loop using a Multilevel Adaptive Implementation Strategy

• Using Randomization to Construct an Optimized MAISY
Multilevel Adaptive Implementation Strategy (MAISY)

A MAISY is a sequence of decision rules used to guide how best to adapt the provision of implementation strategies

(i) at critical decision points,
(ii) across multiple levels,
(iii) based on **both baseline and ongoing/changing status** of the targets in an organization.
Multilevel Adaptive Implementation Strategy (MAISY)
Multilevel Adaptive Implementation Strategy (MAISY)

- Implementer
- Decision Levels
- Targets
- Decision Points
- Action Options
- Tailoring Vars
- Decision Rules
- Outcomes
- Rationale
MAISY Example #1
Adaptive School-based Implementation of CBT (ASIC)

EBP: Cognitive Behavioral Therapy in Michigan Schools
Developer: Amy Kilbourne

Start-up School:
A school with school professionals who do not have training in CBT or have never provided CBT to any of their students.
MAISY Example #1
Adaptive School-based Implementation of CBT (ASIC)
EBP: Cognitive Behavioral Therapy in Michigan Schools
Developer: Amy Kilbourne

**Slow-responding School:**
(i) Any SP reports not providing 3+ CBT components to >10 students
OR  (ii) SPs report >2 barriers to CBT delivery (on average)
MAISY Example #2
Feedback & Outcomes for Clinically Useful Student Svcs (FOCUSS)
EBP: Measurement-based Care in Connecticut Schools
Developer: Elizabeth Connors

**Under-implementing Clinician:**
Collected 1+ outcome measure on <40% of students served in first 4 months
Why MAISYs?

**Timing is important**
Speed of adoption varies; not all targets are ready to take on more

**Strategic sequencing**
Lay a strong foundation for subsequent strategies, if needed

**Health equity**
MAISYs are consistent with “vertical health equity” principles
Why MAISYs?

**Engagement is critical**
In short-run, not just about fidelity or quant. of implementation

**Often, more is not better**
Kitchen sink strategies can lead to suboptimal implementation

**Resource/Cost efficiency**
Step-up for targets that need it; step-down for targets doing well
MAISYs are Guides for Implementers

• Implementation practitioners
• Community service providers
• Policy makers
• Clinical leaders
• Researchers
MAISYs are Guides for Implementers, not Researchers

- Implementation practitioners
- Community service providers
- Policy makers
- Clinical leaders

Researchers unless the Researcher happens to be in the role of the Implementer for purposes of the study, but let’s hope the clinics and practitioners perceive it this way
A MAISY is not a Research Method

• Not an experimental design
  • There are no researchers in a MAISY
  • There are no randomizations
• Not an approach to conducting pilot studies
• Not an approach to data analysis
• Not an adaptive trial design
Jargon Buster Slide (Babel)

• Special case of what Byron Powell calls a “multifaceted multilevel implementation strategy”

• Special type of “adaptive implementation strategy”

• Certainly, MAISYs falls within the realm of “precision implementation strategies”
Recall MAISY Example 1
Adaptive School-based Implementation of CBT (ASIC)
Other Considerations

• Pre-specified (pre-planned)
• Mechanisms can be tailoring variables!!
• The tailoring variables are part of the MAISY
• Caution against conflating MAISYs and “adaptation”
Outline

• Implementers Have Many Decisions to Make

• Multilevel Adaptive Implementation Strategies
  What? Why? Who?

• Developing an Optimized MAISY

This is all about asking Optimization Questions
I am going to show you 13 of these.
Outline

• Implementers Have Many Decisions to Make

• Multilevel Adaptive Implementation Strategies
  What? Why? Who?

• Developing an Optimized MAISY

So put your researcher hats back on!
## Optimization Questions: Basic, but important

<table>
<thead>
<tr>
<th>Type</th>
<th>In the context of ASIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  First stage strategies</td>
<td>What is the effectiveness of Coaching?</td>
</tr>
<tr>
<td>2  Later stage strategies</td>
<td>What is the effect of Facilitation among schools that are slower responders?</td>
</tr>
<tr>
<td>3  Interaction</td>
<td>Do Coaching and Facilitation interact to produce beneficial outcomes?</td>
</tr>
<tr>
<td>4  Adaptive versus not adaptive</td>
<td>What is the effect of the MAISY shown earlier vs only Coaching (not adaptive)?</td>
</tr>
</tbody>
</table>
Sequential Multiple Assignment Randomized Trial
The ASIC SMART
PI: Amy Kilbourne
ASIC Primary Aim Results

Smith, Almirall, Choi, ...Kilbourne (2022), Impl Sci
Optimization Questions: All about tailoring

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<tr>
<td>5</td>
<td>Better way to define non-response? Should we use a more lenient definition (a lower cut-off) for “Responding School”?</td>
</tr>
<tr>
<td>6</td>
<td>Other baseline tailoring variables? Perhaps only start-up schools require Coaching?</td>
</tr>
<tr>
<td>7</td>
<td>Other ongoing tailoring variables? Perhaps Facilitation should only be offered to sub-optimally responding schools that did not engage in Coaching?</td>
</tr>
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</table>
### Optimization Questions: More about tailoring

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<tr>
<td>8</td>
<td>Other multilevel tailoring variables? Perhaps Facilitation should only be offered to sub-optimally responding schools within the lowest resourced school districts?</td>
</tr>
<tr>
<td>9</td>
<td>Is the putative mechanism aide in decision making? Is Facilitation necessary in sub-optimally responding schools delivering higher-quality CBT as a result of Coaching?</td>
</tr>
</tbody>
</table>
### Optimization Questions: Some novel ones

<table>
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<tr>
<td>10</td>
<td>Sleeper effects of prior stage strategies? Is it possible that first-stage strategies have no effect in the short-run, but have beneficial effects in the long-run when followed by a particular second-stage strategy?</td>
</tr>
<tr>
<td>11</td>
<td>Prescriptive effects? Did we learn something from Coaching that can help decide whether to do Facilitation?</td>
</tr>
</tbody>
</table>
Sequential Multiple Assignment Randomized Trial
The ASIC SMART
PI: Amy Kilbourne

District Level
REP
100 Schools in Michigan

District Level
Continue REP
School Level
Coaching
No Coaching

District Level
Continue REP
School Level
Facilitation
No Facilitation

Week 0
Week 12
Week 21
Week 44
MAISY Example 2
Feedback & Outcomes for Clinically Useful Student Svcs (FOCUSS)

EBP: Measurement-based Care in Connecticut Schools
Developer: Elizabeth Connors

Under-implementing Clinician:
Collected 1+ outcome measure on <40% of students served in first 4 months
Back to Optimization Questions #2 and #7 in FOCUSS

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<th>Type</th>
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<tr>
<td>2</td>
<td>What is the average effect of clinician-level Individual Consultation?</td>
</tr>
<tr>
<td>7</td>
<td>How do we define “under-implementing clinician”?</td>
</tr>
</tbody>
</table>
Two-arm Optimization Randomized Trial
The FOCUSS Study
PI: Elizabeth Connors, Yale
Optimization Questions: Concerning Spillover

<table>
<thead>
<tr>
<th>Spillover Questions!</th>
<th>In the context of FOCUSs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>12</strong></td>
<td></td>
</tr>
<tr>
<td>Optimal tipping point effect?</td>
<td>Effect of providing Individual Consultation to 30% vs 70% of under-implementers in a district?</td>
</tr>
<tr>
<td><strong>13</strong></td>
<td></td>
</tr>
<tr>
<td>Outer level strategies that engender beneficial spillover?</td>
<td>Target a random 1/2 of under-implementing clinicians vs up to 1/2 on a first-come first-serve basis?</td>
</tr>
</tbody>
</table>
A Hypothetical, Multilevel SMART
Illustrated using FOCUSS
PI: Elizabeth Connors, Yale
Evaluation and optimization are very different. This is evaluation.

Usual Care Implementation or a Suitable Control Strategy
Thank you!

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R01DA047279 (UWisc, A. Quanbeck)

Institutes for Education Sciences
R324B210001 (UMich, d3c);
R305B210004 (UWash, A. Lyon)