Optimizing Multicomponent Interventions: The Multiphase Optimization Strategy (MOST)

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Treatment Package Approach

• Traditional approach in prevention science

• Multitude of interventions developed this way
What is wrong with evaluating a multicomponent intervention via an RCT?

Absolutely nothing!
But... an RCT cannot:

- Identify the contribution of individual components to the desired outcome.
- Whether the inclusion of one component has an impact on the effect of another (+/-).
- If a component’s contribution offsets its cost.
- Whether all the components are all really needed.
- How to make the intervention more effective, efficient, and scalable.
But... an RCT cannot:

- Incredibly resource-intensive (e.g., time, money, person hours)
- Conducted in a highly controlled environment
  - NOT the “real world”
  - Not scalable
- Often does not produce a positive effect
  - (or it may not be replicable)
The Multiphase Optimization Strategy (MOST)

An engineering-inspired framework for optimizing multicomponent behavioral interventions

**Component** = anything that can be separated out for study (e.g., parts of intervention content, features that promote engagement, or features aimed at improving fidelity)

**Optimization** is the process of identifying an intervention that provides the best expected outcome obtainable within key constraints

**Constraint** = anything that can interfere with implementation (i.e., time, money, person-time, participant, burden, etc.)

A comprehensive strategy for optimization and evaluation
Multiphase Optimization Strategy
Preparation Phase

- Conceptual Model
- Optimization Criterion

Optimization: 4 Desiderata for multicomponent behavioral interventions

• **Effectiveness**
  • Extent to which the intervention does more good than harm (under real-world conditions, Flay (1986))

• **Efficiency**
  • Extent to which the intervention avoids wasting time, money, or other valuable resources

• **Economy**
  • Extent to which intervention is effective without exceeding budgetary constraints, and offers a good value

• **Scalability**
  • Extent to which the intervention can be implemented widely with fidelity
Selecting the experimental design

- Experimental design options for the optimization trial are limitless
  - Should be driven by:
    - Research question
    - Type of intervention
    - Resource management principle

- Examples: factorial, fractional factorial, microrandomized trial (MRT) sequential microrandomized trial (SMART), control engineering

![Diagram showing likely relevance of various types of experimental designs for optimization of different types of interventions](image-url)
Additional thoughts

- Make more effective, don’t throw out what we have
- Fixed vs. Adaptive interventions
- MOST results in an intervention that is not only optimized, but economical, efficient, and scalable
The National Institutes of Health funded projects using MOST

- National Institute on Alcohol Abuse and Alcoholism
- National Institute on Aging
- National Institute of Allergy and Infectious Diseases
- National Center for Complementary and Integrative Health
- National Cancer Institute
- National Institute on Drug Abuse
- National Institute on Diabetes and Digestive and Kidney Diseases
- National Institute on Child Health and Human Development
- National Heart, Lung, and Blood Institute
- National Institute on Minority Health and Health Disparities
- National Institute on Mental Health
- National Institute on Nursing Research
- National Institute of Neurological Disorders and Stroke

+ 100 funded projects!
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