Optimizing Multicomponent Interventions: The Multiphase Optimization Strategy (MOST)

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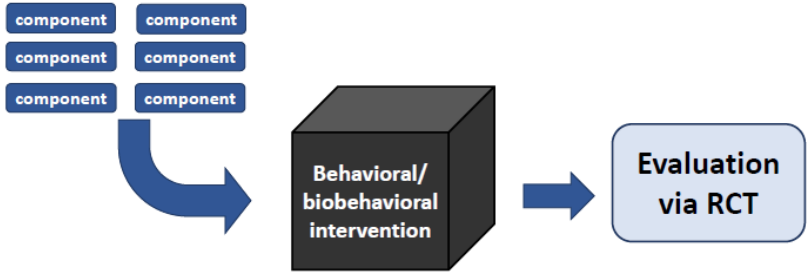
Treatment Package Approach

- Traditional approach in prevention science

- Multitude of interventions developed this way



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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

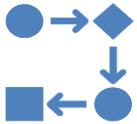
But… an RCT cannot:

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)

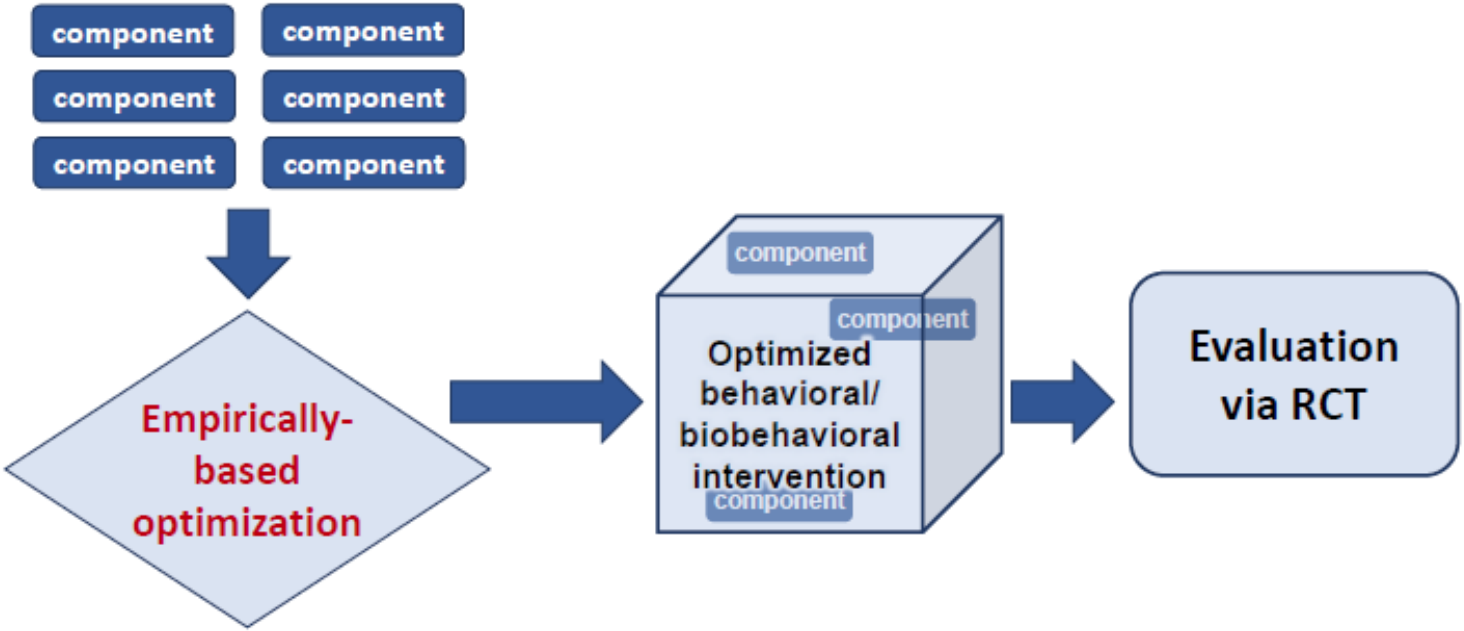


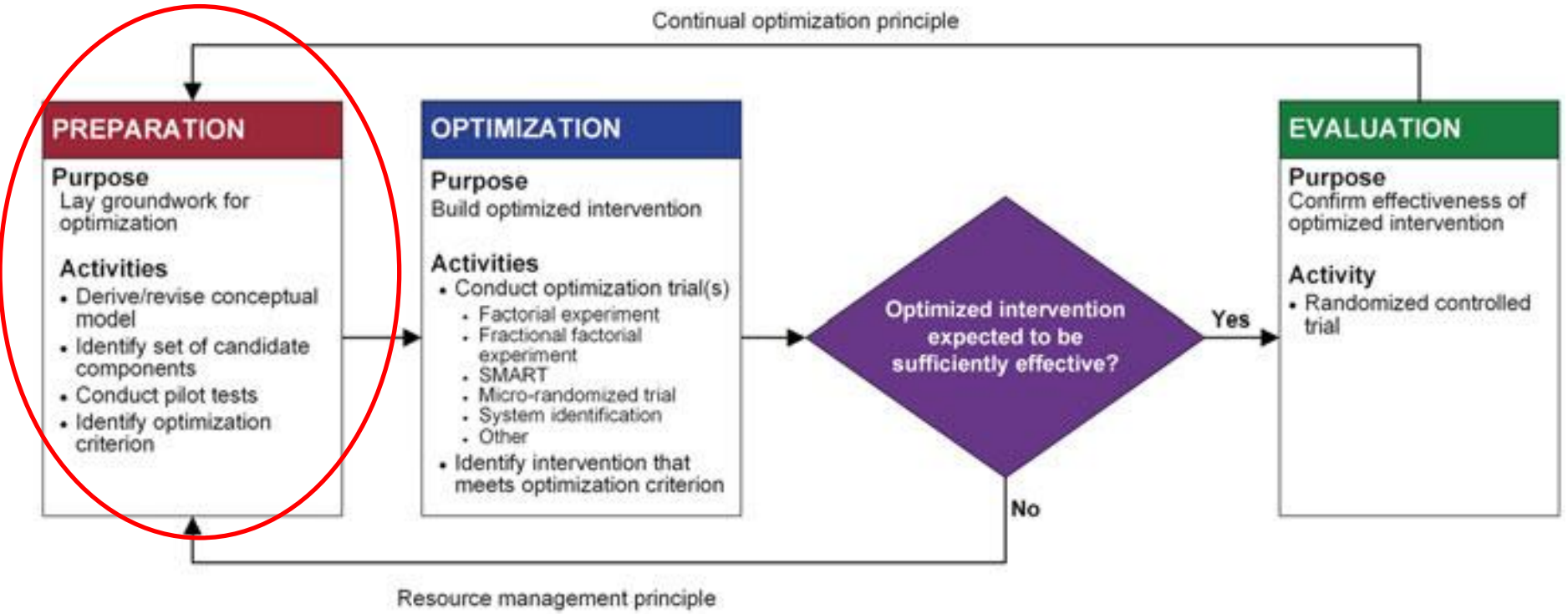
Optimization **is the process of identifying an intervention that provides the best expected outcome obtainable within key constraints**

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





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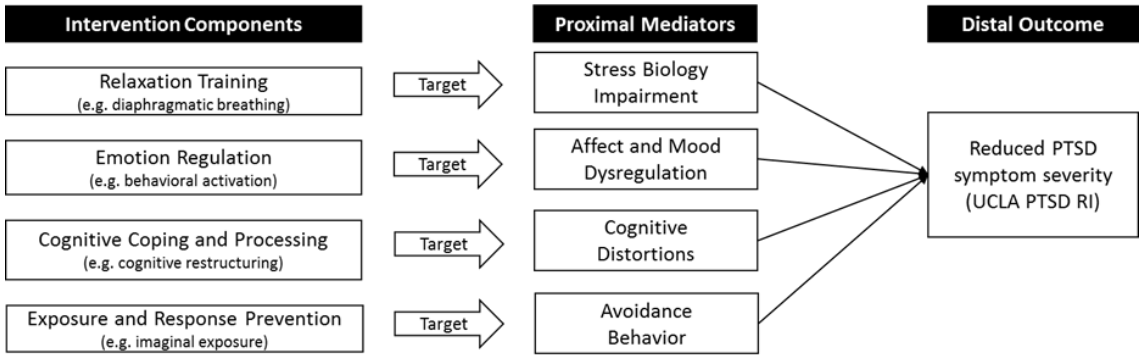
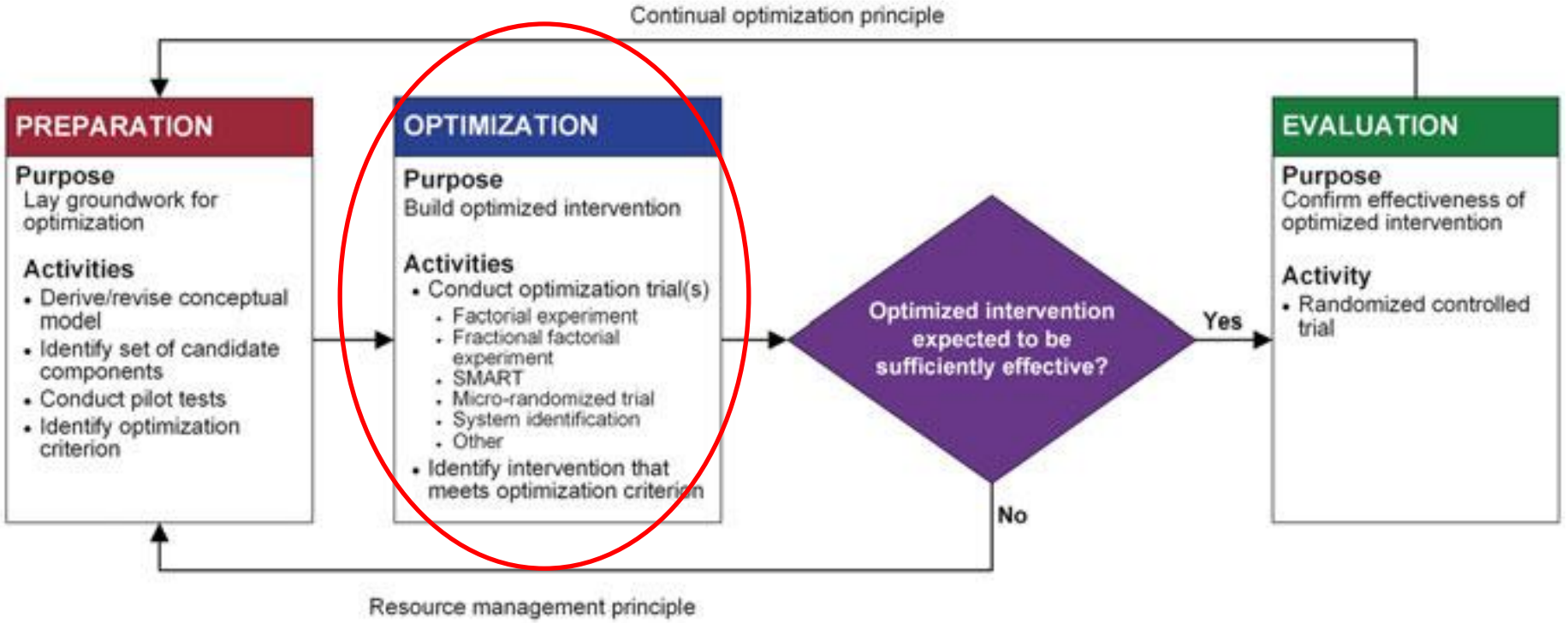
Preparation Phase

- Conceptual Model
- Optimization Criterion



Guastaferro, K., Shenk C.E., & Collins, L.M. (2020). The multiphase optimization strategy for developing and evaluating behavioral interventions. In A.G.C. Wright & M.N. Hallquist (Eds). *Handbook of Research Method in Clinical Psychology.* Cambridge University Press.



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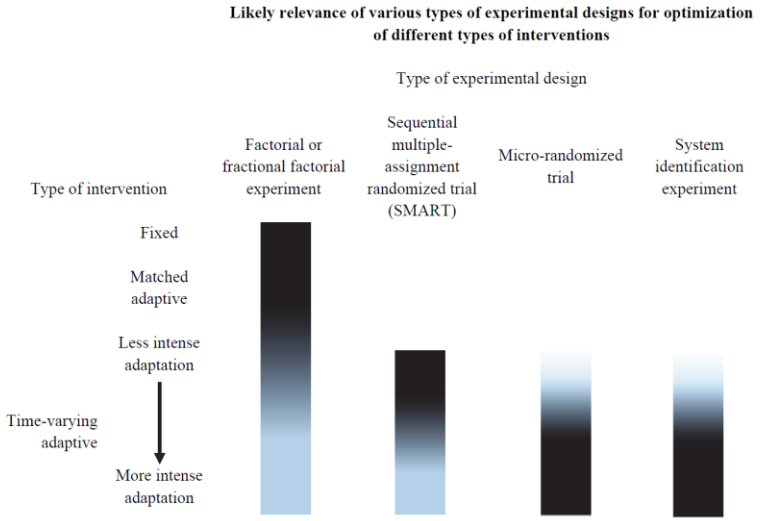
Optimization: 4 Desiderata for multicomponent behavioral interventions

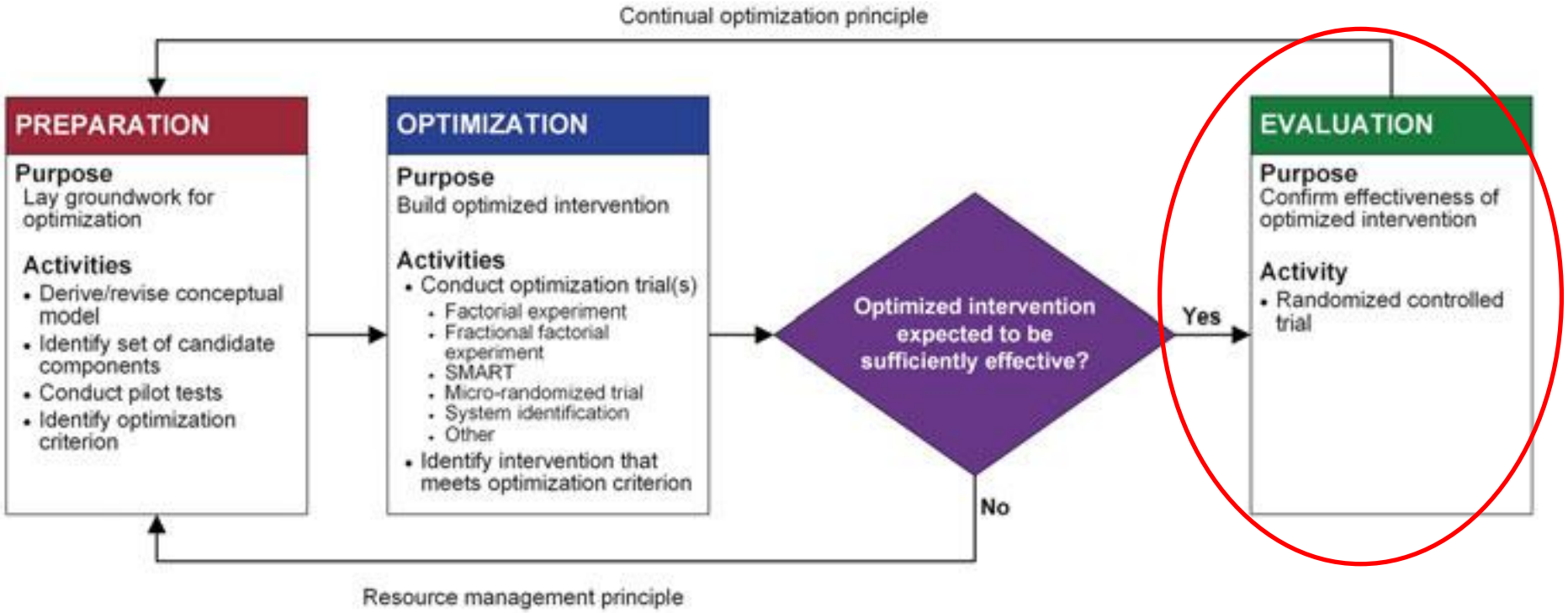
- Effectiveness
  - Extent to which the intervention does more good than harm (under real-world conditions, Flay (1986))
- Efficiency
  - Extent to which the intervention avoids wasting time, money, or other valuable resources
- Economy
  - Extent to which intervention is effective without exceeding budgetary constraints, and offers a good value
- Scalablity
  - 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





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Additional thoughts

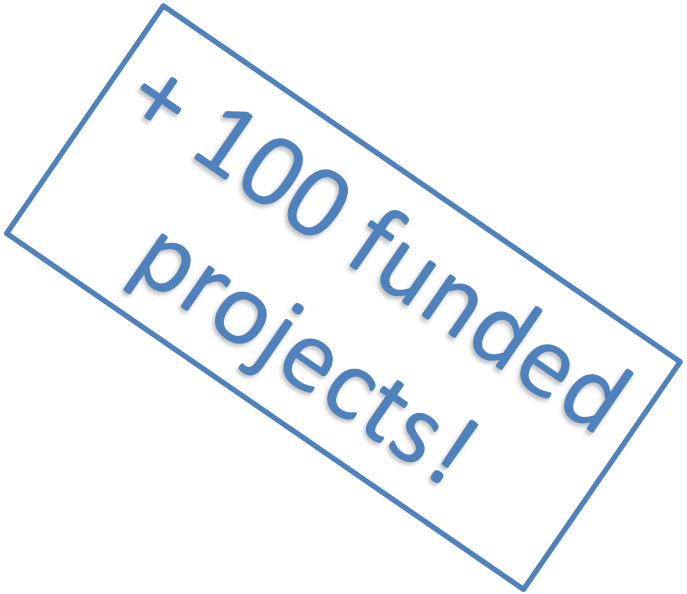
Make more effective, don't throw out what we have

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



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