How do we identify effective components of serious illness care?
The multiphase optimization strategy

J. Nicholas Odom, PhD, RN, ACHPN, FAAN
Doreen C. Harper Endowed Professor of Nursing
UAB School of Nursing
Director, Caregiver and Bereavement Support Services
UAB Center for Palliative and Supportive Care

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

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How do we know what components of serious illness care interventions are effective?

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should be interpreted cautiously.

Unanswered Questions and Future Research

Several gaps remain regarding palliative care. First, this review could not discern the association between specific palliative care processes and outcomes. Future research should aim to identify the efficacious component(s) of palliative care. Second, future studies should assess patient-reported out-

Research

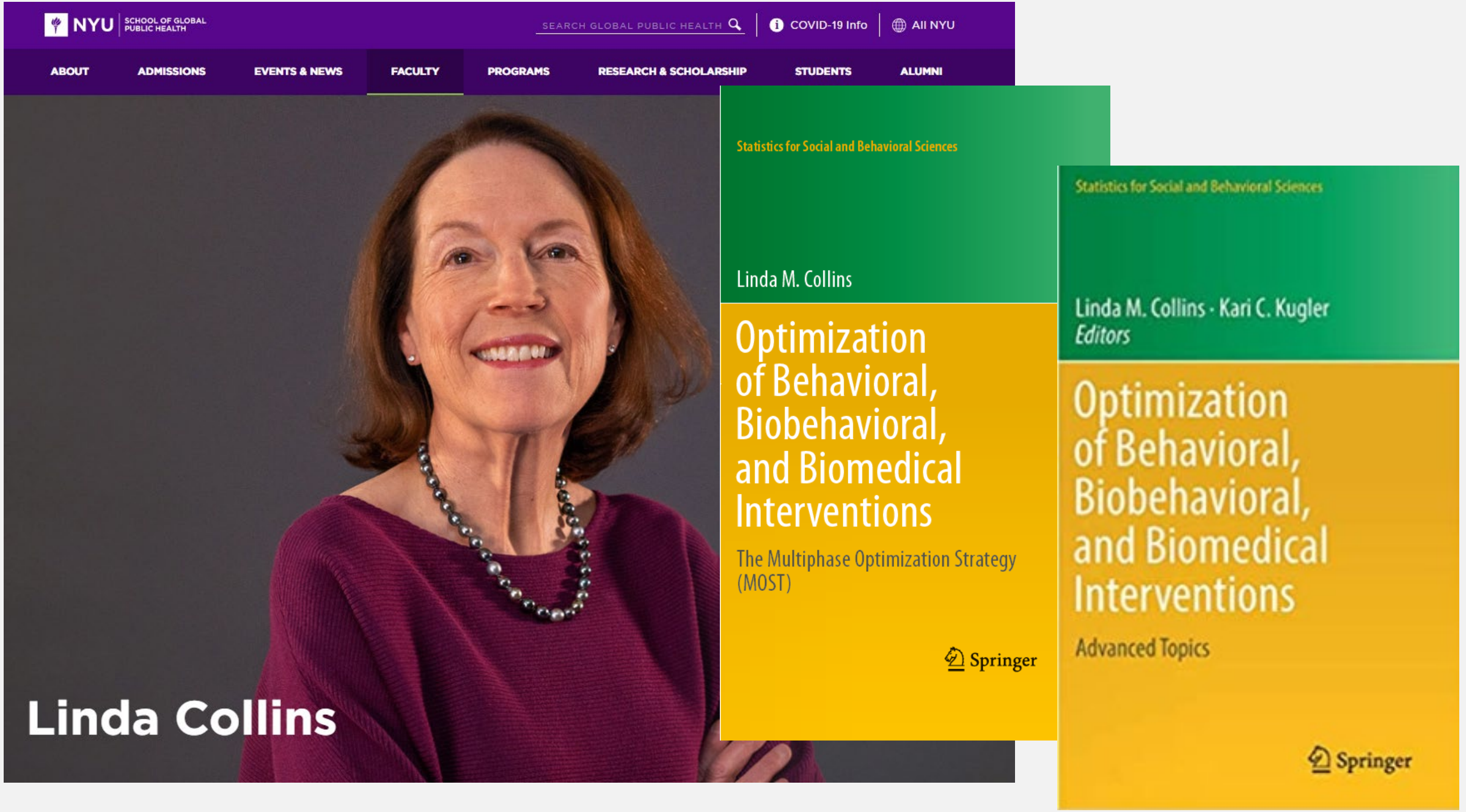
JAMA | Or

Assoc
and Patient and Caregiver Outcomes
A Systematic Review and Meta-analysis

Dio Kavalieratos, PhD; Jennifer Corbelli, MD, MS; Di Zhang, BS; J. Nicholas Dionne-Odom, PhD, RN; Natalie C. Ernecoff, MPH; Janel Hanmer, MD, PhD; Zachariah P. Hoydich, BS; Dara Z. Ikejiani; Michele Klein-Fedyshin, MSLS, BSN, RN, BA; Camilla Zimmermann, MD, PhD; Sally C. Morton, PhD; Robert M. Arnold, MD; Lucas Heller, MD; Yael Schenker, MD, MAS

IMPORTANCE The use of palliative care programs and the number of trials assessing their effectiveness have increased.

Editorial page 2090
Related article page 2094
Supplemental content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The classic “bundled” package approach to intervention development and testing

Component A

Component B

Component C

Component D

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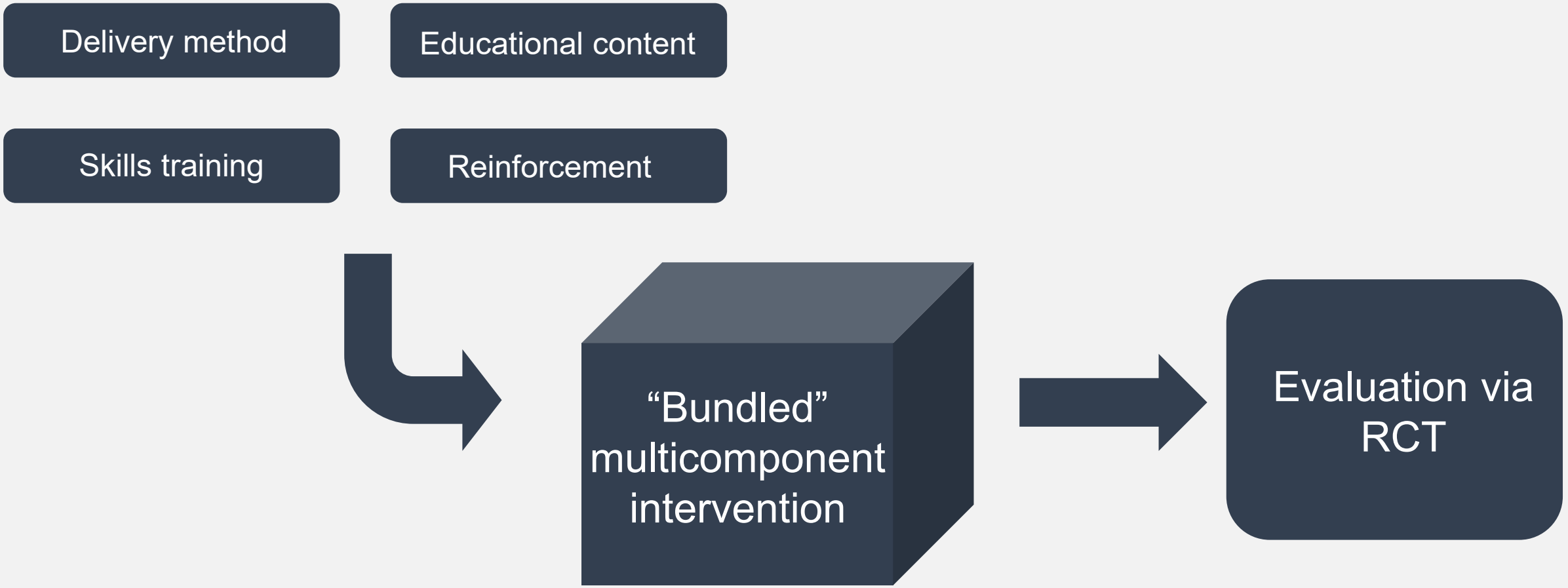
The classic “bundled” package approach to intervention development and testing



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But, there's a bunch of stuff the RCT can't tell us…

- Which comp … s
- Whether one … effect of another
- Whether a c … cost
- Whether all …
- How to mak … ent, and scalable

But wait. What exactly is an intervention component?

Slide courtesy of Linda Collins

What is an intervention "component"?

Any aspect of an intervention that can be separated out for evaluation

- Program content (disease education, health promotion)
- Amount or exposure (single vs. multiple sessions)
- Delivery mode (in-person, telehealth, text messaging)
- Behavior change technique (motivational interviewing, CBT)
- Adherence strategy (reminder phone calls, text messages)
- Fidelity measures (enhanced clinician training/education)
- Timing (early, later)
- Interventionist type (CHW vs. social worker vs. nurse vs. MD)
- Drug (methylphenidate vs. dextroamphetamine for fatigue)

The multiphase optimization strategy (MOST)

Component A

Component B

Component C

Component D

Determines performance of **individual components** and whether they interact

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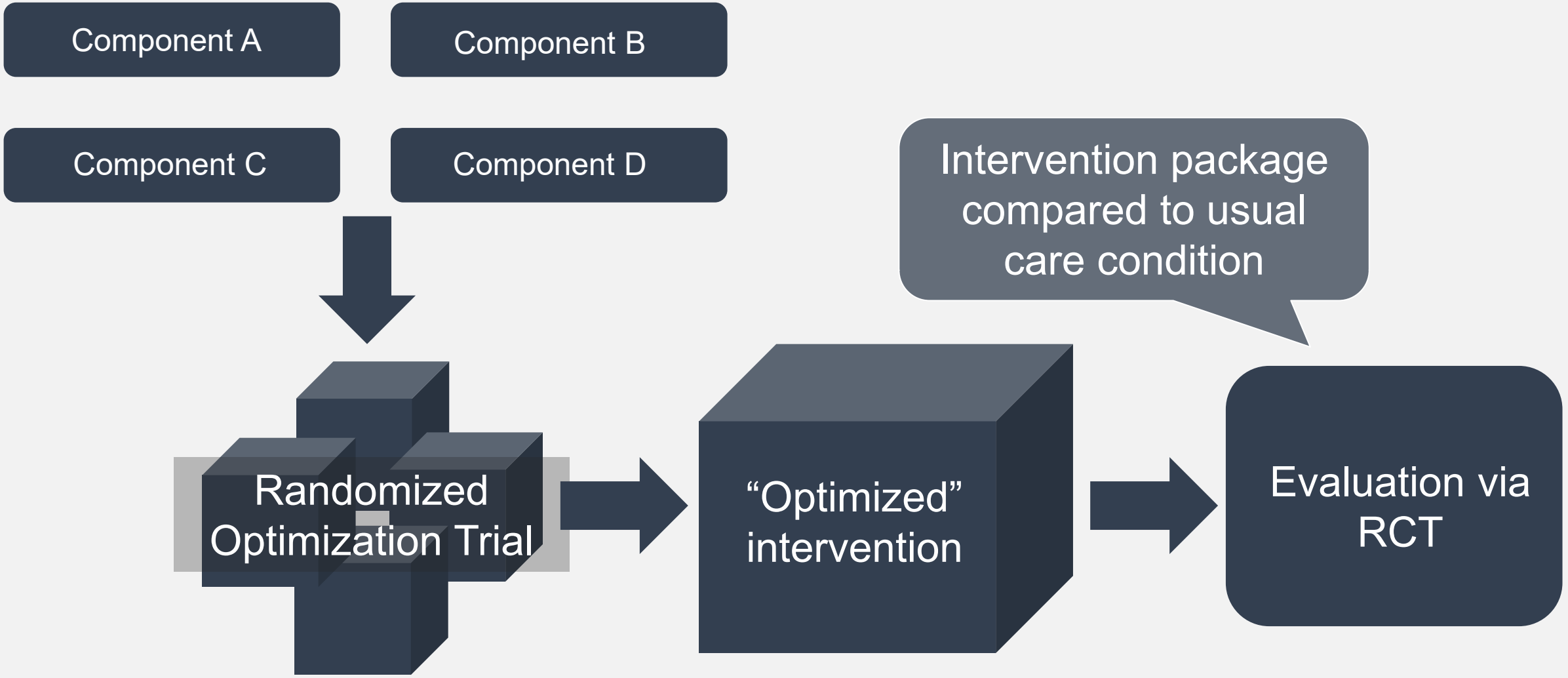
The multiphase optimization strategy (MOST)



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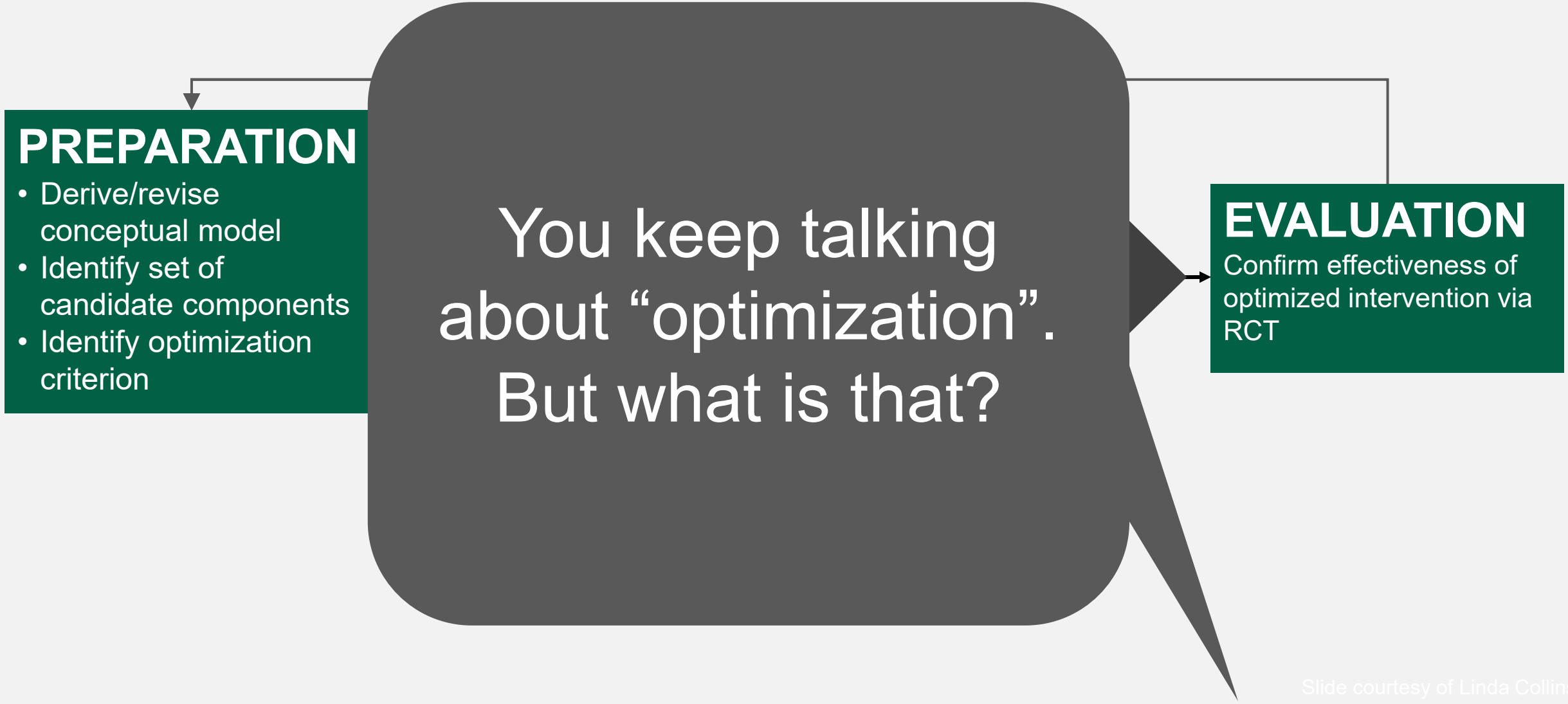
The multiphase optimization strategy (MOST)



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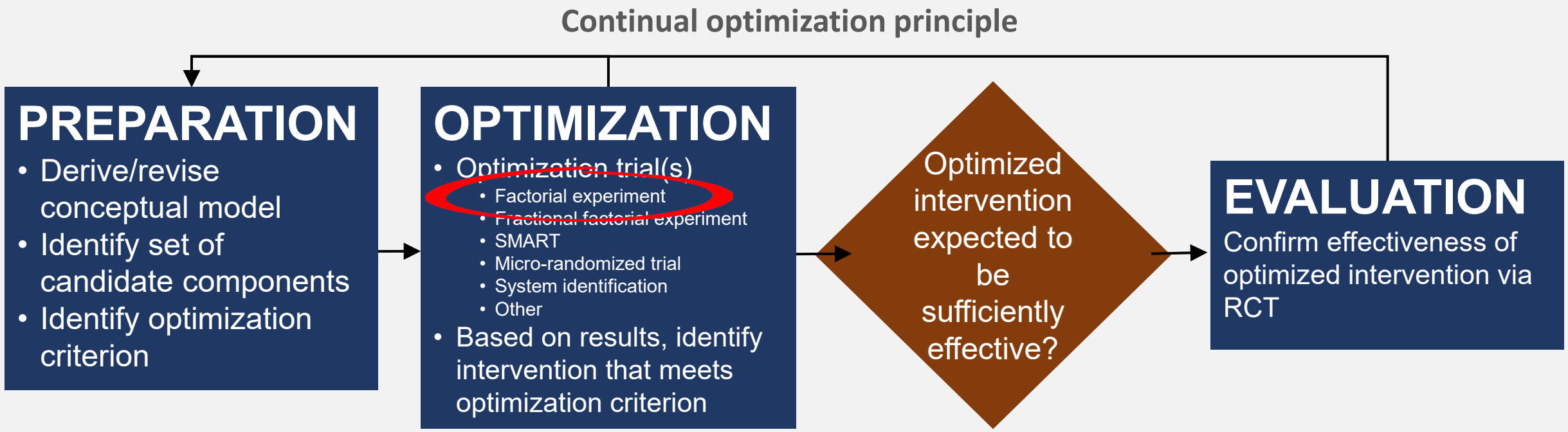
What is optimization of an intervention?

Process of identifying an intervention that provides the best expected outcome obtainable within key constraints, including…

- **Effectiveness**: Is the intervention beneficial?
- **Affordability**: Does the intervention offer a good value for the expended costs?
- **Scalability**: Can the intervention be implemented widely with fidelity?
- **Efficiency**: Does the intervention minimize resource use and avoid waste?

Guastaferro et al., 2021, *J Chid Fam Stud*

The multiphase optimization strategy (MOST)



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Hypothetical multicomponent intervention to increase future planning conversations

Hypothetical multicomponent intervention to increase future planning conversations

Delivery	Toolkit	MD Communication guide	Follow-up calls
Telehealth vs. In-person	Yes/No	Yes/No	1 call vs. 3 calls

Each component=independent variable. Because there are 4 components with 2 levels, this is a 2 x 2 x 2 x 2 (or 2^4) factorial design. This will have 2^4=16 experimental conditions.

Experimental conditions in a factorial experiment with 4 intervention components

Condition	Delivery	Toolkit	MD communication guide	Follow-up calls	n
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					

Experimental conditions in a factorial experiment with 4 intervention components

Condition	Delivery	Toolkit	MD communication guide	Follow-up calls	n
1	Telehealth				
2	Telehealth				
3	Telehealth				
4	Telehealth				
5	Telehealth				
6	Telehealth				
7	Telehealth				
8	Telehealth				
9					
10					
11					
12					
13					
14					
15					
16					

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4	Telehealth				
5	Telehealth				
6	Telehealth				
7	Telehealth				
8	Telehealth				
9	In-person				
10	In-person				
11	In-person				
12	In-person				
13	In-person				
14	In-person				
15	In-person				
16	In-person				

Experimental conditions in a factorial experiment with 4 intervention components

Condition	Delivery	Toolkit	MD communication guide	Follow-up calls	n
1	Telehealth	Yes			
2	Telehealth	Yes			
3	Telehealth	Yes			
4	Telehealth	Yes			
5	Telehealth				
6	Telehealth				
7	Telehealth				
8	Telehealth				
9	In-person	Yes			
10	In-person	Yes			
11	In-person	Yes			
12	In-person	Yes			
13	In-person				
14	In-person				
15	In-person				
16	In-person				

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6	Telehealth	No			
7	Telehealth	No			
8	Telehealth	No			
9	In-person	Yes			
10	In-person	Yes			
11	In-person	Yes			
12	In-person	Yes			
13	In-person	No			
14	In-person	No			
15	In-person	No			
16	In-person	No			

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5	Telehealth	No	Yes		
6	Telehealth	No	Yes		
7	Telehealth	No	No		
8	Telehealth	No	No		
9	In-person	Yes	Yes		
10	In-person	Yes	Yes		
11	In-person	Yes	No		
12	In-person	Yes	No		
13	In-person	No	Yes		
14	In-person	No	Yes		
15	In-person	No	No		
16	In-person	No	No		

Experimental conditions in a factorial experiment with 4 intervention components

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13	In-person	No	Yes	1 call	22
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15	In-person	No	No	1 call	22
16	In-person	No	No	3 calls	22

Random assignment of 352 individuals to 1 of 16 conditions

Experimental conditions in a factorial experiment with 4 intervention components

Condition	Delivery	Toolkit	MD communication guide	Follow-up calls	n
1	Telehealth	Yes	Yes	1 call	22
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12	In-person	Yes	No	3 calls	22
13	In-person	No	Yes	1 call	22
14	In-person	No	Yes	3 calls	22
15	In-person	No	No	1 call	22
16	In-person	No	No	3 calls	22

Experimental conditions in a factorial experiment with 4 intervention components

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8	Telehealth	No	No	3 calls	22
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Condition	Delivery	Toolkit	MD communication guide	Follow-up calls	n
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3	Telehealth	Yes	No	1 call	22
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6	Telehealth	No	Yes	3 calls	22
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12	In-person	Yes	No	3 calls	22
13	In-person	No	Yes	1 call	22
14	In-person	No	Yes	3 calls	22
15	In-person	No	No	1 call	22
16	In-person	No	No	3 calls	22

Main effect of Delivery:

Mean of conditions 1-8

vs.

Mean of conditions 9-16

Condition	Delivery	Toolkit	MD communication guide	Follow-up calls	n
1	Telehealth	Yes	Yes	1 call	22
2	Telehealth	Yes	Yes	3 calls	22
3	Telehealth	Yes	No	1 call	22
4	Telehealth	Yes	No	3 calls	22
5	Telehealth	No	Yes	1 call	22
6	Telehealth	No	Yes	3 calls	22
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11	In-person	Yes	No	1 call	22
12	In-person	Yes	No	3 calls	22
13	In-person	No	Yes	1 call	22
14	In-person	No	Yes	3 calls	22
15	In-person	No	No	1 call	22
16	In-person	No	No	3 calls	22

n=176

n=176

Main effect of the Toolkit:

Mean of conditions 5-8, 13-16

vs.

Mean of conditions 1-4, 9-12

Condition	Delivery	Toolkit	MD communication guide	Follow-up calls	n
1	Telehealth	Yes	Yes	1 call	22
2	Telehealth	Yes	Yes	3 calls	22
3	Telehealth	Yes	No	1 call	22
4	Telehealth	Yes	No	3 calls	22
5	Telehealth	No	Yes	1 call	22
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14	In-person	No	Yes	3 calls	22
15	In-person	No	No	1 call	22
16	In-person	No	No	3 calls	22

Main effect of MD communication guide:

Mean of conditions 3, 4, 7, 8, 11, 12, 15, 16

vs.

Mean of conditions 1, 2, 5, 6, 9, 10, 13, 14

Condition	Delivery	ACP guidebook	MD communication guide	Follow-up calls	n
1	Telehealth	Yes	Yes	1 call	22
2	Telehealth	Yes	Yes	3 calls	22
3	Telehealth	Yes	No	1 call	22
4	Telehealth	Yes	No	3 calls	22
5	Telehealth	No	Yes	1 call	22
6	Telehealth	No	Yes	3 calls	22
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14	In-person	No	Yes	3 calls	22
15	In-person	No	No	1 call	22
16	In-person	No	No	3 calls	22

Main effect of Follow-up calls:

Mean of conditions
1, 3, 5, 7, 9, 11, 13, 15

vs.

Mean of conditions
2, 4, 6, 8, 10, 12, 14, 16

Condition	Delivery	Toolkit	MD communication guide	Follow-up calls	n
1	Telehealth	Yes	Yes	1 call	22
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Factorial trial designs

Objective: Efficient screening of intervention components

- Weed out underperforming components
- Determine magnitude of each component's effect
- Examine whether component effects are augmented or reduced in the presence of another component
- Optimize the scalability of the intervention package by having cost and other resource use parameters

Summary points

- **Key research priority**: Assessing active components of serious illness care interventions and services
- **MOST** (Multiphase Optimization STrategy): a framework for multicomponent intervention development and testing
- **Factorial trial design**: among the optimization trial designs that test **components** of multicomponent interventions
- Optimization using **MOST** maximizes **EASE**:
  - **E**ffectiveness
  - **A**ffordability
  - **S**calability
  - **E**fficiency

Thank you!

J. Nicholas Odom, PhD, RN, ACHPN, FAAN
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Director | Caregiver & Bereavement Support Service
UAB Center for Palliative and Supportive Care

Email: dionneod@uab.edu **X (Twitter):** @NickOdomPhD_RN

Ongoing trial using factorial trial design:

Decision support training for advanced cancer family caregivers: The CASCADE Factorial Trial (NCI R01CA262039; NCT04803604; 2021-26)

Our team's publications on MOST and factorial trial design:

Gazaway et al., 2023, *Contemp Clin Trials*
Dionne-Odom et al., *2022, J Pain Symptom Manage*
Wells et al., 2021, *J Pain Symptom Manage*