Effectiveness-Implementation Hybrid Studies: An Overview and Reflection on 10 Years Since Their Introduction

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Goals for today

• Present on the hybrid study idea
  – From the perspective of their original conception...
  – Why and when to consider them

• Review 3 types of hybrid studies

• Present reflections from a recent working group
  – Chambers, Curran, Fernandez, Landes, McBain, Mittman, Pyne, Smith
  – Critique, adjustments, new recommendations...
    – Under review

• Take your questions
Who am I?

• Sociologist by training (1996)
• Began doing implementation research in the US Department of Veterans Affairs (VA) in 1998
  – Quality Enhancement Research Initiative (QUERI)
  – Implement EBPs while studying how best to implement
• VA, NIH, AHRQ implementation research grants
• Testing implementation strategies in support of adoption of EBPs
• Focus as well on methods and design in implementation research
Think back to 2012...

Effectiveness-implementation Hybrid Designs:
Combining Elements of Clinical Effectiveness and Implementation Research to Enhance Public Health Impact

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"Traditional\) Research Pipeline
\((...\text{when do we do implementation research?})\)

- “Finish” efficacy research
- “Finish” effectiveness research
- \textit{Then} start implementation research...
Traditional Pipeline as a relay race analogy:
“Here... GO! GO! GO!”

“Clinical” Researcher

Intervention “ready for” dissemination and implementation

“Implementation” Researcher
Effectiveness-Implementation hybrid studies

Efficacy Research → Effectiveness Research → Implementation Research → Improved processes, outcomes

Spatially speaking, hybrids “fit” in here...
Why Hybrid Studies?

• Can we hurry up please?
  – Blend intervention “effectiveness” and “implementation” research questions in the same study and save time
• Don’t wait for “perfect” effectiveness data before moving to implementation research
• We can “backfill” effectiveness data while we test implementation strategies
• How do intervention outcomes relate to levels of adoption and fidelity?
  – How will we know this without data from “both sides”?
Couple of intro thoughts about hybrids

• Researchers were doing “hybrid designs” well before my colleagues and I began speaking and writing about them as such

• 2012 paper tried to bring some clarity, direction, examples, and recommendations

• Original paper focused on trials but these hybrid concepts can and are being used in many other designs
  – To me at the moment it’s more about combining research questions
  – More on this later...
When teaching this stuff, some very non-scientific language can also be helpful...

• The intervention/practice/innovation is THE THING
• Effectiveness research looks at whether THE THING works
• Implementation research looks at how best to help people/places DO THE THING
• Implementation strategies are the stuff we do to try to help people/places DO THE THING
• Main implementation outcomes are HOW MUCH and HOW WELL they DO THE THING

Curran, Implementation Science Communications, 2020
Types of Hybrids *by thing/do the thing*

- Intervention Effectiveness Research
- Implementation Research
- Hybrid Type 1
- Hybrid Type 2
- Hybrid Type 3
Types of Hybrids *by thing/do the thing*

**Hybrid Type 1**: test the *thing*, gather information on doing the *thing*
Types of Hybrids by thing/do the thing

Hybrid Type 3: test do the thing, gather information on the thing
Types of Hybrids by \textit{thing/do the thing}
Hybrid Type 1 (original spec)

Definition:
• Test the thing and explore implementation-related factors (80%/20%?)

Description:
• Intervention effectiveness study “plus”:
  • Describe implementation experience (worked/didn’t; barriers/facilitators)
  • How might the thing need to be adapted going forward?
  • What is needed to support people/places to do the thing in the real world?

Indications:
• Intervention effectiveness evidence remains limited, so intensive focus on implementation might be premature...BUT
• Effectiveness study conditions offer ideal opportunity to explore implementation issues, plan implementation strategies for next stage
Remember...

• All effectiveness studies use “implementation strategies” to support the delivery of the intervention; we just usually don’t call them that...

• In clinical type studies, we “know” that some/many the strategies used are not feasible for supporting wide-spread adoption
  – Paying clinics, paying interventionists, paying for care, intensive training, frequent fidelity checks...

• BUT, we can learn from the use of those strategies during the study!
Type 1 examples
Hybrid Type 2 ("original spec")

Definition:
• Test thing and do the thing (50/50? 60/40? 72/28?)

Description:
• Dual-focus study:
  – Intervention effectiveness study combined with:
    • Implementation study of 2+ strategies (randomized?)
    • Study of single implementation strategy (not randomized; “pilot”)

Indications:
• Intervention effectiveness data available, though perhaps not for context/population of interest for this study
• Data on barriers and facilitators to implementation available
Study Considerations: Type 2

• Important to have an explicitly described implementation strategy that is thought to be plausible in the real world
  – Clear distinction from type 1

• Explicit measurement of adoption, fidelity...
  – Always happens in type 2

• Try to be clear about intervention components versus implementation strategy components
  – This isn’t always easy to decide or describe
  – E.g., delivery format...
    • Is delivering the intervention over the telephone an intervention component or an implementation strategy?
### Type 2 examples

#### Implementation-effectiveness trial of an ecological intervention for physical activity in ethnically diverse low income senior centers


#### Telephone care coordination for smokers in VA mental health clinics: protocol for a hybrid type-2 effectiveness-implementation trial

Hybrid Type 3 (original spec)

Definition: Test do the thing, gather info on the thing (80%-20%...?)

Description:
• Largely focused on evaluating implementation strategies
• Unit of analysis = provider, clinic, or system
• Clinical outcomes are “secondary”

Indications:
• We sometimes proceed with implementation studies without completing a “full portfolio” of effectiveness studies
  – Strong momentum in a system, e.g., “We are rolling this out!”
• Interested in exploring how clinical effectiveness might vary by level/quality of implementation?
Study Considerations: Type 3

• How many places you got/need?
  – 6? 20? 40? 100?

• Which study design might work best for all involved?
  – See Brown, Curran, et al., 2017
  – Wolfenden et al., 2020 (trial designs)

• What’s your evidence for implementation strategies selected?

• Clinical outcomes data collection
  – Measures available in existing data?
  – Primary data collection? *(Mental Health outcomes not routinely available...)*
    • Sub-sample?
More Type 3 examples
An introduction to effectiveness-implementation hybrid designs

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Thoughts from 2019 paper

- Hybrid type 1 less of a “special case” but more routine?
  - If effectiveness research is the “last step” before trying to get people to do the thing... why not more of a focus on implementation questions?
  - Some folks doing hybrid 1 type work in *efficacy* research
  - Type 1 pilot studies

- Type 2 need to be fully justified and include “failsafe”
  - Build in time and data collection to iterate strategies if needed

- Hybrid type 3 less of a “special case” also?
  - When *wouldn’t* we want patient-level outcomes data?
  - Shouldn’t we PROVE how much fidelity is important and under what circumstances?
Thoughts from Oct 19, 2022...
Us and others reflecting...

• Special Issue on Hybrids in Frontiers in Health Services

• “Reflections on 10 Years of Effectiveness-Implementation Hybrid Studies”
  – In submission
  – Curran, Landes, McBain, Pyne, Smith, Fernandez, Chambers, Mittman
  – 5 questions
Q1: Are they really “designs”? 

- *Depends on your definition...*
- **BUT:** Initial paper’s focus on *trial designs* was too limiting
  - Original paper talked about “where to randomize...”
  - “Do they have to be trials?” No.
  - Lots of folks took the basic idea and applied it to lots of study, program evaluation, QI, designs
- Let’s go with “**hybrid study**” instead
Q2: Which hybrid type should I use?

3. How much do you already know about implementation determinants for the intervention in your context of interest?
   - Not much? If you also need to focus on effectiveness data, consider type 1.
   - If the effectiveness data are strong, and you know enough already to develop/select a strategy or package of strategies to evaluate? Consider type 2 or 3.

4. How ready are you to evaluate a “real world” implementation strategy or package of strategies?
   - Not ready? A type 1 is indicated, where you collect information on implementation determinants to help you prepare for developing strategies later.
   - Ready, and you need to focus as well on effectiveness of the intervention (Question 1)? Consider a type 2.
   - Ready, and your effectiveness data are strong (Question 1) and you don’t need to adapt a lot (Question 2)? Consider a type 3.
And remember...

• You don’t need to do a hybrid study
• “Too early” for a hybrid?
  – Intervention not yet established as safe
• Don’t need to look at intervention effectiveness?
  – Evaluating implementation of vaccines
  – Doing a focused study on implementation determinants
• Explicitly justify why you are doing a hybrid
Q3: Which research design should I use?

• Largely depends on the research questions...

• Research designs are not intrinsically linked to hybrid type, BUT:
  – Type 1 studies favor intervention outcomes at a person level, so a lot of these studies have individual-level randomization or focus
  – Type 3 studies favor implementation outcomes at a place level, so a lot of these studies use clustered designs or place-level focus
  – Type 2 studies blend the two; hence relative emphasis tends to drive the design choice

• See also observational designs, non-randomized studies, and designs often used for formative or pilot work (pre/post, interrupted time series...)
  – Observational Types 2-3 in healthcare/public health systems evaluating roll outs
  – Pre-post formative work revising/optimizing strategies

And remember: your research design is only as good as your partners are comfortable with...
Q4: What are challenges with the typology?

• Typology was set with clinical research mindset
  – Doesn’t work so well for health promotion/public health type interventions
    • Little “efficacy”; Always start with “real world” implementation and strategies
    – Not sure types fit for policy research…
  • “Shorthand” for relative focus on intervention/ implementation outcomes
    – Doesn’t capture nuance
• Not everyone agrees on what “the thing” is
  – Medication adherence interventions
  – Contingency management interventions
• Still recommending use of typology…
  – But with language like “consistent with type X” when nuance is at play
Q5: How is cost analyzed in hybrids?

- Increasing attention paid to the cost of implementation strategies
- Not always easy to do: lotta time-based activity stuff
- Cost effectiveness analysis can be done in all hybrid types
  - Include implementation costs in conventional CEA
  - Focus of CE of implementation strategies on increments of adoption/fidelity
- Team sport for sure; seek professional help
- More and more examples published
Wrap it up

• We hope these thoughts and reflections are helpful to folks considering if/when/how to use hybrid studies
• Thanks for your attention!
• I am happy to take your questions/comments
Example of Type 1: CALM study

- Curran et al., 2012, *Implementation Science*
- Large effectiveness trial of anxiety intervention in primary care
  - 4 cities, 17 clinics, 1004 patients
  - Care managers using software tool with patients to navigate Tx manual
  - Care managers were local nurses/social workers already working in the clinics
- Qualitative process evaluation alongside trial
  - 47 interviews with providers, nurses, front office, and anxiety care managers
  - Most interviews done on the phone
  - Interview guide informed by an implementation framework (PARIHS)
    - (these days, that link needs to be very explicit...
What did we learn?

• Lots of stuff...
• But, I’ll share one important piece of data that illustrates the value of this kind of evaluation
  – Many of the providers in the participating clinics DID NOT refer a lot of patients for the trial. Some referred NOBODY.
  – Those who referred a lot were already interested in MH
  – Those who didn’t were not persuaded during the site trainings that this was a good enough idea to be actively involved
  – So, “uptake” and “reach” were not great in the trial, even though the researchers tried to get all providers to refer
  – So, key barrier to future implementation was provider buy-in and engagement. “Standard” strategies to entice them didn’t work.
  – We would have learned this about this barrier about 2+ years later if we had done this sequentially.
Type 2, Example 1: Cully et al., 2012, 2014+

- Clinical trial of brief cognitive behavioral therapy in treating depression and anxiety; 1 “pilot” implementation strategy
  - Patient randomization only; Pilot study of implementation strategy (online training, audit and feedback, facilitation) in 2 large VAMCs
  - Intent-to-treat analysis of clinical outcomes (N=320)
  - Feasibility, acceptability, and “preliminary effectiveness” data collected on implementation strategy
    - Measured knowledge acquisition, fidelity to model
    - Qualitative data on implementability, time spent, etc.
  - Preparatory to implementation trial of strategy
Type 2, Example 2: Garner et al., 2017

- **Aim 1**: effectiveness of a motivational interviewing-based brief intervention (MIBI) for substance use as an adjunct to usual care (referral) within AIDS service organizations (ASOs)
- **Aim 2**: effectiveness of implementation and sustainment facilitation (ISF) as an adjunct to the Addiction Technology Transfer Center (ATTC) model for training staff in MI
  - Patients randomized within ASOs (N=1872)
    - Substance use outcomes
  - ASOs randomized to ACCT or ACCT+ISF (N=39)
    - Proctor et al (2011) implementation outcome measures
Type 3 Example, Smelson et al., 2015

- Mission-Vet is an evidence-based treatment for co-occurring SUD and MH disorders among homeless Veterans
- Compare “implementation as usual” of Mission-Vet to IAU plus Getting To Outcomes (GTO)
  - IAU = Standard training plus access to Mission-Vet manual
  - GTO = planning, implementation (supervision, monitoring...), self evaluation (audit and feedback)
- 3 large VAMCs
  - Case managers (69) randomized to IAU or IAU+GTO
  - 1500-2000 Veterans
- RE-AIM measures
  - Adoption = meeting 50% of eligible Veterans involved in intervention
  - Effectiveness = SUD, MH symptoms, functioning, housing