

Design for Digital Mental Health Interventions: Optimizing Engagement & Implementation

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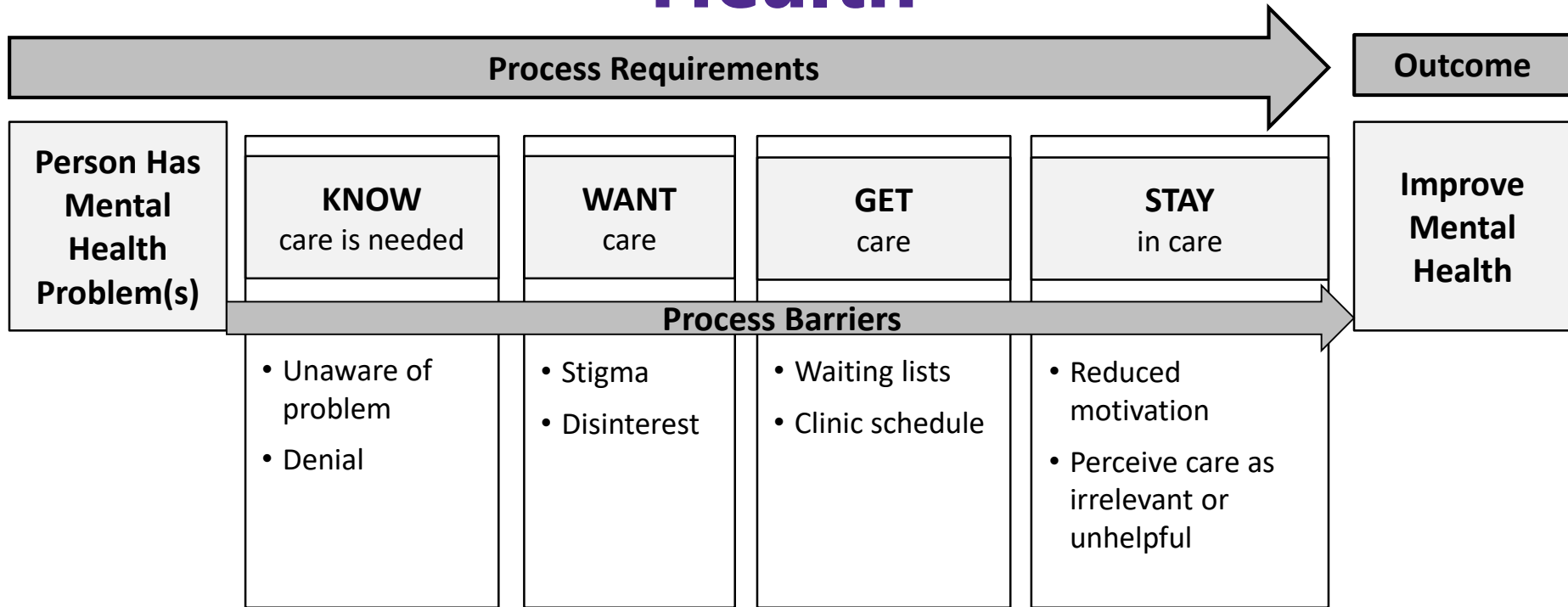
PSMG • January 18, 2022



@andreakgraham

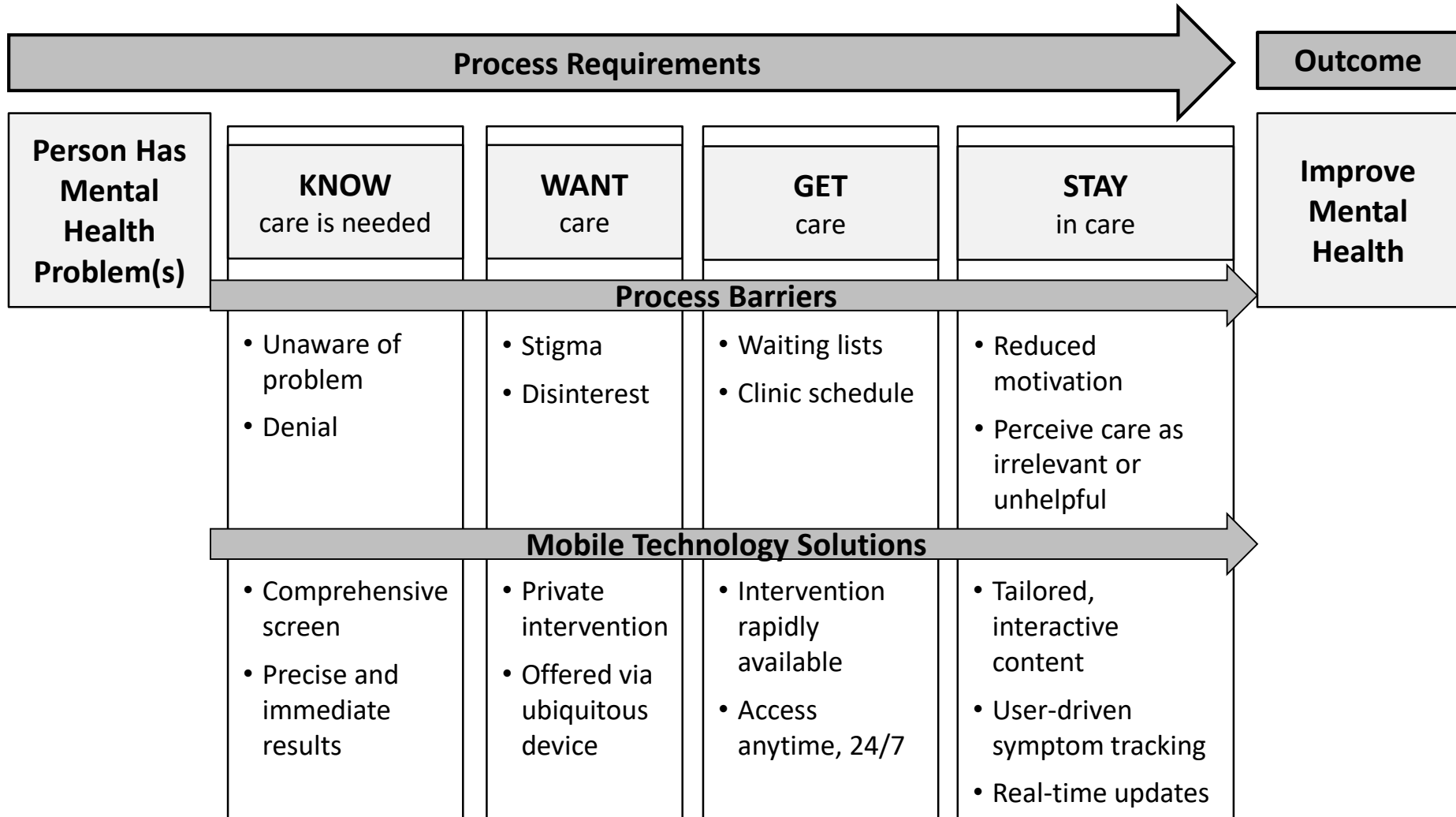
Northwestern

Challenges to Addressing Mental Health

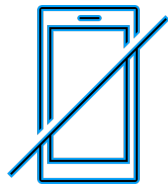


Kass, et al., 2017, The economic case for digital interventions for eating disorders among United States college students. *Int J Eat Disord*

The Promise of Digital Technologies



The disruptive innovation of digital interventions is extending treatment beyond in-person sessions into the **fabric of people's lives**



But:

If they are not engaging, people will **stop using** them



Implication:

Must be **engaging** to have clinical impact

Engagement is a Problem

- When digital services have moved from research settings to real-world settings, **implementation has frequently failed**
 - Low rates of use and retention among patients
 - Failed integration within their systems of care

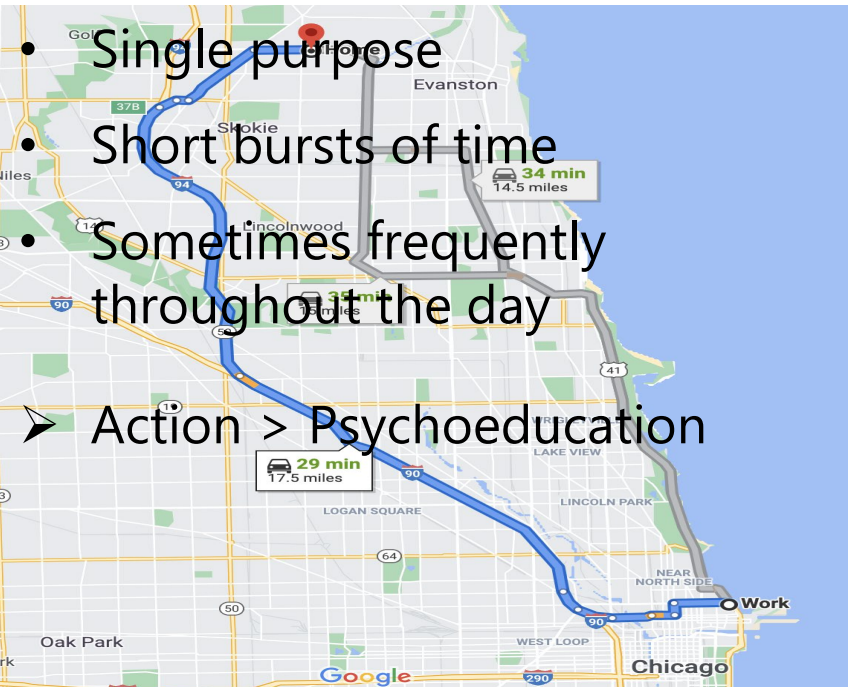
What's the Disconnect?

Cannot simply translate a face-to-face treatment to a digital format

How DMHIs are Designed

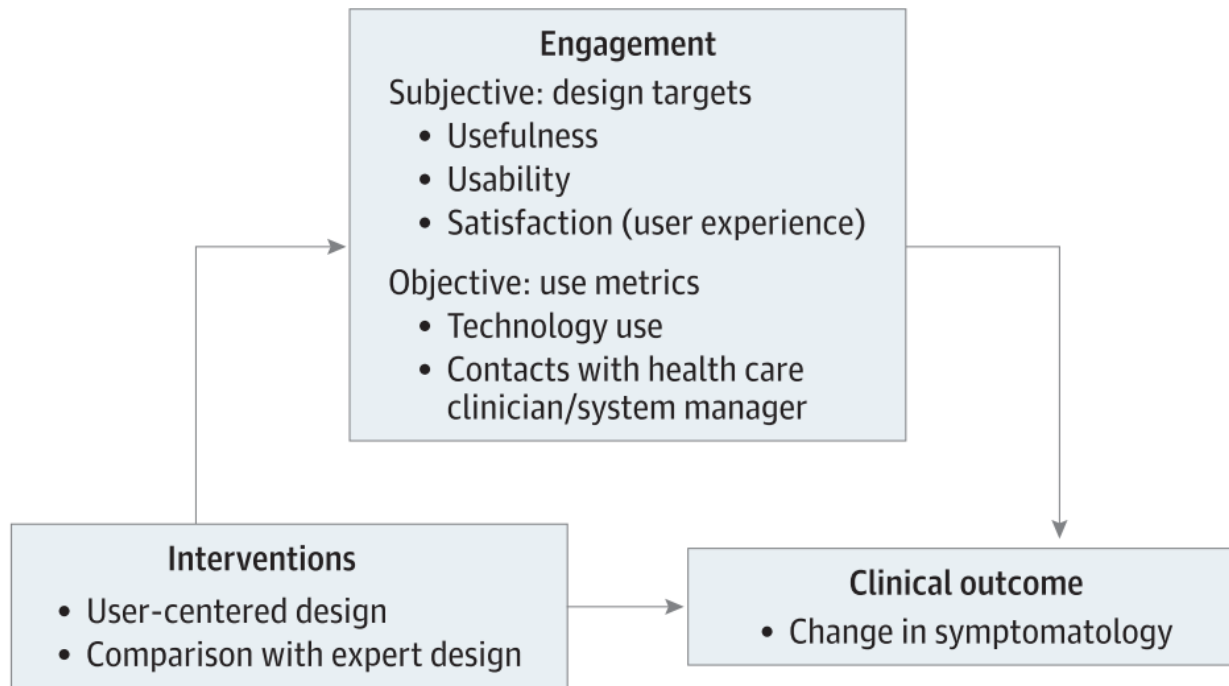
- Rely heavily on psychoed
- Require 30-45 min use/week
- Typically for 6+ weeks
- Engagement is challenging

How People Use Apps



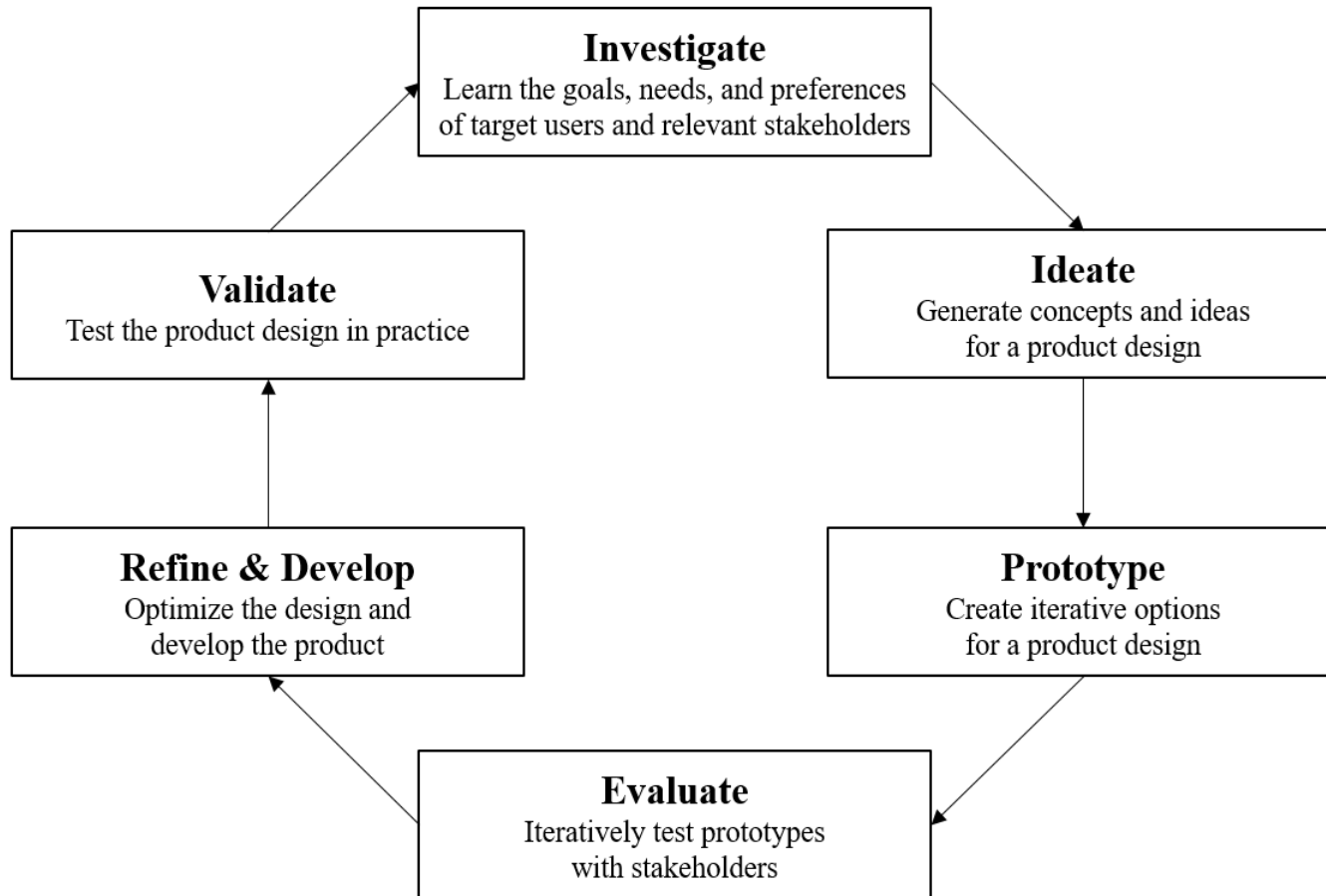
The User Experience Matters

Figure. Conceptual Model for Experimental Therapeutics to Target Engagement as a Mediating Mechanism for Digital Mental Health



Graham, Lattie, & Mohr, 2019, Experimental therapeutics for digital mental health, *JAMA Psychiatry*,
Graham et al., 2021, Targeting subjective engagement in experimental therapeutics for DMHIs, *Internet Interventions*

User-Centered Design: A Model



Graham, Wildes et al., 2019, User-centered design for technology-enabled services for eating disorders, *Int J Eat Disord*

Why User-Centered Design

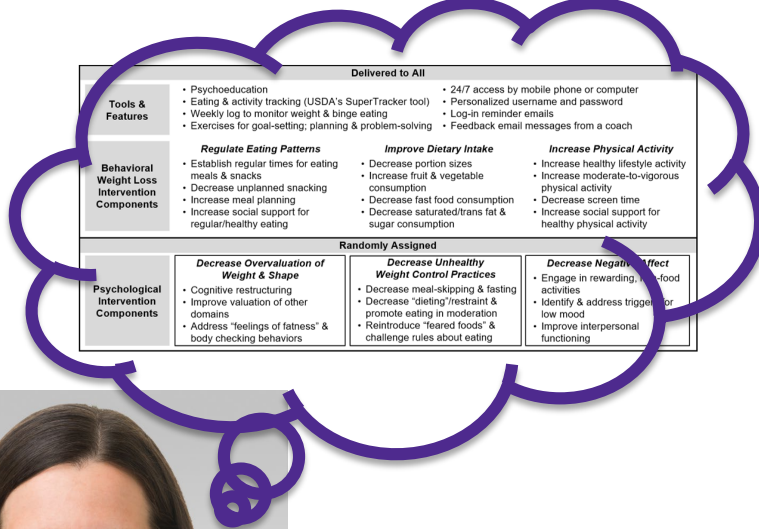
Great advantage to up-front efforts

- Enables rapid learning
 - Numerous design methods, most can be implemented relatively quickly
- Saves money and “rework”
 - Many problems are avoidable if given adequate attention (Boehm & Basili, 2001, *Computer*)

Graham, Wildes et al., 2019, User-centered design for technology-enabled services for eating disorders, *Int J Eat Disord*

Designing a Mobile Intervention for Binge Eating & Weight Management

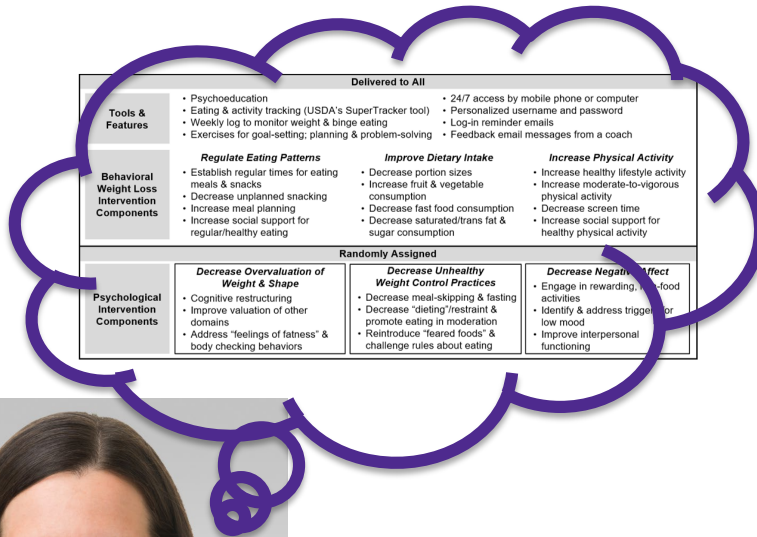
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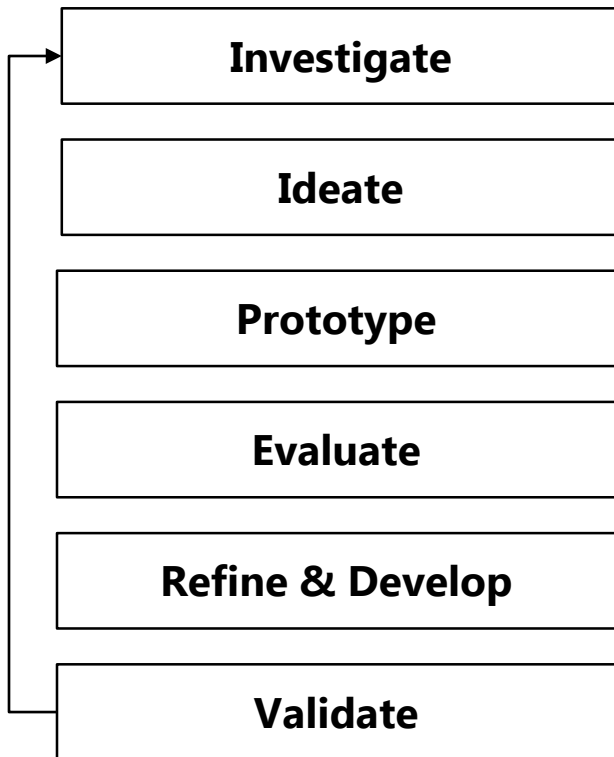
My Originally-Proposed Intervention

| Delivered to All | | | |
|---|---|--|--|
| Tools & Features | <ul style="list-style-type: none"> • Psychoeducation • Eating & activity tracking (USDA's SuperTracker tool) • Weekly log to monitor weight & binge eating • Exercises for goal-setting; planning & problem-solving | <ul style="list-style-type: none"> • 24/7 access by mobile phone or computer • Personalized username and password • Log-in reminder emails • Feedback email messages from a coach | |
| Behavioral Weight Loss Intervention Components | <p>Regulate Eating Patterns</p> <ul style="list-style-type: none"> • Establish regular times for eating meals & snacks • Decrease unplanned snacking • Increase meal planning • Increase social support for regular/healthy eating | <p>Improve Dietary Intake</p> <ul style="list-style-type: none"> • Decrease portion sizes • Increase fruit & vegetable consumption • Decrease fast food consumption • Decrease saturated/trans fat & sugar consumption | <p>Increase Physical Activity</p> <ul style="list-style-type: none"> • Increase healthy lifestyle activity • Increase moderate-to-vigorous physical activity • Decrease screen time • Increase social support for healthy physical activity |
| Randomly Assigned | | | |
| Psychological Intervention Components | <p>Decrease Overvaluation of Weight & Shape</p> <ul style="list-style-type: none"> • Cognitive restructuring • Improve valuation of other domains • Address "feelings of fatness" & body checking behaviors | <p>Decrease Unhealthy Weight Control Practices</p> <ul style="list-style-type: none"> • Decrease meal-skipping & fasting • Decrease "dieting"/restraint & promote eating in moderation • Reintroduce "feared foods" & challenge rules about eating | <p>Decrease Negative Affect</p> <ul style="list-style-type: none"> • Engage in rewarding, non-food activities • Identify & address triggers for low mood • Improve interpersonal functioning |

The Clinical - Design Chasm



UCD Activities



111 end-users

- Needs assessments
- Prototyping
- Co-design workshops
- Field test

54 intervention users (so far)

- Randomized pilot trial

Graham et al., 2021, *JMIR Form Res*; Graham et al., 2021, *Front Dig Health*; Weinheimer et al., 2020, *Int J Eat Disord*; Venkatesh et al., 2021, *Nutrients*; Fu et al., In press, *Eat Behav*; Liu et al., Under review; Voss et al., Under review.

Initial Design Activities & Implications

- Question: How do binge eating and weight impact day-to-day life?
- Users present to treatment with wide variation:
 - In past intervention experiences, interests, needs (e.g., variety of triggers, ways binge eating impacts their lives)
 - Some facility with behavior change techniques (e.g., goal setting, action planning)
- And, 100% endorsed past attempts to lose weight + 91% endorsed past attempts to stop binge eating

Graham et al., 2021, *JMIR Form Res*; Graham et al., 2021, *Front Dig Health*; Weinheimer et al., 2020, *Int J Eat Disord*; Fu et al., 2021, *Eat Behav*

Low Fidelity Prototyping: What Do You Want to Work on?

| Intervention Target | # of Options | Times Selected |
|--|--------------|----------------|
| Improve Dietary Intake | 6 | 19 |
| Increase Physical Activity | 3 | 6 |
| Reduce Over-valuation of Weight and/or Shape | 4 | 3 |
| Reduce Unhealthy Weight Control Practices | 3 | 2 |
| Decrease Negative Affect | 3 | 1 |

Now, go do it for 1 week!

Graham, et al. (2021). Integrating user-centered design and behavioral science to design a mobile intervention for obesity and binge eating: A mixed-methods analysis, *JMIR Formative Research*

What Happened?

- How did it go?
 - 41% as planned
 - 41% somewhat as planned
 - 18% not as planned
- Did it help?
 - 82% said yes
- Will you keep it going?
 - 86% planned to continue practicing
- Average within-subject changes in weight (-2.2 [SD - 5.0] pounds) & binge eating (-1.6 [SD -1.8] episodes)

Design Implications

- Offer choice in selecting skills to practice
 - Guided customization: personalization within a defined array of credible options
- Offer support in problem solving
 - Importance of positivity and reinforcement

Personas

The Snacker

"When I try to watch what I eat, then I get really really hungry."

About Me:

I feel like I am constantly eating. My day consists of eating between meals. I am trying to limit my calories, so I eat a small breakfast and lunch. Throughout the day, though, I get hungry for more food. I get bored sitting at my desk all day, and it's hard to resist the temptation to buy something from the vending machines. Office birthday parties and donuts at meetings also make it hard to stay on track. I like joining my coworkers for happy hour, and we share appetizers and drink beers. Once I get home, I don't eat much for dinner, but tend to snack again while relaxing and watching TV.



<https://unsplash.com/photos/BES9AifUfD4>

Motivations:

- Structure my eating and reduce my desire for snacks
- Learn to resist available food

Pain Points:

- I have constant cravings
- I never feel particularly hungry or full
- I feel unsatisfied after meals
- I eat when I'm bored

The On-The-Goer

"I'll do good all day, I'll eat light, and then binge at the end of the night, because I'm so famished."



About Me:

I barely have time to eat throughout the day, then eat too much at night. I bustle between responsibilities all day. I work full-time, and I often don't have time in the morning to pack a lunch. I rely on granola bars or leftover snacks to get through the day. After work, I pick up my kids and bring them to soccer practice or doctors' appointments. By the time we get home, I have to make them dinner before their bedtime routines. It's not until I have a moment to myself at the end of the day that I even realize I haven't eaten much at all and am starving. It's hard not to binge in these moments.

Motivations:

- Plan meals in advance and structure my eating
- Provide for my family, while also care for myself

Pain Points:

- I go too long without eating
- I don't have enough time for meal planning, but feel exhausted and helpless to make a change
- I put myself and my health after other responsibilities

The Emotional Eater

"It's just a constant downhill spiral. And so, when I get depressed, I eat more and that causes me to get more depressed and it just it doesn't seem to end."



About Me:

I turn to food when I'm stressed or down. When I get overwhelmed about a school assignment, I eat to calm myself down. Unfortunately, this makes me more stressed in starting my assignment, which causes more stress. Because money is tight, I don't like to stock up on extra groceries. But my roommates always share their leftovers and leave snacks on the counter, which are hard to resist. I struggle with depression and anxiety, while the initial comfort of eating creates a bit of relief. I feel ashamed and guilty after a binge. I don't want people to know this is my pattern, so I try to hide evidence of my binges.

Motivations:

- Manage sadness and emotions without food
- Improve my mental health and binge eating

Pain Points:

- I use eating to cope
- I fall into a cycle of eating for comfort, then withdrawing

The Enthusiast

"It's really difficult and discouraging because I'm putting so much work into physical exercise, and I just throw it away with binge eating for a few minutes of enjoyment."



About Me:

I am very aware of my weight and binge eating, and I'm always looking to make a change. I spend a lot of time researching different solutions so I can learn about new trends to lose weight. I love to read weight loss blogs and follow influencers' recipes and tips on social media. I am good about creating weight loss plans, but I can't seem to follow through on my plans and see results.

Motivations:

- See visible success (e.g., scale numbers decreasing, how clothes fit, flatter stomach)
- Set a clear plan with validation/motivation as I reach my goals

Pain Points:

- I can't organize but can't stay on a plan
- I put in effort that is not rewarded with success
- I often fail at my goals, like cutting out foods but indulging in them later or realizing I set unrealistic exercise goals

The Planner

"I kind of plan my meals and life around when I can binge eat next time."

"The worst thing about binge eating is that it knocks back any progress that you're making, in your healthy diet and healthy workout habits."



About Me:

I know binge eating is going to happen, so instead of trying to stop it, I plan ahead. I mainly binge on holidays and special occasions. I fast and exercise a lot in preparation. Before the binge, I stock up on my favorite binge foods, but often I end up buying too much food. Once I binge, it's hard to get back on track – it's like, "oh well" – and I eat poorly for several more days. My weight constantly fluctuates because I cycle between denying and indulging on food.

Motivations:

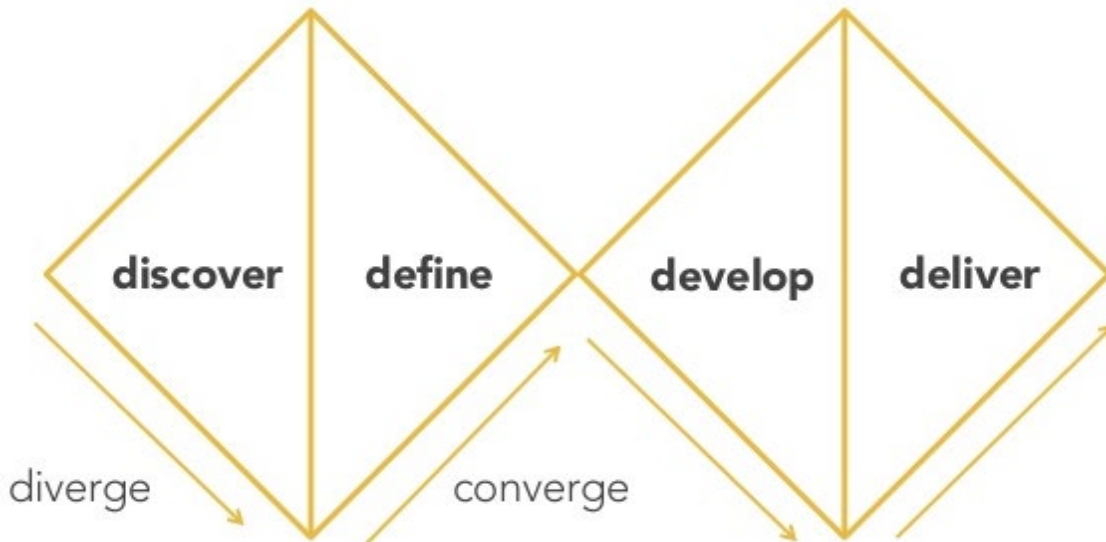
- Enjoy events without the need to binge
- Eat small portions of celebratory foods without engaging in a binge episode

Pain Points:

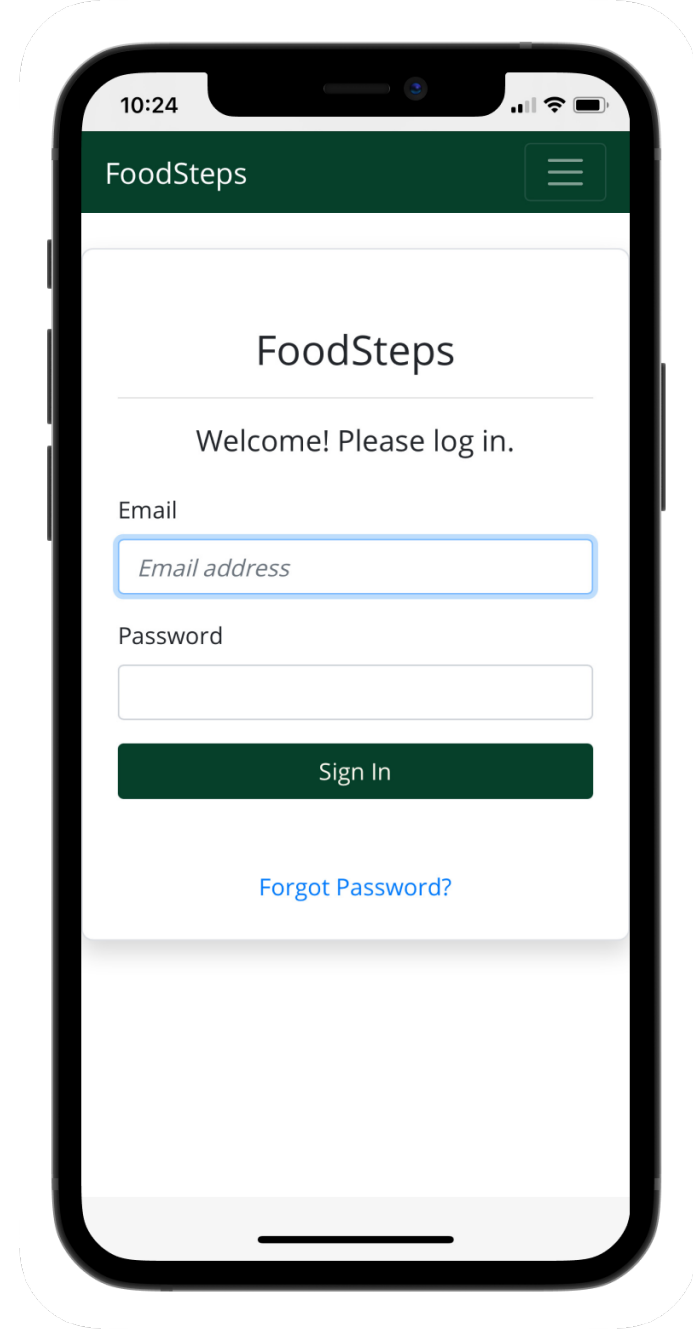
- I feel like binge episodes are inevitable
- I tell myself I will work off the calories later
- I'm nervous about my weight, because these binge episodes happen more and more often

Graham et al., 2021, *Frontiers in Digital Health*

From Design to Development: FoodSteps

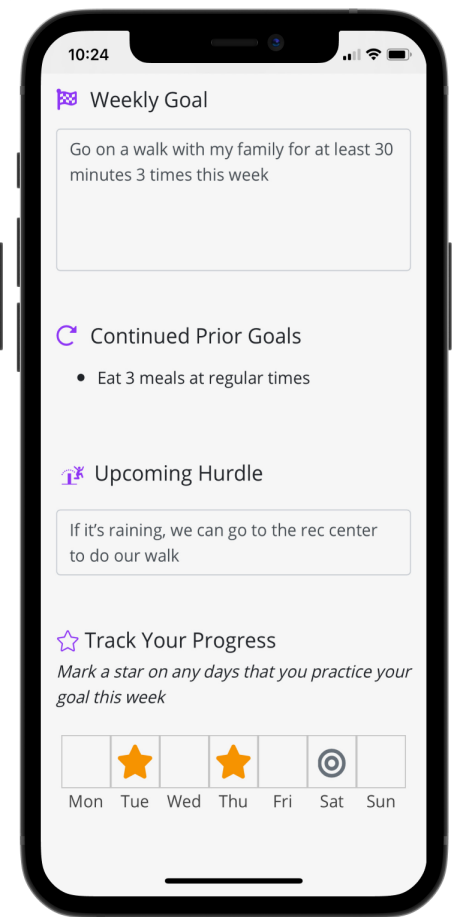
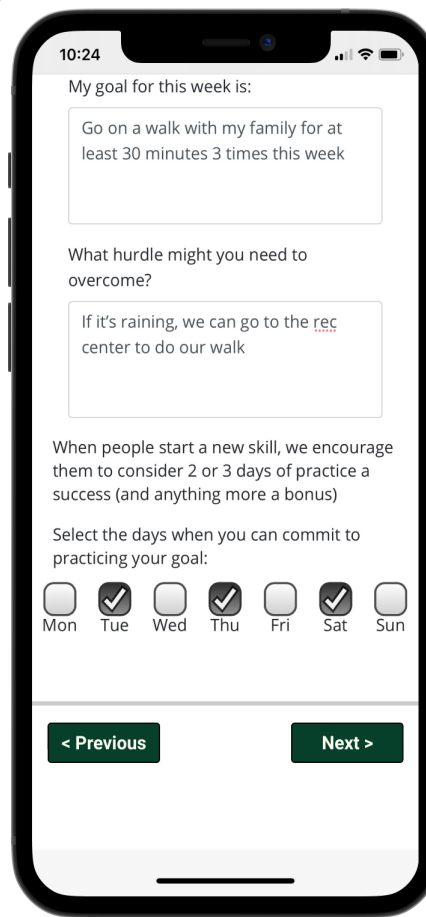
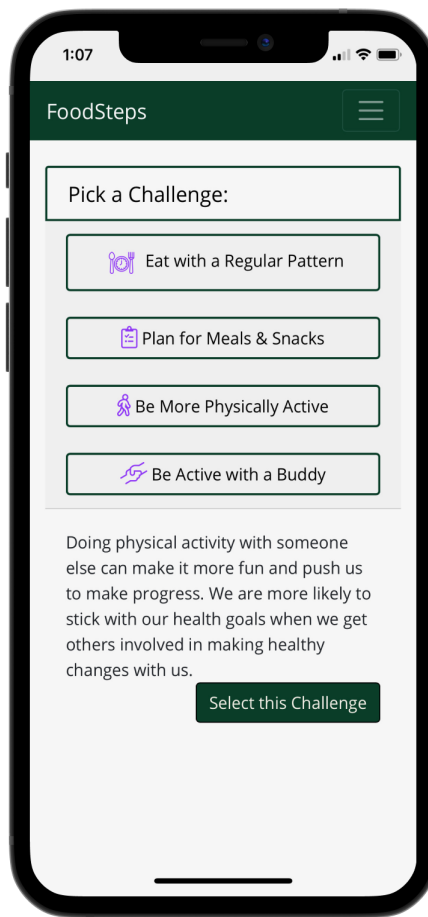
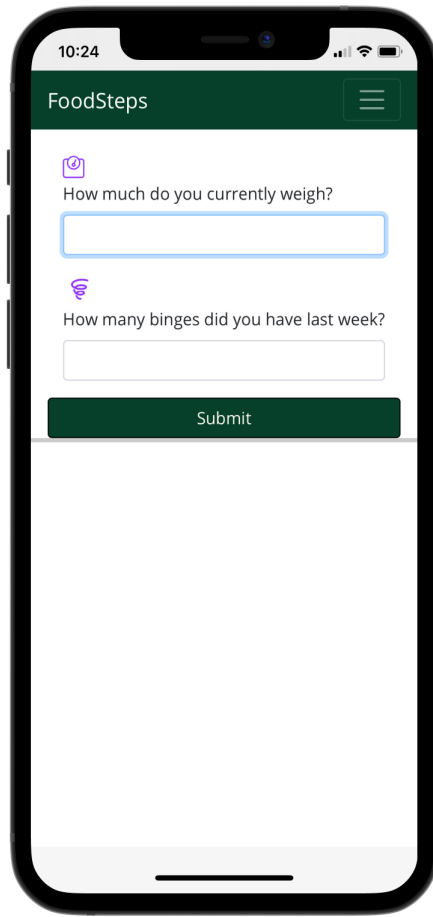


DESIGN THINKING WORKSHOP | Zaana Howard | 14



What Can You Work On in FoodSteps?

(From 21 → 10 Skills)



Multiphase Optimization Strategy (MOST) Framework

- Manipulating 3 components in a factorial trial

| Experimental Condition | Weight Loss | Decrease Overvaluation of Weight & Shape | Decrease Unhealthy Weight Control Practices | Decrease Negative Affect |
|------------------------|-------------|--|---|--------------------------|
| 1 | Yes | No | No | No |
| 2 | Yes | No | No | Yes |
| 3 | Yes | No | Yes | No |
| 4 | Yes | No | Yes | Yes |
| 5 | Yes | Yes | No | No |
| 6 | Yes | Yes | No | Yes |
| 7 | Yes | Yes | Yes | No |
| 8 | Yes | Yes | Yes | Yes |

How It's Going

(Preliminary Data: Trial in Progress)

- Usage is high: users complete 80% of the program on average
 - Completing $\geq 75\%$ of sessions has benefit in weight management interventions
- Compliance is high: target selected and assessment completed on 94% of sessions completed
- Greater precision is needed: average weekly reductions in weight and binge eating
 - But, suboptimal proportion with weekly improvement

Future Design Crossroads

How to Sequence Targets Week to Week: Same Target or New?

"It seemed like I was picking the same goal over and over again, but that's what I needed."

Behavior Theory: Continued practice facilitates learning

"Maybe [add] a feature to help encourage people to diversify, if they're not doing it already."

"Having it switch around could be beneficial. So, if it's like, 'Okay, you did this kind of a goal last week, so we're going to limit the number of goals you have.'"

Measurement-based Care: Modifying treatment when progress stalls prevents failure and accelerates change

Future Design Crossroads

How to Deliver Targets Each Week: Free Choice, Recommend, or Assign?

"I personally liked being able to use my own judgment if I wanted to focus on something week to week or if I wanted to diversify. [...] If it's not forced on them and they can do it all alone, then that's very helpful for them."

"Maybe you could have a branch. So, on a week, you could say, 'Okay here's a pre-set goal you can pick, or you can pick this one, or you can pick your own'."

Nudge Theory, Behavioral Economics: Nudging influences decision-making and behavior without restricting choice

"It's probably easier to have preset goals than to have to come up with my own, just for me. Like, 'Okay, this is what we're working on this week,' as opposed to 'Oh my gosh, how can I, what do I have to do?'"

"For weeks where I just have no motivation, it's easy to pick a goal that I think will be much easier to accomplish. [Free choice] runs into potentially avoiding some more challenging behavioral changes."

Choice Overload, Behavioral Economics: Too many choices (overload) leads to faulty decision making over time

Areas for Future Optimization

- Stress from social determinants of health
 - Venkatesh, et al, 2021, Perceived facilitators and barriers to engaging with a digital intervention among those with food insecurity, binge eating, and obesity. *Nutrients*
 - Kosmas, Wildes, Graham, & O'Connor, In preparation
- Managing expectations for weight loss
 - Voss, et al., Under review, The impact of binge eating and overvaluation of weight and shape on weight loss expectations
- Self-determined monitoring metrics
 - Liu, et al., Under review, Understanding self-monitoring preferences and behaviors to inform the design of a mobile intervention for binge eating and weight management: A proof-of-concept randomized trial.

Customizing Monitoring



The Importance of Starting With Goals in N-of-1 Studies

Sean A. Munson^{1*}, Jessica Schroeder², Ravi Karkar², Julie A. Kientz¹, Chia-Fang Chung³ and James Fogarty²

¹ Human Centered Design and Engineering, DUB Group, University of Washington, Seattle, WA, United States, ² Computer Science and Engineering, DUB Group, University of Washington, Seattle, WA, United States, ³ Informatics, Indiana University Bloomington, Bloomington, IN, United States

N-of-1 tools offer the potential to support people in monitoring health and identifying individualized health management strategies. We argue that elicitation of individualized goals and customization of tracking to support those goals are a critical yet under-studied and under-supported aspect of self-tracking. We review examples of self-tracking from across a range of chronic conditions and self-tracking designs (e.g., self-monitoring, correlation analyses, self-experimentation). Together, these examples show how failure to elicit goals can lead to ineffective tracking routines, breakdowns in collaboration (e.g., between patients and providers, among families), increased burdens, and even designs that encourage behaviors counter to a person's goals. We discuss potential techniques for eliciting and refining goals, scaffolding an appropriate tracking routine based on those goals, and presenting results in ways that advance individual goals while preserving individual agency. We then describe open challenges, including how to reconcile competing goals and support evolution of goals over time.

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Next Step: Designing for Implementation

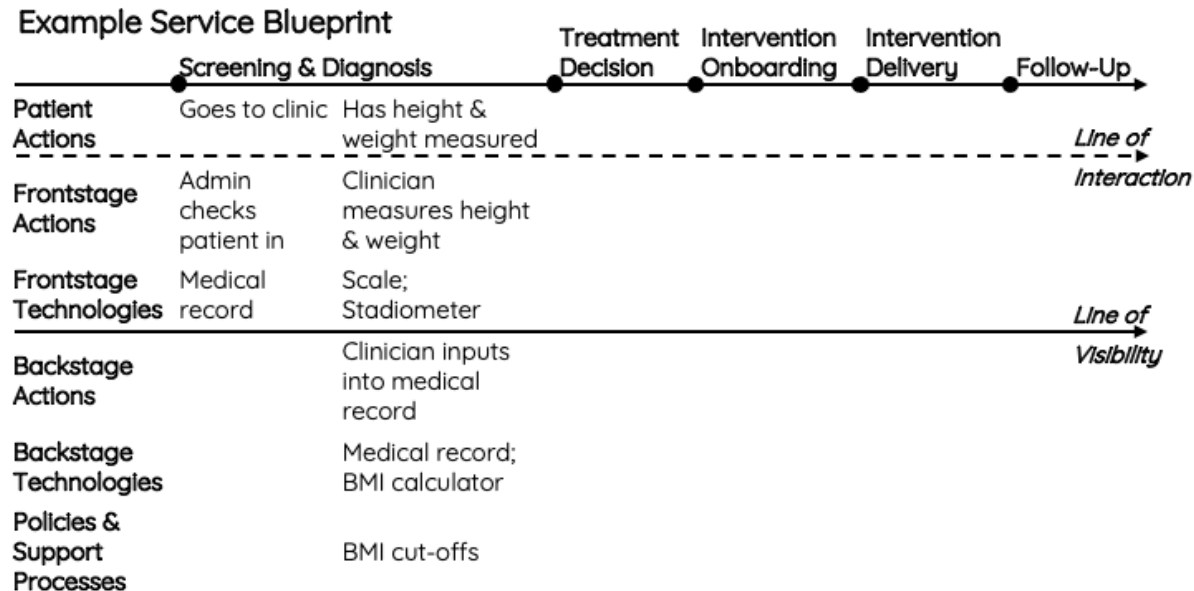
- Integrating new interventions into existing workflows is challenging
 - Especially true for digital, whose delivery differs from in-person **by design**
- For clinicians to use digital interventions, these tools must be embedded into the natural flow of patient care

Graham et al., 2020, Implementation strategies for digital mental health interventions in health care settings, *Am Psychol*;
Graham, Lattie, & Mohr, 2019, Experimental therapeutics for digital mental health, *JAMA Psychiatry*

Applying Service Design Methods for FoodSteps

R03 DK128531

- Design **service blueprints** & **implementation roadmaps** with 3 clinical settings

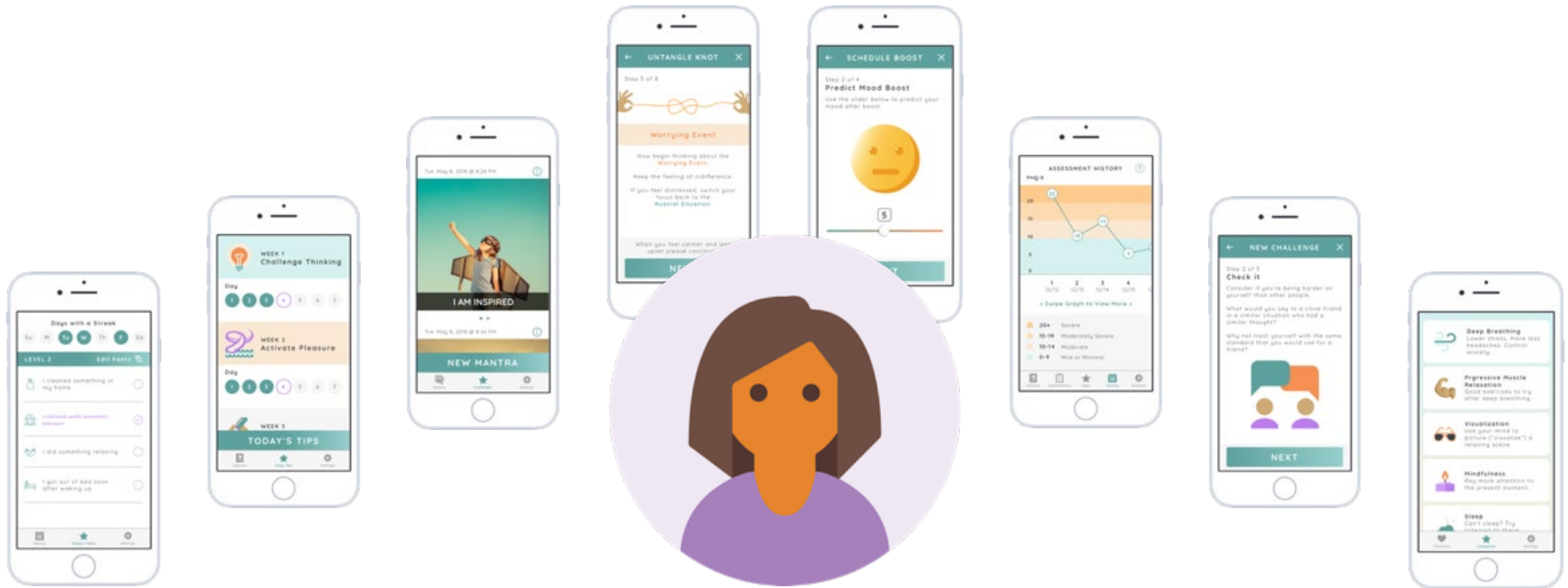


“...workflow considerations remain among the **least explored but most needed** factors towards facilitating implementation...”

Torous et al., 2021, *World Psychiatry*

Workflow Integration: An Example

IntelliCare



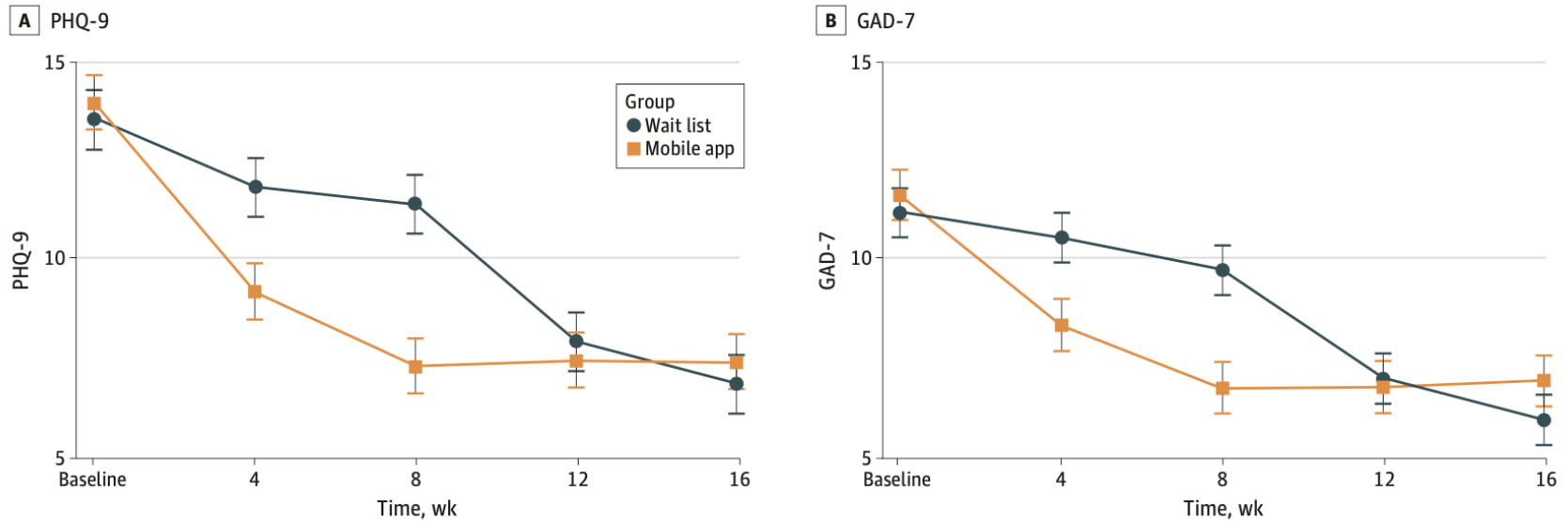
Mohr, et al., 2017, IntelliCare: An eclectic, skills-based app suite for the treatment of depression and anxiety, *JMIR*

“Implementing an Innovative Suite of Mobile Applications for Depression & Anxiety”

- SBIR R44 MH114725 (PI: Naik)
 - Collaboration between Actualize Therapy, Northwestern University, & the University of Arkansas for Medical Sciences
- First trial:
 - Comparing IntelliCare to treatment-as-usual
 - Evaluating a mental health app *platform*
 - Evaluating a mental health app with primary care patients

Results

Figure 2. Change in Least Square Means Scores



- Effect sizes of 0.78 and 0.64 for depression and anxiety

Graham, et al., 2020, Coached mobile app platform for the treatment of depression and anxiety among primary care patients: A randomized clinical trial, *JAMA Psychiatry*

Engagement

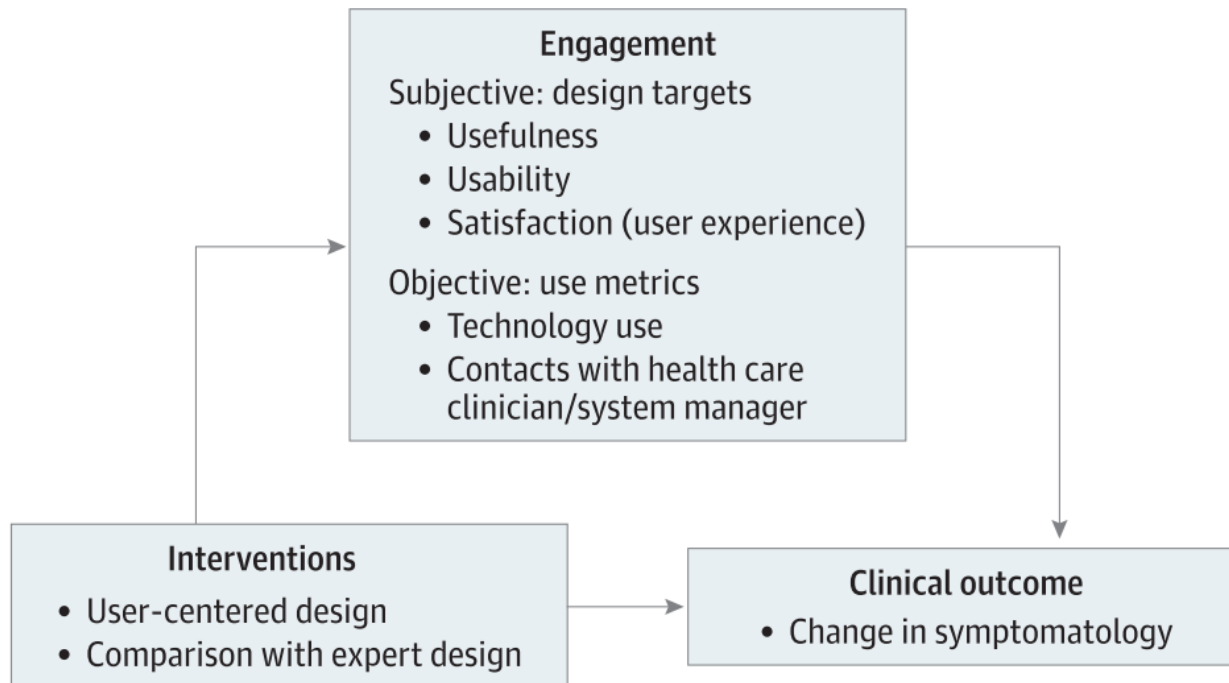
Table 3. App Use Metrics for the Full IntelliCare Platform and Each Individual App

| Group | Mobile app ^a | Median (IQR) [range] | | |
|----------------------|-------------------------|----------------------|-------------------|-------------------|
| | | Sessions | Days used | Time to last use |
| Depression (n = 122) | Suite (all apps) | 93 (51-133) [0-333] | 27 (17-35) [0-50] | 43 (32-48) [0-56] |
| | Hub | 20 (11-30) [0-102] | 12 (7-17) [0-39] | 40 (28-45) [0-56] |
| | Daily Feats | 26 (11-44) [0-94] | 17 (8-26) [0-50] | 36 (19-45) [0-53] |
| | Day-to-Day | 16 (6-25) [0-90] | 11 (5-16) [0-40] | 29 (9-41) [0-52] |
| | MyMantra | 9 (2-19) [0-59] | 6 (2-10) [0-37] | 15 (2-28) [0-50] |
| | Thought Challenger | 8 (3-16) [0-74] | 6 (3-12) [0-41] | 16 (6-29) [0-51] |
| | WorryKnot | 5 (0-11) [0-29] | 4 (0-8) [0-23] | 9 (0-19) [0-46] |
| Anxiety (n = 131) | Suite (all apps) | 98 (46-146) [0-321] | 27 (16-35) [0-50] | 42 (32-48) [0-56] |
| | Hub | 21 (11-30) [0-102] | 11 (7-16) [0-39] | 39 (28-45) [0-56] |
| | Daily Feats | 25 (10-44) [0-94] | 17 (6-26) [0-50] | 36 (11-44) [0-53] |
| | Day-to-Day | 17 (7-29) [0-90] | 11 (5-18) [0-40] | 29 (8-41) [0-52] |
| | MyMantra | 10 (2-22) [0-59] | 6 (1-11) [0-37] | 15 (0-28) [0-50] |
| | Thought Challenger | 8 (3-16) [0-53] | 6 (3-12) [0-30] | 16 (4-30) [0-50] |
| | WorryKnot | 5 (0-10) [0-29] | 4 (0-7) [0-23] | 8 (0-17) [0-50] |

Graham, et al., 2020, Coached mobile app platform for the treatment of depression and anxiety among primary care patients: A randomized clinical trial, *JAMA Psychiatry*

Engagement: Designing for the User Experience

Figure. Conceptual Model for Experimental Therapeutics to Target Engagement as a Mediating Mechanism for Digital Mental Health



Engagement

- Objective use metrics (e.g., number of app sessions) were not significantly related to outcomes
- Subjective metrics were!

Regression parameters for change in clinical outcome per unit change in subjective use measures of a digital mental health intervention (all observed data).

| USE subscale | Depression (n = 112) median (25th, 75th) [min, max] | Change in PHQ-9 unadjusted | Change in PHQ-9 adjusted | Anxiety (n = 121) median (25th, 75th) [min, max] | Change in GAD-7 unadjusted | Change in GAD-7 adjusted |
|-------------------------------|---|-------------------------------|-------------------------------|--|-------------------------------|-------------------------------|
| Usefulness (6 items) | 33 (28, 37) [12, 42] | -0.21 (SE = 0.09) [P = 0.014] | -0.25 (SE = 0.09) [P = 0.007] | 33 (26, 38) [12, 42] | -0.16 (SE = 0.06) [P = 0.007] | -0.19 (SE = 0.06) [P = 0.002] |
| Ease of Use (5 items) | 31 (28, 35) [5, 35] | -0.18 (SE = 0.11) [P = 0.090] | -0.16 (SE = 0.11) [P = 0.136] | 30 (26, 35) [5, 35] | -0.19 (SE = 0.07) [P = 0.008] | -0.20 (SE = 0.07) [P = 0.008] |
| Ease of Learning (3 items) | 21 (18, 21) [3,21] | -0.36 (SE = 0.18) [P = 0.056] | -0.32 (SE = 0.19) [P = 0.098] | 21 (18, 21) [3, 21] | -0.36 (SE = 0.12) [P = 0.004] | -0.37 (SE = 0.13) [P = 0.004] |
| Satisfaction (5 items) | 28 (22, 32) [5, 35] | -0.18 (SE = 0.08) [P = 0.040] | -0.20 (SE = 0.09) [P = 0.022] | 28 (22, 33) [5, 35] | -0.15 (SE = 0.06) [P = 0.014] | -0.17 (SE = 0.06) [P = 0.005] |

Note: PHQ-9 = Patient Health Questionnaire-9; GAD-7 = Generalized Anxiety Disorder-7. Change in PHQ-9 and GAD-7 was defined as post-treatment minus baseline scores. Adjusted analyses accounted for age, sex, and race.

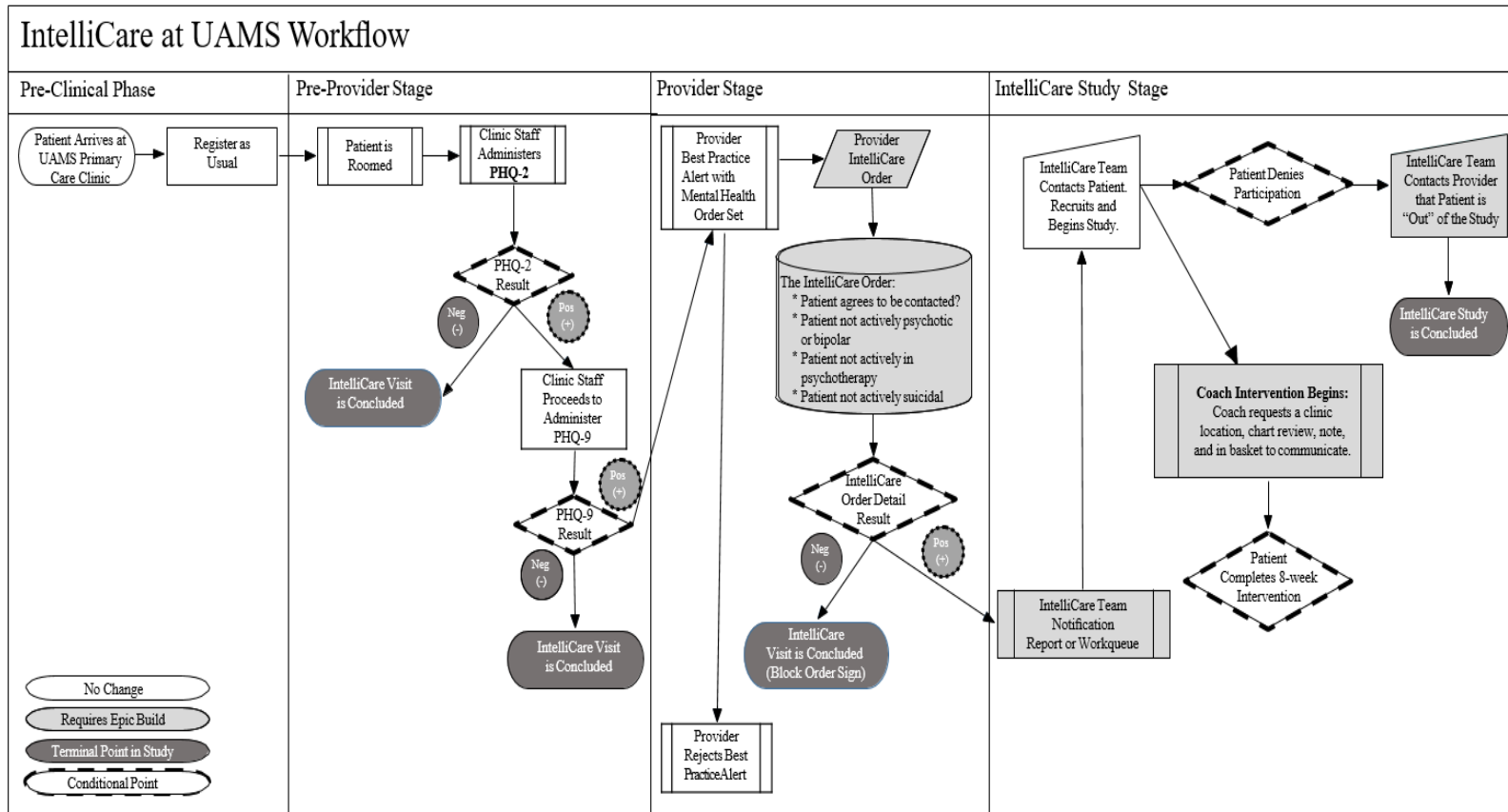
Graham et al., 2021, Targeting subjective engagement in experimental therapeutics for DMHIs, *Internet Interventions*

Workflow Integration: Referral Management

| Referral Strategies | | | | | | | |
|---------------------|-------------------|-------|-------------------|-------------------|-----------|------------|-------------|
| Direct to Consumer | | | Provider Referral | | | Other & >1 | |
| Digital | Research Registry | Print | Clinic | EHR alert + order | Recommend | Other | Campus Buzz |

Graham, et al., 2020, Lessons learned from service design of a trial of a digital mental health service: Informing implementation in primary care clinics, *Transl Behav Med*

Workflow Integration



Graham, et al., 2020, Lessons learned from service design of a trial of a digital mental health service: Informing implementation in primary care clinics, *Transl Behav Med*

Interoperability with an EHR



<https://www.insider.com/nailed-it-netflix-baking-fails-photos-2018-3#the-judges-congratulated-this-contestant-for-completing-her-cake-in-a-short-period-of-time-4>

Workflow Integration

| Referral Strategies | | | | | | | |
|---------------------|--------------------|-------|--------|-------------------|-----------|-------------------|-------------|
| Direct to Consumer | | | | Provider Referral | | Other & >1 | |
| Digital | Research Registry | Print | Clinic | EHR alert + order | Recommend | Other | Campus Buzz |
| Yield: | 82% (n=257) | | | 4% (n=14) | | 14% (n=42) | |

Graham, et al., 2020, Lessons learned from service design of a trial of a digital mental health service: Informing implementation in primary care clinics, *Transl Behav Med*

Designing for Implementation

- Integrating new interventions into existing workflows is challenging
 - Especially true for digital, whose delivery differs from in-person **by design**
- There is a gap in knowing “how” (the methods and techniques) to implement digital interventions in health care settings

Proposed Implementation Strategies

Proposed Implementation Strategies across Phases of Implementation

Exploration Phase

- Conduct needs assessments (e.g., among practitioners, consumers)
- Align practitioners on DMHI adoption (e.g., consensus discussions)
- Review DMHI evidence and content
- Aim to ensure equity in who can access the DMHI

Preparation & Implementation Phases

- Create a business associate agreement to restrict data usage
- Determine who is appropriate for the DMHI, and create guidelines
- Create and distribute educational materials about the DMHI
- Be transparent about DMHI data security, privacy, & use
- Assist with onboarding (e.g., educational materials, point-person)
- Create and disseminate practice guidelines for delivering the DMHI
- Offer training & ongoing supervision in using the DMHI
- Specify plans for monitoring & addressing safety concerns
- Change record systems (e.g., integrate DMHI with the health record; integrate communication portal with tools practitioners use)
- Appropriate sufficient funds (e.g., to license the DMHI, initiate a contract, workflow integration, programming, staff training)
- Build partnerships for priority setting & evaluation
- Adopt DMHIs with demonstrated effectiveness
- Design the referral process & inform referring practitioners
- Have “champions” inform consumers about the DMHI
- Be transparent about DMHI requirements, promote autonomy
- Make technical assistance available
- Ensure practitioners are competent to deliver the DMHI
- Monitor practitioners’ fidelity to the DMHI protocol
- Make plans for safety monitoring transparent to consumers
- Conduct small tests of the new processes
- Track time & resources spent implementing the DMHI
- Create learning collaboratives to share resources & learnings

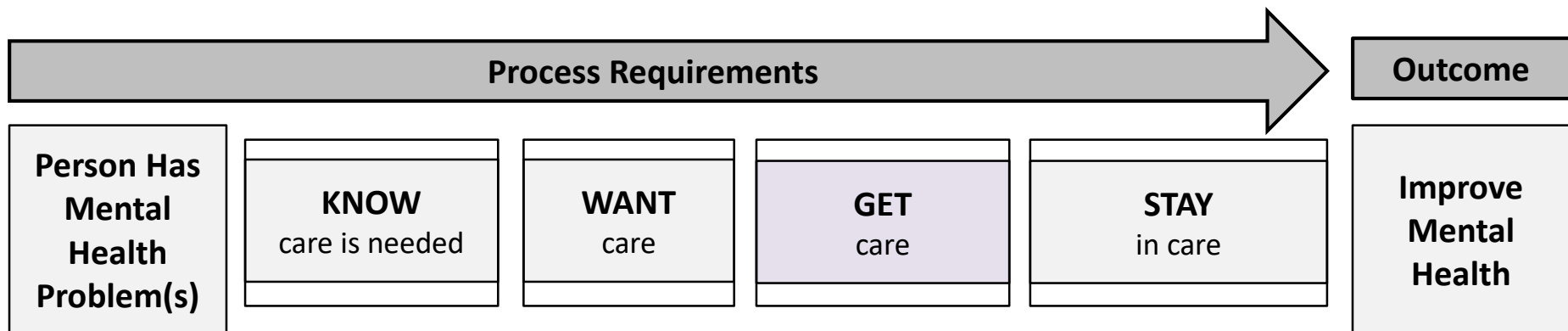
Sustainment Phase

- Optimize the technologies & implementation plans over time
- Assess changing needs & preferences over time

Graham, Lattie, Powell, Lyon, Smith, Schueller, Stadnick, Brown, & Mohr, 2020, Implementation strategies for digital mental health interventions in health care settings, *Am Psychol*

Assist with Onboarding

- Referral management can be a pain-point in the “implementation cascade” for DMHIs
 - Who’s responsible?
 - Ethics and legalities (data sharing, endorsement)
 - Software integration challenges



Designing Digital Health for All

JAMA Health Forum.



Viewpoint

Resolving Key Barriers to Advancing Mental Health Equity in Rural Communities
Using Digital Mental Health Interventions

Andrea K. Graham, PhD; Ruth Striegel Weissman, Dipl-Psych, PhD; David C. Mohr, PhD

For example: Some DMHI affordances could put rural communities at a disadvantage

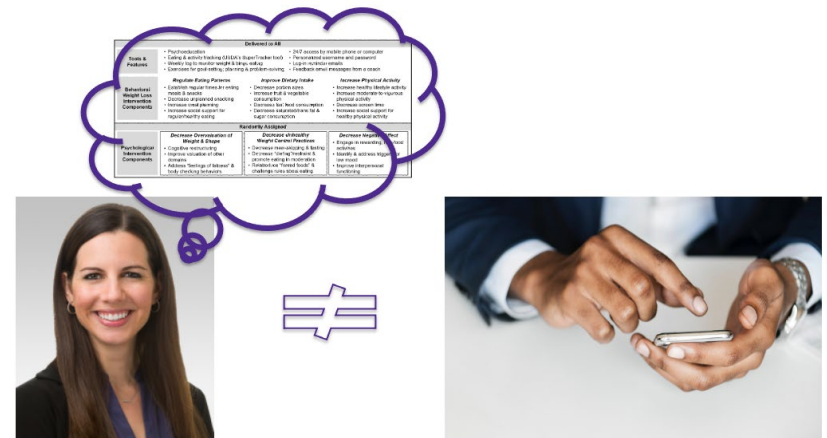
- Fitting services into the fabric of people's lives
- Facilitating seamless remote patient monitoring through interoperability
- Reducing reliance on licensed specialty clinicians

Conclusions

- Digital health interventions are effective
- But, they are not widely implemented in health care systems
- Successful integration requires designing these services to meet the needs of users and align with their implementation contexts


Recommendations for Clinical Researchers Doing UCD

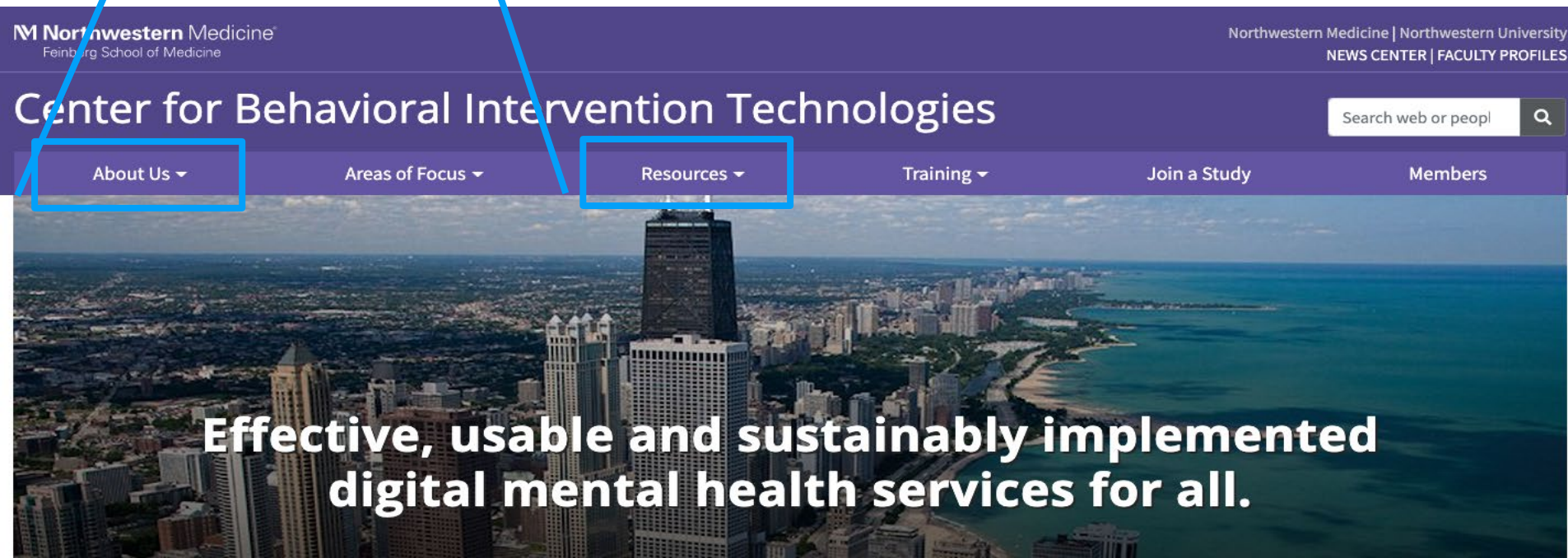
- Get things in front of end-users
- Focus on the **minimally-viable product**
- Iterate, iterate, iterate



Thank You!


Want More User-Centered Design Resources?

- **Email:** andrea.graham@northwestern.edu  @andreakgraham
- **Visit:** cbits.northwestern.edu
 - Design for Digital Health Reading Course: syllabus + articles
 - Request Consultation (supported by P50 MH119029; PIs Mohr & Reddy)



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Effective, usable and sustainably implemented digital mental health services for all.