

Data-Driven Implications for Translating Evidence-Based Psychotherapies into Technology-Delivered Interventions

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Mental Health Disorders

Leading cause of disability and death

Evidence-based psychotherapy is effective for many disorders



Dialectical Behavioral Therapy (DBT)

Treats people with complex disorders and suicidal ideation

Helps people develop concrete coping skills

Effective for a wide range of disorders



Difficult to quantify the effectiveness of skills



Mobile Mental Health Interventions

Reduce financial and time barriers

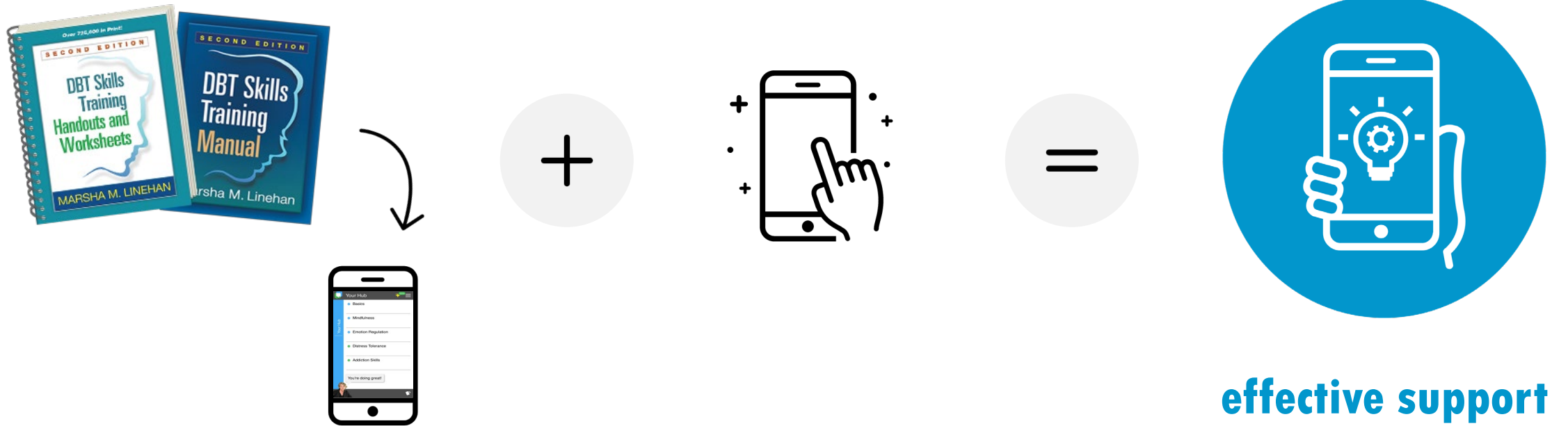
Increase engagement and honest disclosures



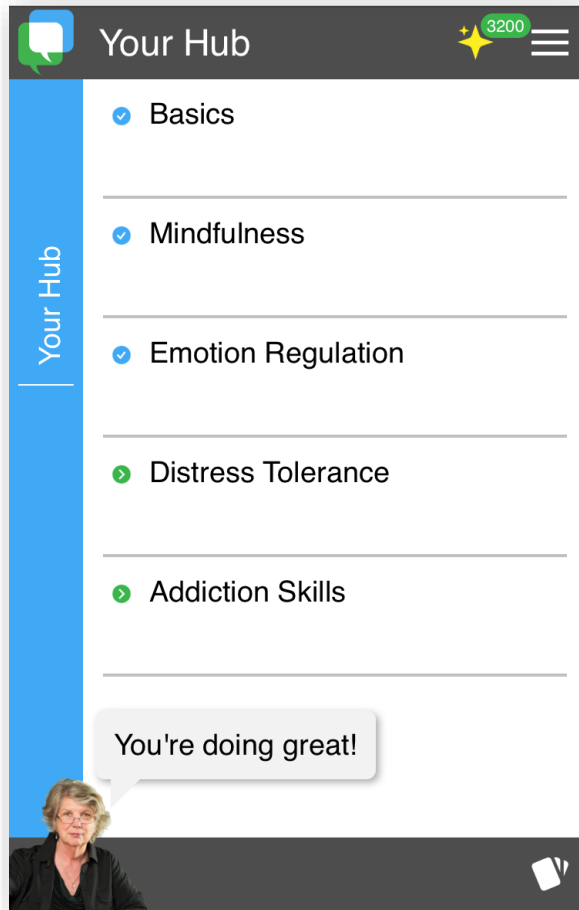
Do not follow evidence-based principles



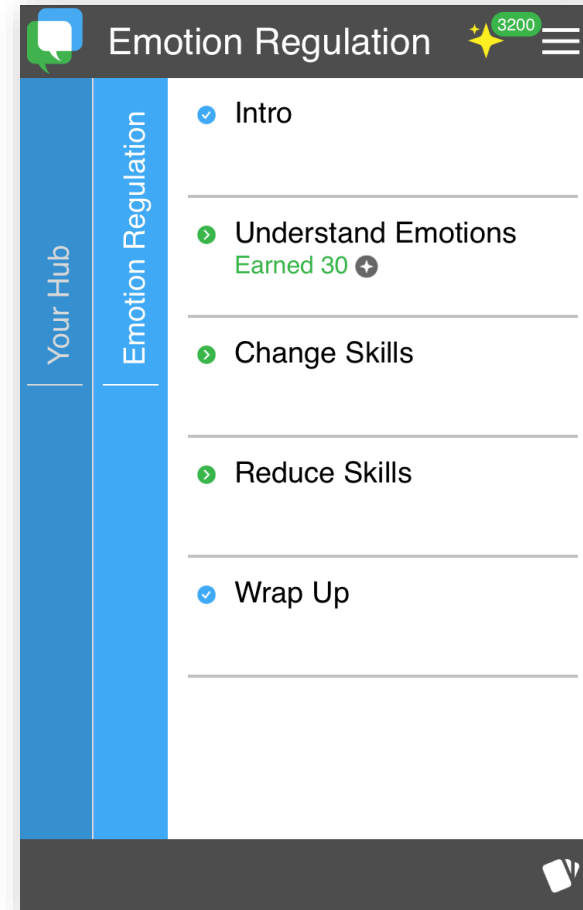
Digitally Translated Interventions



Pocket Skills

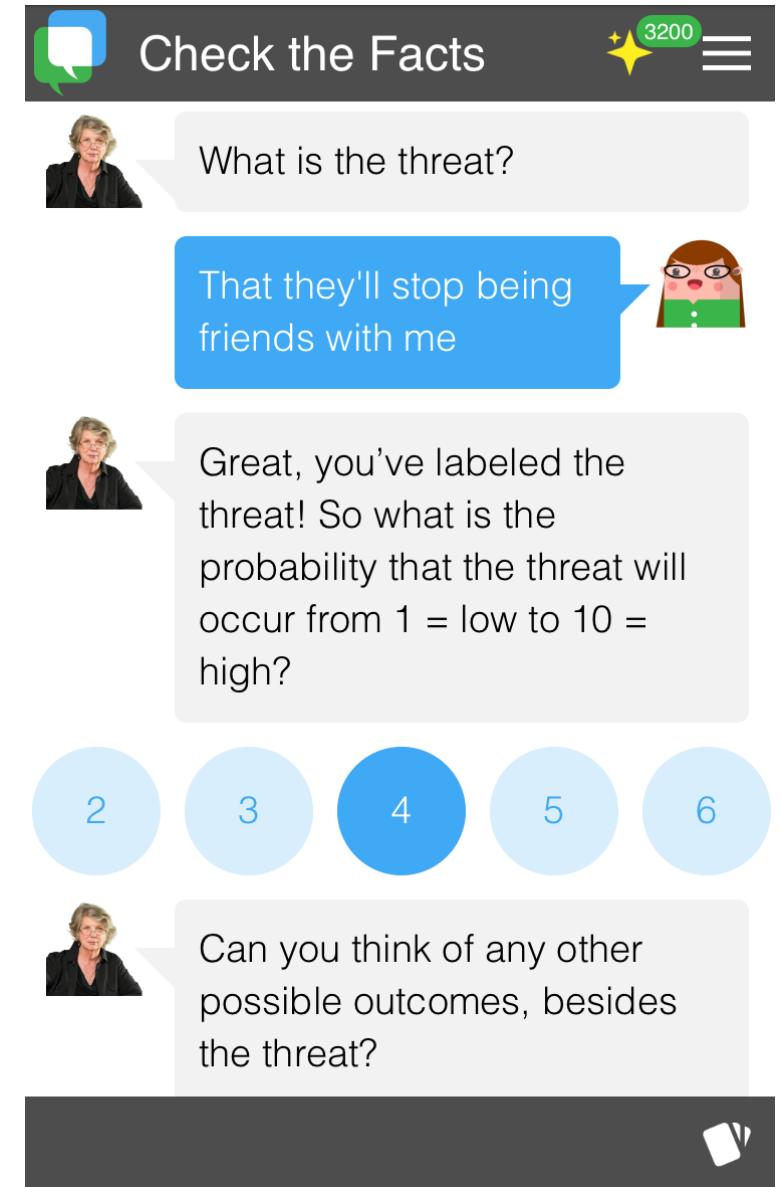
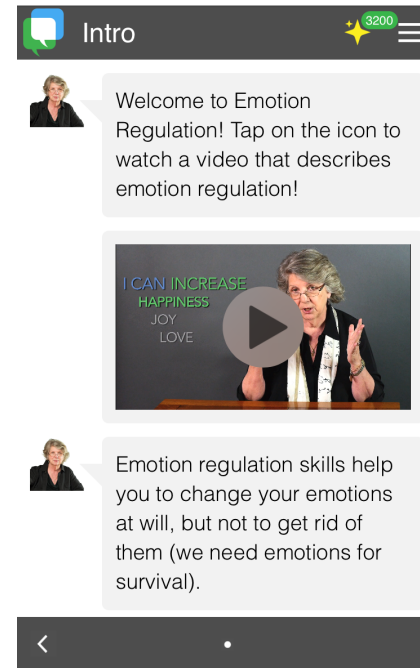
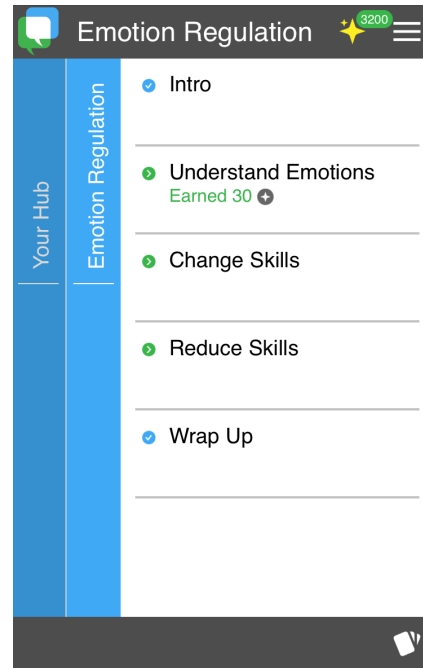
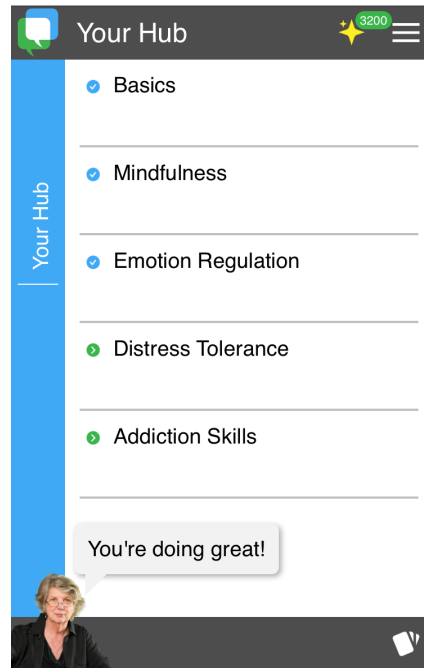


Modules



Skills

Pocket Skills



Managing Emotions

EMOTION REGULATION WORKSHEET 5 (p. 2 of 2)

Step 4

Ask: Am I assuming a THREAT? What is the THREAT? What about this event or situation is threatening to me? What worrisome consequences or outcomes am I expecting?

CHECK THE FACTS!

List as many *other* possible outcomes as you can, given the facts.

REWRITE the facts if needed. Try to check the accuracy of your expectations. If you can't check out probable outcomes, write out a likely noncatastrophic outcome to expect.

Facts
→

Step 5

Ask: What's the CATASTROPHE, even if the outcome I am worrying about does occur? Describe in detail the worst outcome I can reasonably expect.

DESCRIBE WAYS TO COPE if the worst does happen.


Step 6


ASK: Does my emotion (or its intensity or duration) FIT THE FACTS?
(0 = not at all to 5 = I am certain): _____

If you are unsure whether your emotion or your emotional intensity fits the facts (for example, you give a score of 2, 3, or 4), keep checking the facts. Be as creative as you can be; ask others for their opinions; or do an experiment to see if your predictions or interpretations are correct.

Describe what you did to check the facts:





 Check the Facts 3200



What is the threat?


That they'll stop being friends with me






Great, you've labeled the threat! So what is the probability that the threat will occur from 1 = low to 10 = high?

2 3 4 5 6



Can you think of any other possible outcomes, besides the threat?



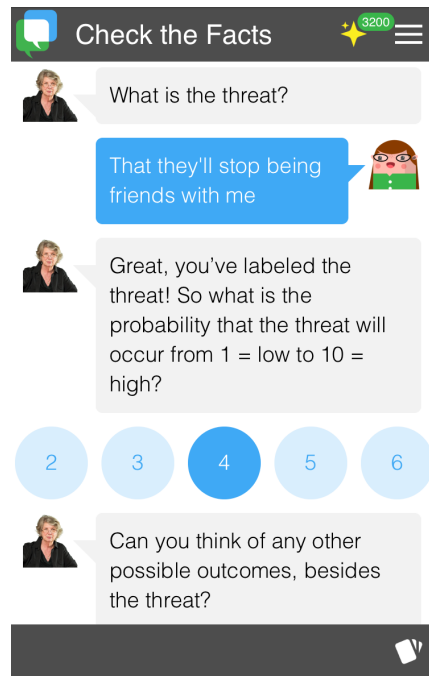
Dr. Marsha Linehan



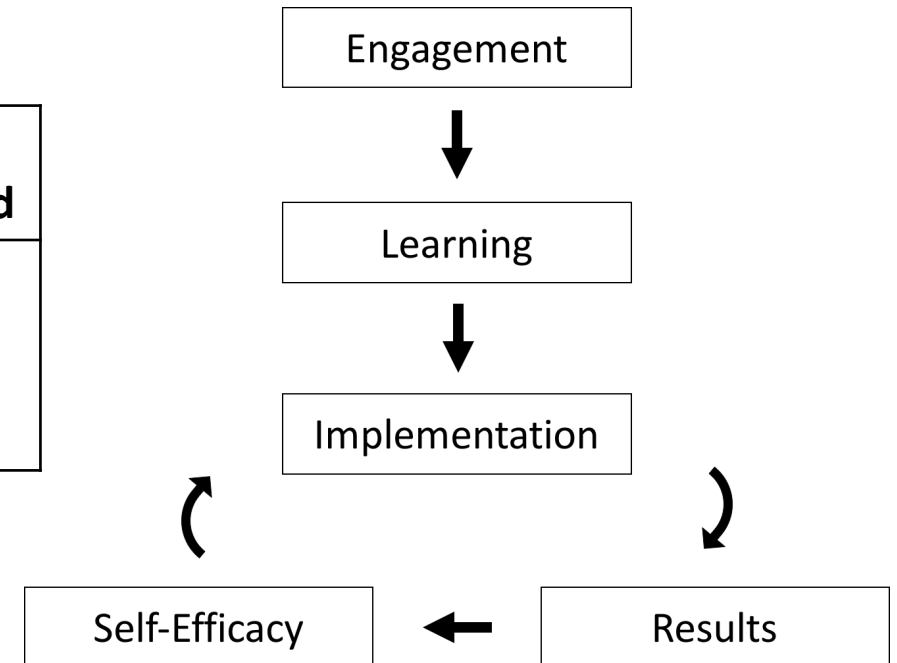
eMarsha



Pocket Skills: A Conversational Mobile Web App To Support Dialectical Behavioral Therapy



Scale	Percent Recovered	Percent Improved
OASIS	41.7	8.3
PHQ-9	22.2	4.2
Skills Use	6.9	12.5



[PocketSkills: A Conversational Mobile Web App to Support Dialectical Behavioral Therapy](#)

Jessica Schoeder, Chelsey Wilks, [Kael Rowan](#), Arturo Toledo, [Ann Paradiso](#), [Mary Czerwinski](#), Gloria Mark, Marsha M. Linehan *In Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (CHI '18)* | April 2018

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Study and Methods



Field Study

4 weeks

100 participants



Analysis

Statistical methods

Machine learning



Survey

Demographics

Validated mental health scales

Disorder types, personal preferences



App Usage

Navigation and skill use

Ratings before and after skill use

Research Questions

RQ1. When did study participants use the skills?

RQ2. Were particular skills more or less effective?

RQ3. Were skills more or less effective for different subgroups?

RQ4. Did skill-level effectiveness influence overall depression, anxiety, or skill use improvement throughout the study?

RQ5. Can we predict a particular skill's effectiveness, given participant and skill characteristics?



When did study participants use the skills?

82.6% skills with pre-skill distress ratings ≥ 3 (out of 5)



Skills were used in the moment

DESIGN IMPLICATIONS

Design for Emotional Context

Guide towards most feasible skill in the moment and support discovery and development of new skills

RQ2

Were particular skills more or less effective?

DT Self-Soothe skills result in less skill improvement by 0.63 to 0.9 points ($p < 0.05$) than other skills



Some skills are helpful if you can complete them

DESIGN IMPLICATIONS

Design for Environmental Context

Solicit feasibility, snooze activities, give choices



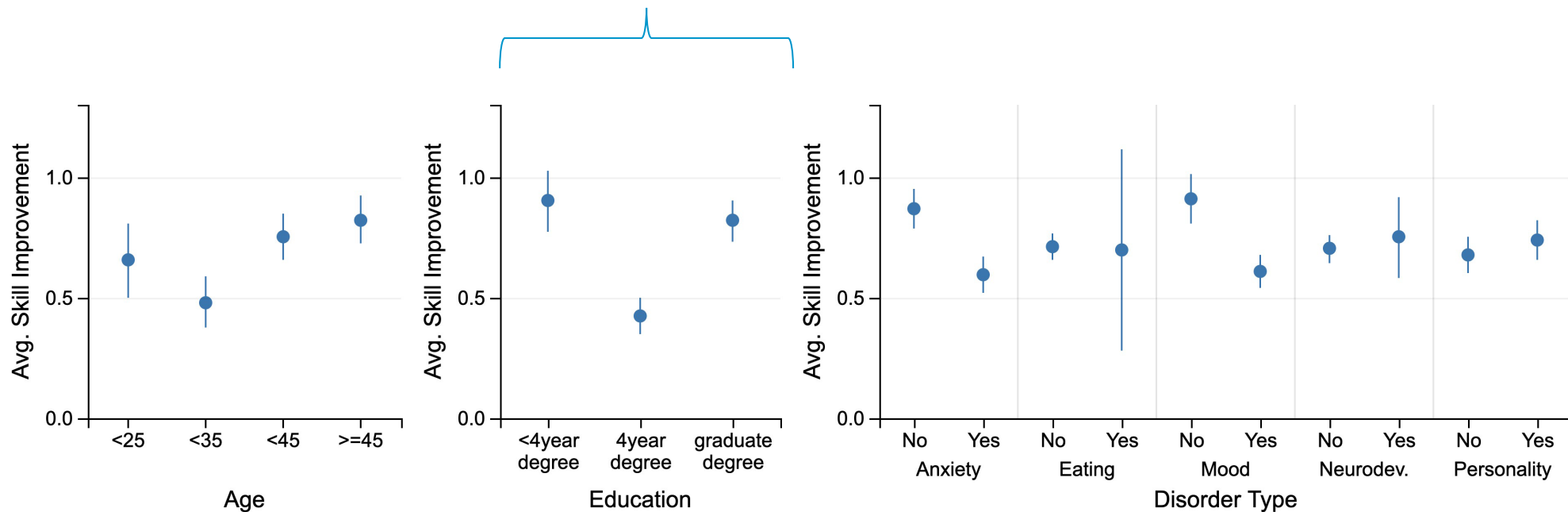
Were skills more or less effective for different subgroups of people?

Significant differences based on age, education, disorder type, medication, close by family

RQ3

Were skills more or less effective for different subgroups of people?

Having a 4-year degree correlated with over 0.4 points ($p < 0.01$) less improvement than other education groups





Were skills more or less effective for different subgroups of people?

Significant differences based on age, education, disorder type, medication, close by family



Individual characteristics are important for effectiveness

DESIGN IMPLICATIONS

Design for Personal Context

Account for individual differences in intervention activities



Did skill-level effectiveness influence overall depression, anxiety, or skill use improvement?

Larger best skill improvement resulted in significantly more depression improvement



Skills that work lead to improvement

DESIGN IMPLICATIONS

Design for Personalized Skills

Help discover skills that are more likely to reduce distress and improve mindfulness

RQ5

Can we predict a particular skill's effectiveness?

Classifiers predicted skill effectiveness with 72.1% test accuracy (over 57.4% base rate)



Effective skills can be predicted

DESIGN IMPLICATIONS

Design for Intelligent Support

Recommend skills based on emotional, personal, and environmental context from data and expert feedback

Data-Driven Design Implications Summary



FINDINGS FROM DATA

Skills are used in the moment, some are more useful than others, and their effectiveness are influenced by individual characteristics.

Skills that work leads to overall improvement, and skill effectiveness can be predicted using individual and skill use characteristics.



DESIGN IMPLICATIONS

Design for Emotional, Environmental, Personal Context

Design for Intelligent Support with Personalized Skills Recommendations

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DESIGN IMPLICATIONS

**Design for Emotional, Environmental, Personal
Context**

**Design for Intelligent Support with
Personalized Skills Recommendations**

SUPPORTED BY

NSF: DGE-1256082, IIS-1553167, IIS-1813675, IIS-1901386

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Adobe Data Science Research Award

Supportiv

Allen Institute for Artificial Intelligence

