

# Iterative Design of Between-Therapy Session Interventions in Problem Solving Therapy

## Specific Aims

A critical element of learning-based evidence-based psychosocial treatments (e.g. BA, CBT, CPT, IPT, PST) is goal setting<sup>1</sup>, yet adherence to out-of-session action plans (homework) is low. Between 20-50% of patients complete homework as assigned<sup>2</sup>. The objective of the proposed research is to employ human-centered design (HCD) methods to identify challenges patients and clinicians face in the use of homework. We will identify opportunities for clinicians and patients to *iteratively design, plan, implement and revise* homework tailored to the patient needs. This research supports the UWAC mission by applying expertise in mental health and in HCD to **address usability and sustained quality of delivery of therapy homework** in the context of Problem Solving Therapy (PST), an evidence-based treatment for depression. This pilot will focus on the first two phases of the Discover, Design, Build and Test model. *Data from this pilot will inform potential modifications to how homework is managed in interventions like PST and the UWAC Typology of EBPI Targets.* Our aims are:

**Aim 1: Determine the clinician and patient usability challenges in creating, tailoring and engaging with homework to fit patient needs:** We will uncover what aspects of homework assignments patients and clinicians find most challenging and determine which strategies clinicians and patients who successfully use homework employ to overcome these challenges. We will recruit patients and clinicians, and analyze therapy session recordings from Dr. Areán's Engage Study. We use three approaches: **(1a) Audio recordings data analysis of patient and clinician interactions during PST sessions** to understand *how* patients and clinicians set therapy goals, and design, plan, review and revise homework. Analysis of recordings will surface *communication needs* between patients and clinicians while engaging with homework. **(1b) Interviews with clinicians** to understand their *methods* in tailoring homework when they design, plan, review and revise homework, and the support they feel patients need *during* and *between* therapy sessions. This will reveal the clinicians' underlying *process* and *needs in tailoring* homework that will complement the observations from (1a). **(1c) Interviews with patients** to understand patient needs in using homework *during* and *between* session, and their *engagement* with homework *between* sessions. Interview will surface patient needs in designing, planning, implementing and revising homework. Through a diary study with patients, we will capture in-context challenges and facilitators to engaging with homework. We will understand how patients design, plan, implement and revise homework, and their needs while doing so.

**Aim 2: Identify methods for implementing principles of iterative design into PST to support patient ability to *adhere to homework*.** Based on the insights from Aim 1, we will design paper prototypes and wireframes to elicit feedback from patients and clinicians about their experience interacting with the prototypes. We will also assess the acceptability, appropriateness and feasibility of the prototypes and interventions.

## Background and Significance.

*The importance of homework in depression treatment.* Problem Solving Therapy (PST) is an evidence-based treatment for depression, with a particular indication for the treatment of late-life depression. In a large scale randomized trial of older adults with depression, the NNT for PST was 4, a very large effect size (NNT for antidepressant medications is 7)<sup>3</sup>. PST is a strategy to help patients set goals and create action plans. Through a seven step process, patients (1) select a problem they want to solve ("I eat too much sugar at night, and it affects my sleep"), (2) select a goal for the week that addresses the problem ("Only have on bon-bon after dinner."), (3) brainstorm strategies to meet the goal ("eat the bob-bon very slowly, to enjoy it", "go for a walk after I eat"), (4) weigh the feasibility of each strategy, (5) select the most feasible strategy, (6) create and implement the strategy as homework, (7) review how helpful it was and troubleshoot if it was not helpful.

Critical to PST's success is implementation of the strategy as homework and application of PST steps to other problems patients encounter during the week. Decades of research has demonstrated that one of the most effective elements in interventions like PST (inclusive of CBT, CPT and BA) is goal setting and homework assignments<sup>4</sup>. Homework assignments vary in content across these interventions but do share the common function of helping patients overcome obstacles to self-selected goals. PST may be a particularly useful treatment alternative in an older patient population, who is more likely to be resistant to pharmacotherapy<sup>3</sup>. Most common goals in older adult populations is increasing physical and social activities, managing health and financially related concerns, and in some cases better management of emotion, concentration and memory. Despite the importance of homework in these therapies and the association with outcomes, data show that patient homework adherence, defined as completing assignments discussed in session, is low; between 50-80% of adults, and 50% of older adults, never complete homework as assigned<sup>5</sup>. Indeed, nonadherence to homework is a primary reason for treatment failure, particularly among older adult populations<sup>2,6</sup>.

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*Current strategies to enhance patient adherence to homework are not user-friendly.* Several patient-level factors contribute to poor homework adherence: *Internal factors* (e.g., low motivation to change, not understanding relevance of the homework, and the need for immediate gratification)<sup>7-9</sup> and *External factors* (e.g., effort involved in completing the homework, time constraints, poor preparation by the therapist, inability to be flexible with barriers to homework completion)<sup>10,11</sup>. Currently, interventions to enhance adherence focus on clinician-facing strategies aimed at addressing internal factors, and include psychoeducation and prediction of potential implementation obstacles *prior to implementation*<sup>12</sup>. In our experience training clinicians in these skills, we have found that these practices are the most challenging to learn, and only marginally effective in improving adherence. We propose that iterative redesign of homework should be among the skills taught to patients and clinicians, so they are more effective at designing usable homework, at responding to challenges that arise in doing homework, and thus helping patient achieve goals. Thus, we propose that a potential solution to overcome the challenge of poor adherence is to develop methods to assist clinicians and patients in flexibly modifying homework assignments for the immediate needs of the patient, both during therapy session and as daily events arise in everyday life.

To support patients in customizing and modifying homework assignments *between therapy sessions*, we draw on insights on how to support people in planning positive behaviors. Online social platforms enable people to identify ideas they had not considered about improving behaviors for diet and exercise<sup>13,14</sup>. Systems like CrowdFit<sup>15</sup> show how technology can support people in creating exercise plans when they do not have access to an expert, with similar quality to expert plans. To support people in having access to *tailored action plans*, CrowdFit provides in context information about a person's needs, preferences and constraints<sup>15</sup>. To support managing difficult situations in the moment, online systems have shown that by scaffolding CBT techniques for reframing thoughts peers can provide in the moment support to others<sup>16,17</sup>.

To support patients and clinicians in designing action plans tailored to people's needs *during therapy* we draw on research about tailoring of behavioral interventions in a collaborative setting. For example, behavior diaries that capture contextual information (e.g. social interactions, location, environmental cues) can help clinicians to identify opportunities for tailored recommendations for smoking cessation<sup>18</sup>, or in informing appropriate diet decisions for IBS patients<sup>19</sup>. Prior research shows there is a need in integrating recommendations for behavioral interventions with people's everyday routines, and schedules in a variety of domains such as smoking cessation<sup>18</sup>, exercise<sup>14,20</sup>, or medication adherence<sup>21,22</sup>. To support revision of homework, we draw on approaches for self-experimentation for behavior change<sup>23</sup>, and reflection that informs designing tools that explaining and questioning behavior, seeing past behaviors from a different point of view, challenging assumptions and generating hypothesis<sup>24</sup>.

**Impact.** This proposal addresses NIMH strategic priority 3.2 to develop ways to tailor existing and new interventions to optimize outcomes. By uncovering the challenges that clinicians and patients face in the design and implementation of homework assignments, we may be able to create strategies that would help patients tailor homework assignments to their ability to implement them in the moment. This proposal also addresses the UWAC research aims to identify mutable targets of EBPI usability challenges. Through interviews and direct observation, we will inform what impacts effective homework creation and implementation.

**Innovation.** This proposal explores the potential applicability of HCD methods as intervention methods to improve homework adherence. The application of iterative design as a therapeutic intervention to increase homework adherence is novel, and is an excellent example of employing a unique solution from one field of science to another. The innovation is well aligned with innovations that NIMH is seeking from ALACRITY Centers.

### Approach

In the proposed pilot project, we focus on the first two phases of the Discover, Design, Build and Test model:

(1) Through the first aim, we will address the research questions: what are the **challenges and facilitators that clinicians and patients encounter in iteratively tailoring the design, planning, and revising of homework** interventions in PST, *during* and *between* therapy sessions, in a way that fits with patient needs? What **challenges and facilitators do patients encounter** during and between therapy sessions? This aim will lead to understanding: (a) patient and clinician needs in using homework *during therapy sessions* from analysis of therapy session audio recordings, (b) clinician *process in tailoring homework* and their *perceived needs for supporting patients between sessions*, from interviews with clinicians, (c) *patient needs in using homework during and between sessions*, from interviews and diary study with patients.

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(2) Through this second aim, the pilot will use insights from (1) to address the research question: how do **patients and clinicians perceive design prototypes for supporting iteration on homework**, with regard to how appropriate, acceptable and usable they are to support *during* session and *between* session homework use in the context of PST? The pilot will elicit feedback from patients and clinicians on storyboards and early prototypes. We will recruit participants for this project from Dr. Areán's Engage study, a multisite R01 comparing the learnability, usability and impact of PST, an evidence-based treatment for depression to a modification of PST called Engage.

### **(1) Understand challenges and facilitators in iteratively tailoring PST homework:**

**(1a) Understand patient and clinician practices, *in-session*:** To understand how clinicians and patients iterate on homework across therapy sessions, we will review audio recordings of high and low performing clinicians from the Engage Study. To date we have 180 audio recording from training sessions and 2250 audio recording from active treatment sessions (N=250 patients and N=20 clinicians). We will sample recordings to get a breadth of patients based on how the sessions were rated for prior research with respect to patient performance relative to homework completion, clinician performance, ratings on homework performance by clinicians. We will use qualitative analysis to code transcripts for 10-15 patients, across several of their therapy sessions, until we reach data saturation. Depending on the data analysis we might adjust the number of participants and therapy sessions per participant (e.g. if individual participants do not show any changes across therapy sessions, we will sample more patients). We will conduct thematic analysis<sup>25</sup> to understand how patients and clinicians iterate upon homework during sessions. We expect to identify how patients and clinicians communicate information in therapy to support setting goals, designing, planning, tailoring and revising homework to the patient's needs. This will help inform where to focus the design intervention and in what way (e.g. at what stage in the design, planning or revision stage), and what types of goals and action plans to support for the corresponding needs.

**(1b) Understand the clinician practices and perceptions on using homework:** The goal of this aim is to understand the practices of clinicians in using PST homework across therapy sessions, with a focus on opportunities to design new supports for designing, planning, completing, and reviewing homework. We will interview 8 clinicians from the Engage Study about their practices and perceptions of patient needs around homework. Clinician participants are community-based masters level social workers who are trained in either PST or Engage. Currently, four clinicians are active in the study at UW and four at Cornell. From this interview study, we will understand: (1) what process clinicians use to set and iterate on goals and homework tailored to the patient's needs during therapy sessions, and (2) the clinicians' anticipations of patient needs in between therapy sessions. This will inform how a design intervention can support clinicians (e.g. through supporting tailoring processes), and how clinician processes can inform between session support for patients (e.g. how patients can use similar processes to revise homework in the face of everyday challenges).

**(1c) Understand the practices and perceptions of patients about engaging with homework during and between therapy sessions:** The goal of this aim is to understand PST patients' practices and perceptions about homework and their needs between therapy sessions, with a focus on opportunities to create new supports for designing, planning, completing, and reviewing homework. We will conduct a *diary* study, with participants recruited from the Engage study, to understand the barriers and facilitators they encounter in doing homework.

We will recruit 20 participants from the 50 patients actively enrolled in PST in the Engage study. We will sample participants at different stages in the therapy process. Patients are older adults, 60 years old and older, who meet criteria for Major Depression, as determined by a Hamilton Depression Rating Scale of 20 or greater, and a diagnosis of Major Depression on the Structured Clinical Interview for DSM (SCID). To be eligible for this study, they must be in the active phase of treatment (sessions 2-8). The final number we recruit may change based on the variation we observe in aims 1a and 1b, or as aim 1c progresses. We will ask participants to keep a *diary* for 2-3 weeks, to capture their homework iteration process through two different therapy sessions. This will complement the diary patients keep for therapy. Patients will track information around their context (e.g. location, interactions with others, activities done before homework) and facilitators when engaging with homework (e.g. feelings, thoughts, any person, situation, environmental factor that was helpful), the barriers they encountered when they did not complete homework (e.g. difficulty of homework, not knowing what to do, motivation), and any other engagement with homework (e.g. feelings, thoughts, adaptations of the homework). Patients will be asked to track at least daily, or as engagement with homework occurs. We will interview patients twice, before they keep a diary about their engagement with homework, and after they completed the diary. We expect to learn how (1) patients set and iterate on goals and homework in

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