



Technology's Role in Fostering Therapist-Client Collaboration and Engagement with Goals

BRUNA OEWEL, University of California, Irvine, USA

NADIA AZIZAN, University of California, Irvine, USA

PATRICIA A. AREÁN, University of Washington, USA

ELENA AGAPIE, University of California, Irvine, USA

Psychosocial therapies play a crucial role in effectively treating anxiety and depression. An integral aspect of these therapies involves setting goals that clients engage in outside therapy, known as therapy homework or between-session goals. Yet, clients overwhelmingly do not complete between-session goals. This study explores mental health therapists' and clients' challenges in collaborating to set and manage engagement with between-session goals and discusses how technology could better support them. We interviewed 13 therapists and 14 clients about their experiences with between-session goals. We identified therapists' needs for information to support their clients, challenges in collaboration, and how technology can support client-therapist collaboration. Therapists need in-the-moment information about clients' engagement with goals to inform their decision-making. Clients may feel reluctant to share information due to a lack of trust, embarrassment, or not knowing what to share. Clients could use technology to asynchronously communicate about sensitive topics with their therapists. Technologies could facilitate gathering in-the-moment data that supports client-therapist collaboration on goals.

CCS Concepts: • **Human-centered computing** → **Empirical studies in HCI**.

Additional Key Words and Phrases: mental health, goal setting, behavior change, personalization, tailoring

ACM Reference Format:

Bruna Oewel, Nadia Azizan, Patricia A. Areán, and Elena Agapie. 2024. Technology's Role in Fostering Therapist-Client Collaboration and Engagement with Goals. *Proc. ACM Hum.-Comput. Interact.* 8, CSCW2, Article 516 (November 2024), 28 pages. <https://doi.org/10.1145/3687055>

1 Introduction

Every year, 20% of the US adult population experiences depression and anxiety [26]. Evidence-based psychotherapies such as Cognitive Behavioral Therapy (CBT), Problem-Solving Therapy (PST), and Dialectical Behavior Therapy (DBT) are effective at treating depression and anxiety disorders [29, 65, 86, 87]. A key aspect of mental health treatment is known as therapy *homework*, which involves setting goals that clients and therapists agree on during the therapy sessions [61, 65]. Homework consists of activities intended for the client to pursue between therapy sessions [61, 65]. When clients engage in homework, they have improved therapy outcomes [29, 65]. Despite the effectiveness of homework, only 20-50% engage in between-session therapy activities [51, 61, 65].

The goals that clients and therapists set consist of the client doing activities through which the client practices and strengthens therapeutic skills and engages in behaviors that promote mental health [24, 61, 65]. However, clients do not engage with between-session therapy goals due to a

Authors' Contact Information: Bruna Oewel, University of California, Irvine, Irvine, USA, bsoewel@uci.edu; Nadia Azizan, University of California, Irvine, Irvine, USA, nazizan@uci.edu; Patricia A. Areán, University of Washington, Seattle, USA, parean@uw.edu; Elena Agapie, University of California, Irvine, Irvine, USA, eagapie@uci.edu.



This work is licensed under a [Creative Commons Attribution International 4.0 License](https://creativecommons.org/licenses/by/4.0/).

© 2024 Copyright held by the owner/author(s).

ACM 2573-0142/2024/11-ART516

<https://doi.org/10.1145/3687055>

range of factors, such as low motivation to change, not understanding the relevance of therapeutic activities, the effort involved in planned activities, lack of time, and barriers that come in the way [23, 24, 45, 121]. Given the importance of therapy goals and between-therapy session plans, there is a need to understand how to identify the client's goals and create action plans that the client can engage in between therapy sessions. This can be difficult because the client and therapist's communication is limited to in-session collaboration, with many activities occurring between therapy sessions that might be difficult to capture and communicate around [3]. Gathering such data can take weeks or months or might never be fully achieved [3]. Data exchange between client and therapist is limited through one-on-one conversations and lacks in-the-moment details of people's experiences [3]. This can result in disagreements and a lack of mutual understanding between clients and therapists and can lead to people giving up therapy altogether [102].

Current mental health technologies can support homework activities through useful features, such as self-monitoring or educational content [7, 118]. When some clients use technology for therapy homework activities, they favor using technology over paper handouts [2, 96]. Despite mental health tools having potential for homework activities, they do not support the client and therapist in working together towards identifying and supporting engagement with goals. However, technology in other domains has surfaced the potential to address some of the needs that clients and therapists might have. For example, health providers, behavioral counselors, or coaches can support client goals and create action plans using technology [16, 32, 103, 104, 109], better share data from everyday life using personal informatics tools [32, 109], surface client goals [107, 109, 127], or support communication of personal goals [127]. We are starting to gain insight into how technology can support clients and dietitians in their collaboration, such as sharing multimedia (e.g., verbal and visual content) from the client's context and routines [32, 107]. However, there needs to be more understanding of how technology can support clients' and therapists' collaboration around planning activities to benefit client engagement outside of therapy sessions.

In this paper, we investigate the collaboration needs that mental health therapists and clients have in identifying between-session therapy goals and supporting client engagement in between-session goals and how technology can facilitate their collaboration. We interviewed 13 mental health therapists and 14 clients about their challenges in setting and engaging in between-session therapy goals. We asked participants to envision designs that can support them in this process through ideation activities. We conducted follow-up interviews with 7 of the participants to gain more insights about the use of technology by discussing low-fidelity technology features. Our work contributes to:

- Understanding the information needs that clients and therapists have in jointly setting goals that support client needs, as well as the challenges they encounter in collaborating. Therapists want to know a range of client data, including internal and external factors that impact engagement with between-session therapy goals. Clients can be reluctant to share information due to their lack of trust in sharing information, not knowing what information to share, or not feeling comfortable sharing failure. Clients and therapists can have misaligned perspectives about what goals are achievable and how much to communicate outside of therapy sessions.
- Design opportunities for how technology can support information exchange between the client and therapist, including lightweight approaches to communicating outside of therapy sessions and approaches for capturing data outside of therapy through tracking, sensing, and social connections. We discuss challenges in implementing technological solutions to support collaboration, including clinician-limited time, and tensions in how and what data to collect outside therapy sessions.

2 Background: Goal setting in mental health therapy sessions

Therapy homework is a component of many behavioral therapies, such as Cognitive Behavioral Therapy (CBT) [63], Behavioral Activation (BA) [58], and Problem-Solving Therapy (PST) [4, 39]. Therapy homework consists of formulating and setting goals and, at times, approaches for pursuing those goals. Each therapy might have a different approach to identifying goals. For example, setting goals is one of the multiple activities done in CBT and BA [58, 63]. In BA, setting goals can be part of structured activities that align goals with values [58]. Therapists might assess with the client if the goals are achievable [58]. Problem-solving types of therapies can involve the entire session focused on identifying the appropriate goal to set and how to ensure the client can succeed at pursuing it [4, 39]. Different variants of problem-solving therapies involve activities such as assessing and creating action plans to address the goal or assessing the feasibility of the goals [4, 39].

Therapists and clients set goals intended to be done between each therapy session when the client usually cannot access the therapist, which constitutes the therapy homework, such as practicing therapeutic skills learned during the session [63]. Examples of goals set during therapy sessions include having a client who has trouble keeping their house organized spend 10 minutes a day cleaning the kitchen, or scheduling three outside activities for a depressed client who spends much time watching TV [62]. Between-session goals can vary greatly, involving goals in a wide range of domains, such as managing finances, relationships, work, movement, and diet [62]. The process of defining goals involves reflective practices between therapists and clients to become aware of client values, understand client problems and skills, and anticipate problems that can come in the way [3]. Engaging in goals is a longitudinal process involving provider-client collaboration to identify problems, set goals, and create care plans [3].

Engaging with between-sessions goal-related activities leads to better therapy outcomes for clients [29, 65] and sustained behavior change [63]. However, an overwhelming amount of clients do not engage in goals-related activities [51, 61, 65], for reasons such as activities that do not fit the client's values [24], weak therapeutic alliance or therapist-client relationship [64], client lack of motivation, and avoidance [54].

The misalignment between the goals set and the client's needs raises questions on whether and how the collaboration process between client and therapist might lead to goals that do not meet the client's needs. CSCW and HCI research has extensively investigated collaboration practices between clients or patients and providers more broadly and how technology has the potential to support clients and providers in better sharing information and communicating. In this paper, we answer the research questions:

- What collaboration challenges do clients and therapists encounter in setting between-session goals (i.e., therapy homework)?
- How do clients and therapists think technology can help support them in setting and engaging in goals (i.e., therapy homework)?

3 Related Work

3.1 Collaboration between client and provider for goal setting

3.1.1 Collaboration for goal setting in clinical settings. Goal setting and creating care plans with clinicians is critical to managing care for a variety of health behaviors, including mental health [3], diet [31, 32], managing migraines [107], working towards smoking cessation [16], hospitalized patient care [127], and rare disease management [97]. Increasingly, the clinical models for supporting medical care goals take a client or patient-centric perspective [101], which encourages clinical decisions to be guided by client preferences, needs, and values [92]. Collaboration in setting goals

for care management can lead to better self-management competency [70]. When clients have good quality communication with their provider, their trust in the provider can increase [43].

Despite the benefits of good communication and collaboration between client and provider, setting joint goals can pose multiple challenges. Clinician and client perspectives can be at odds [82]. Clinicians might prioritize goals related to clinical outcomes, such as controlling symptoms [31, 101], while clients might have desired personal health goals that differ from the clinical ones [31, 127]. For example, the provider might want the client to stop eating certain foods to address a health symptom, but the client might prefer to have the symptom and still eat some of those foods [31]. Sometimes, the client may feel uncomfortable communicating with the provider. Clients might not feel like they can communicate with their care team, which can lead to power dynamics dominated by the clinician [38]. Clients can fear being perceived as difficult, which can make them reluctant to communicate with the provider [38]. If the misalignment in goals is not recognized, it could lead to goals that are not relevant to the client [82, 107].

3.1.2 Collaboration practices for goal setting in mental health. Researchers in CSCW have studied practices of goal setting and planning for mental health [3, 56]. Therapists can assist clients in setting goals by providing expertise in the process that helps create more achievable goals for the client [3]. Therapists help clients understand the nature of the problems that bring them to therapy and translate those problems into goals that clients can implement between sessions [3]. In doing so, therapists might encourage the client to see new perspectives about what is the nature of their problems, give ideas for goals that the client did not consider but could address their problems, help the client pivot to a new goal, anticipate future problems that might come up, or reflect on past problems that the client might be avoiding [3]. Although therapists can provide support in creating achievable goals for the client, the goals clients and therapists set still fall short and are often not achieved by clients [51, 61, 65], which raises the question of whether the goals that are set in the first place are not meeting the needs of clients outside of therapy.

Collaboration can be difficult if there is not a clear shared understanding between therapists and clients. For example, documentation about why a client is seeking treatment can be lost, which then takes longer for the therapist to understand the client's needs [50]. Clients with comorbidity (e.g., cancer) may be taking medications that make them more tired, which can make them forget about their homework for that week [116]. Research has indicated a strong relationship between the therapist-client relationship and therapy outcomes [52, 53], also known as a working alliance. The collaborative relationship fosters a safe environment [52, 98] through relational aspects such as trust, affective bond, agreement, and empathy [98] for the client to change [52]. However, that collaborative relationship is often paused outside of sessions. Clients sometimes feel the need to talk to their providers about their mental health between sessions, but providers are often too busy for those requests [116]. In this research, we investigate the challenges clients and therapists have in communicating about and collaborating toward the shared goals they set in therapy sessions and what design solutions might support them in that process.

3.2 Information needs to support the creation of client-centric goals

3.2.1 Use of client-generated data in technology to inform goal-related activities. A critical component of deciding on shared goals between clients and providers is having a shared understanding of client needs and experiences. Increasing research in CSCW and personal informatics shows how using data in clinical encounters can help clients and providers create and engage with care plans, increase client engagement in care plans, improve the relationship between clients and providers [16, 32, 103, 104, 107, 109], align perspectives, and commit to shared decision-making [8, 18, 31]. Providers use a range of information about the client to set achievable goals and create

care plans that are aligned with the client's needs. Such information includes client preferences, values, life circumstances [16, 104], the client's medical history [56], health symptoms [32], financial circumstances [56], health literacy [56], and daily food or exercise data [32]. Such information often involves clients' everyday experiences, which are usually inaccessible to the provider unless the client shares them.

To support the collaborative development of goals, clients and providers increasingly use technology to track data. Client-generated health data can be collected between clinic visits, giving providers more accurate client information [33]. For example, people with migraines track information about what, when, and how migraine triggers happened to inform the goals they set with providers [109]. People managing their diet use photo diaries to help the provider and client better understand food patterns, client routines, and the context of client behaviors [31, 32]. Providers also make use of data to motivate clients to engage in goals. For example, providers can learn the client's values and use that information to encourage them [30]. Reviewing data in clinical encounters can help clients increase their self-knowledge [93].

Technology can come with many challenges in meeting clients' and providers' collaboration and information needs. Providers do not always have a good understanding of the client's goals [3, 32, 127]. Clients might not always be willing to share information about themselves on sensitive topics [3]. Clients might not feel empowered or comfortable to share their needs [127]. It can be difficult for the provider to gather information about the client's experiences outside the clinical encounter [32]. When clients use technologies, such as self-tracking tools, technologies might not be aligned with clients' goals [82]; for example, a diet tracking app may only allow calorie-counting instead of managing an eating disorder [35, 49]. Often, such technologies do not have a way to share information with providers more easily [30]. Even when data is available, providers lack the time to review additional information about the clients [30, 44, 126]. HCI research has indicated the need for providers to get access to that information, as well as a way for those resources to be easily accessed and more effectively organized [116]. Data-centric technologies like step trackers do not provide enough context for what is occurring in a person's life [83]; food diaries do not capture information about the client's life necessary for care plans [32], and summaries of tracked data do not necessarily capture contextual data necessary for tailoring support [108].

3.2.2 Use of client-generated data in mental health therapy sessions. Mental health therapists strive to create goals with clients that are aligned with the client's preferences, values, and context [121]. However, it can be challenging to gain the information that the therapist needs to provide care. Understanding information about the client's situation and goals can take multiple therapy sessions [3]. Certain types of information are difficult to gather from clients, such as how clients engage with their goals outside of therapy sessions, such as what they do and how much time they spend in bed and not engaging in a desired activity [3]. Therapists can find it difficult to gather information about client symptoms. For example, for PTSD clients, therapists thought it could be more accurate to ask trusted others about the client's symptoms (e.g., sleep patterns) because the clients might not be able to assess such patterns themselves [40].

Tracking and sensor-based technologies are showing positive promise in mental health therapy. Clients can find it useful to use tracking technologies to gain insight into their behaviors and gain motivation, such as feeling more motivated to engage in physical activity to manage mood [1]. Numerous technologies aim to provide predictive information about people's mental health based on signals such as location or social proximity [12, 25, 94, 122]. Researchers have started to explore the use of client-generated data in mental health therapy. College students and therapists used tracked data to discuss client progress [78], for example, by assessing sleep patterns to discuss stress [67]. Therapists see the potential of using Fitbit data to discuss client beliefs [83] and to show clients

an outside perspective on their behavior and accomplishments, such as achieving step counts [83]. One of the challenges in using technology to track client experiences is that clients want to keep negative experiences private from the therapist and share more of the positive experiences [110]. Clients might overly focus on the negative patterns in their data, such as lack of physical activity [83]. Reviews of mental health technologies surface that apps include features that can support engagement with between-session goals, such as reminders, self-monitoring, information modules to support learning, coping skills training, and emphasizing completion [7, 24, 118]. Research surfaced that it is important for therapists and clients to collaborate in reviewing homework progress as part of technology apps [99, 118]. However, existing tools are not designed to support collaboration between client and therapist or challenges in engagement with between-therapy goals. There is limited understanding of what data and information therapists want to know to inform their decision-making for setting shared goals during therapy sessions and what might be the challenges in gathering such data. In this study, we seek to understand how information about the client can support goal setting in therapy settings.

4 Methods

We interviewed therapists and clients to understand their challenges in setting and engaging in between-session therapy goals and how technology can support them. We conducted semi-structured interviews with 13 therapists and 14 clients to gain insights into the barriers they encountered in setting goals and creating the between therapy sessions goals. In addition, we conducted activities to generate and discuss design ideas for addressing challenges around goal challenges. This study was self-exempted in the institution's IRB after consulting with the IRB board staff.

Terminology. Goal setting is a core component of therapy "homework." Some therapists might refer to therapy homework as between-session goals or activities or refer to it by the type of activity (e.g., journaling). In the interviews, we followed the terminology that participants used, which could include "goals," "therapy homework," and "interventions between sessions" [61]. Homework was the most commonly used term by our participants, and it will be presented in some of the quotes in the results.

4.1 Participant Recruitment

Therapist participants. We interviewed 13 therapists recruited through the mailing list of the Association for Behavioral and Cognitive Therapies (11) and convenience sampling (2). Two participants were recruited through convenience sampling: one of the researchers shared the study advertisement with two therapists working at other universities. We received responses from 19 eligible participants, and we interviewed 13 therapists. Participants were over the age of 18, were working or living in the US, and were practicing a therapy that included the use of goals and homework with clients. We conducted interviews over Zoom for 60 to 80 minutes. We compensated participants with a \$40 gift card.

Four of the therapist participants held PhD candidacy in Clinical Psychology and had been practicing therapy for 3 to 4 years, while 7 participants had a PhD in Clinical Psychology, and two were licensed clinical social workers. Participants had 3 to 5 years of experience (5), 6 to 9 years of experience (7), and over 20 years of experience (1). They practiced the following types of therapy: Cognitive Behavioral Therapy (CBT), Dialectical Behavioral Therapy (DBT), Acceptance and Commitment Therapy (ACT), Cognitive Processing Therapy (CPT), Problem-Solving Therapy (PST), and Behavioral Activation (BA). Participants practiced in 8 different states in the USA. Participant's gender was man (1), woman (9), or did not specify (3). Participants ages ranged from 25-34 (10), 35-44 (2), and 45-54 (1), with a mean age of 33 and median age of 32. Participants

self-identified as Caucasian/White and Not Hispanic/Latino(a) (10), Middle Eastern (1), or did not specify (2).

Client participants. We interviewed 14 people who were going to therapy (i.e., therapy clients). We recruited through posts on social media (Reddit, Twitter, Instagram, Facebook), a mental health newsletter (Mental Health America), and Craigslist. Participants were over the age of 18, were living in the US, were seeing a therapist at the time, or in the past 3 months, and were setting between-session goals or using homework during therapy sessions. We expected that some clients might not be using the terminology of "homework" with their therapists, but if they set between-session goals, that would qualify as setting therapy homework. Participants self-identified as depressed or anxious, but did not have a severe mental illness condition. We considered that self-identification of being depressed or anxious in addition to attending therapy sessions to be sufficient for studying collaboration in therapy settings and engaging with therapy goals. People with mental health conditions can be reluctant to participate in research because they have been stigmatized and marginalized [124], which is why we chose not to screen clients for a mental health condition because we thought it might further alienate them. Moreover, we considered clients with depression and/or anxiety because they often occur together and have similar treatments [9, 27]. We excluded participants who had severe mental illness conditions because their therapy techniques could be different than behavioral therapies, which would modify the treatment they receive, and whether they had therapy goals [61]. We conducted interviews over Zoom for 60 to 80 minutes. Participants were compensated with a \$30 gift card.

Client participants' genders were man (3) and woman (11). Participants' ages ranged from 25-34 (5), 35-44 (6), 45-54 (2), and over 60 (1), with a mean of 38 years old and median of 37 years old. Participants self-identified as Caucasian/White (9) or Asian or South Asian (5). One person self-identified as Hispanic/Latino (1). Participants were attending therapy sessions weekly (6), biweekly (4), or monthly (3). Participants reported using the following therapies during therapy sessions CBT (6), DBT (1), integrative therapy (1), or did not know or specify (6).

We had a low number of participants who identified as men, with 8% of therapists and 21% of clients. Broader gender distributions of mental health practitioners and therapy clients also have a higher representation of women. 74% of psychology doctorate degrees awarded in 2022 in the USA were to people who identify as women [41], which is the same percentage of women psychologists in the USA workforce in 2021 [84]. Depending on the field of psychology, women represent 85% of enrolled doctorate students (e.g., developmental psychology) [42]. In relation to therapy clients, there is a higher prevalence of women with anxiety (33%) compared to men (22%) [77], and there are almost twice as many women diagnosed with depression and who seek mental health treatment compared to men [72, 111, 119], which explains some of the gender balance in our sample.

Follow-up interviews. We conducted follow-up interviews with 7 participants to understand their technology-related perspectives better. We reached out to 4 therapists (T1, T2, T9, T10) and 3 clients (C4, C9, C10) were chosen randomly from our participants. We conducted interviews over Zoom, which lasted between 25 and 60 minutes. We compensated therapy participants with a \$40 gift card and client participants with a \$30 gift card. The original and follow-up interviews contained participatory activities that are described in Data Collection, which formed a unified approach to eliciting information about challenges and technology solutions from participants.

4.2 Data Collection

We conducted semi-structured interviews that involved participatory activities aimed at eliciting the challenges participants encounter in between-session therapy goals and the technologies that could support them in this process. We used a digital collaborative whiteboard (Miro.com) to guide the interview activities. Before the interview, participants were prompted to provide their top

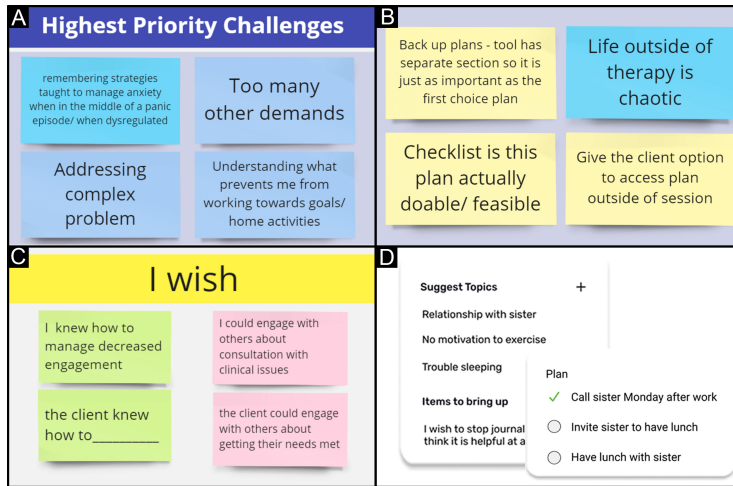


Fig. 1. Activities that participants completed: (A) Generate and discuss challenges in goal setting and pursuit; (B) Discuss and brainstorm ideas of concepts (yellow sticky notes) that could be useful for goal setting and pursuit challenges (blue sticky notes); (C) Discuss and generate ideas of functionalities they wish they had, like social, note taking, information; (D) Discuss ideas of specific functionalities represented through high-level design features.

challenges in designing and engaging with therapy goals. The data collection centered around four different participatory activities as follows:

Activity 1: Discuss and generate challenges in setting and engaging with goals: Participants reviewed common goal setting challenges identified in prior work [24], along with the challenges they reflected on before the interview. They chose four highest priority challenges that were used in the next activity for brainstorming technology solutions (Figure 1 A).

Activity 2: Generate solutions to goal-related challenges: All participants brainstormed technology solutions that would address their four challenges with therapy goals. For each challenge, participants generated three ideas. We encouraged participants to set no boundaries on what tool they imagined, much like a magic tool (Figure 1 B).

Activity 3: Discuss common technology features based on written descriptions: Therapist participants identified common technology features that could support the client and therapist in engaging in between-session goals or homework (e.g. types of information, reminders, notifications, note-taking, visual representations, social features of engagement with others, and social features of seeing content about others). Participants filled in cards such as “*I wish I knew _____ about the client’s problems*” and “*I wish the client had support to _____*” (Figure 1 C). In some interviews, participants filled in the cards with writing, while in other interviews, we only verbally discussed what they wished they had support for.

Activity 4: Discuss common technology features based on low-fidelity wireframes: This activity was conducted in a different follow-up interview than the first three activities, though it was a continuation of the original interview. Participants discussed technologies that could help them in relation to common technology features that might be commonly encountered in a patient-provider collaboration or communication system [88, 89, 116], as well as some features that were derived from the previous feedback of participants. The features were presented in basic ways to communicate what might be potential functionalities in a digital system, such as an information dashboard about a client, progress on a plan, having a wishlist of discussion topics to bring into the

therapy session, being able to communicate with the client/therapist. The designs were low fidelity, so they only served as a conversation starter about technology's role in relation to these topics. These interviews were not intended to evaluate a user interface but to elicit more information about themes already existing in the data.

The features derived from the interviews involved a need for a variety of data about the client, monitoring engagement with the goals set during therapy sessions, and the need to communicate information to the therapist. We wanted to understand better how participants envisioned technologies to support such activities and the role they would play in their practices. We found it useful to create a visual representation of features rather than just textual representations in Step 3; therefore, we created a low-fidelity design artifact that would help facilitate a conversation with participants.

Reporting results: We present results containing insights from both the original and follow-up interviews together. We do so because the interviews discuss similar constructs, but sometimes, there is more detail in an original interview of one participant or a follow-up of another. We found that presenting the results about one theme together communicates the participant's perspectives in a more unified way. However, to ensure that follow-up interviews are distinguished in the data, we identify the quotes from the follow-up interviews with a "-W" (i.e., -Wireframe) after the participant ID, for example, T1-W. Otherwise, we identify the therapists as "Tx" and clients as "Cx", "x" being the number of the participant.

4.3 Data Analysis

Our data analysis and thematic conceptualization incorporated both deductive and inductive approaches [22]. First, past research [24, 37, 64] informed an initial codebook. That deductive approach led to codes such as "challenge - goal completion - things come in the way of engaging in goals" [24, 64] and "support - reminders for client," "support - client self-tracking," and "support - resources - relevant resources for client" [24]. After that, we started an inductive approach to data analysis. Post each interview, a researcher wrote memos, defining the codes that informed the thematic content of the paper. The coding process involved four researchers, with two initially engaging in independent open coding of a single transcript, followed by discussions and resolution of coding disparities. Subsequently, the researchers iteratively analyzed pairs of coded transcripts through multiple sessions. The codebook underwent revisions spanning several weeks, with one researcher subsequently applying the codebook to all transcripts. The inductive analysis employed a line-by-line descriptive coding approach [106]. Some codes conceptualized in the inductive phase included "challenge - understanding context to set reasonable goals", "support - tracking changes and progress over time", "support - collect honest feedback from client". Throughout this coding process, the first author maintained the practice of writing memos and employed affinity diagramming to guide the analysis.

5 Results

Clients and therapists discussed major challenges and designs that can support them. Therapists stated information needs they encountered in supporting the client with setting goals, and they described approaches that could help gather information about the client, including using self-tracking, sensor data, or relying on other people as a proxy for information. Clients expressed concerns about sharing information with the therapist due to a lack of trust, knowing what to share, or feeling embarrassed about failure. Clients and therapists discussed how they might collaborate outside of therapy sessions to support the client in engaging with goals. In this section, when we often use the word "homework" it is because that is how therapist participants referred to between-session goals.

5.1 Holistic information needs to support collaboration for goal setting

Therapists tried to understand the client's experiences outside of therapy so that they could better set goals and create action plans based on the client's needs (T2, T12, C7), increase client awareness (T12), prioritize what clients wanted to work on therapy (T10, T12), and support continued engagement with goals over time (T1, T4, T8). Therapists expressed challenges in gathering and managing all types of information (RQ1). Proposed solutions included aggregating information sources, and tools to help organize information (RQ2).

Understanding clients was important to therapists because if goal-related activities were not adapted to clients' needs (T7, T13, C6, C7), it could lead to clients not wanting to do the activity. Clients may not have engaged in therapy goals if they did not understand its purpose or benefit: *"Therapists will give assignments... that... doesn't seem relevant or aligned with my needs... what's the use of it? What's it gonna help process? What was the activity going to teach, or what is the activity going to broaden my perspective? if it feels... like not a waste of my time"* (C7).

Therapists wanted to have a holistic understanding of the client at the beginning of the therapy process (T8, T12, T13): *"Getting a sense of all domains and finding out what's being affected and where they feel stuck or stressed by is a first step to understand somebody"* (T12). Therapists found it useful to understand the client context, such as financial situation (T2, T5, T8, T12), health insurance (T8), childcare (T8, T9, T10), ongoing responsibilities (T12, T13), and level of social support (T10, T12, T13).

Understanding internal factors that impact clients. Therapists strove to understand what motivated the client to focus on certain goals over others so that they could prioritize what to work on together in therapy: *"Is there intrinsic motivation there? Are they working towards these goals because they think that's what they should be doing, or because what they want to be doing?"* (T2). This helped therapists understand how to assign goal-related activities that aligned with the client's values: *"Focus on values and how the problem interferes with acting in line with values... what are your big picture goals in life? Who do you want to be as a person? And how does the problem that you have now affect that?"* (T4).

Understanding external factors that impact clients. Therapists wanted to understand external factors that impacted the client, including clients' concerns about resources (T2, T5, T12) such as financial situation (T2, T5, T8, T12), health insurance (T8), childcare (T8, T9, T10), and level of social support (T10, T12, T13). Through that understanding, therapists could consider potential barriers and adapt the goal to the client's circumstances: *"understanding their life circumstances and abilities... there was a kid I was working with. And the family didn't really have financial means. The caregivers were very limited in their ability to do things. So it [between-session goal] had to be something that was really easy, didn't cost money"* (T2).

5.1.1 Challenges in sharing holistic information with therapists. Although therapists expressed extensive needs for what information they wanted to know about the client, such information was difficult to acquire. Some clients did not know what was important to share out of many things, while others did not want to share about themselves while building the relationship with the therapist.

Client's lack of relationship with therapist. Some clients did not feel ready to share everything about themselves with a therapist: *"I'm not at a place where I think she needs to know everything"* (C5). It was particularly difficult to disclose sensitive information at the beginning of the therapy process with the therapist: *"The first time I'm meeting with someone, and I'm asking them questions about trauma, not everybody's gonna disclose that. They want to make sure that they feel safe, and that it's a comfortable relationship before they usually start talking about it"* (T4). T13 attributed such issues to the lack of having a good working alliance (T13).

Client not knowing what information is relevant. Some clients tried to ensure they shared relevant information for receiving care but thought it was difficult to navigate the large number of things they could be sharing with the therapist: *"If there's just something... from a past experience, that has influenced, maybe supported this narrative I have in my head or whatever, she needs to know... to help me counter it... it starts to get like a lot if you try to share every little thing"* (C5). C5 was reluctant to share information about themselves because they were not sure what was actually relevant for the therapy session *"I mean, I don't know that that is beneficial to the therapeutic process, because probably sharing all of it is going to get you the best outcome"* (C5).

5.1.2 Proposed solutions to having a holistic understanding of the client. Therapists discussed two needs in understanding holistic information about the client. First, they expected that being able to access other sources of information about the client, like their health records, would help. Second, once they started having information about the client, they wanted to get a better sense of how many data points of the client are connected.

Holistic health information. Some therapists wanted to have access to other health providers' notes to understand better their health issues: *"Sometimes, patients will discuss things with the psychiatrists that they want to bring up to me. And so there's some information that may be related to their medication or something like that, that would be good for me to know"* (T2). T13 thought that primary care providers could gain insight into other information about the client's experiences: *"If you're seeing someone in a primary care setting, then maybe you're getting that information from what other providers have learned. So maybe... notes from their PCP visit"* (T13). When working in a hospital, T2 found it useful to have access to the medical record notes of the psychiatrist, but without the notes found that information missing: *"They don't bring it up to me, or they're telling different things to different providers"* (T2). Some clients also thought that it could be useful to have ways of sharing health information across providers. For example, C9 thought it would be helpful to have a system that made it easier to share medical information across providers: *"One of the things that I'm doing right now is tracking down all my medical records and having them sent to all new providers and stuff. So having just like a universal database... so they can see what's going on"* (C9). C9 added concerns about privacy when envisioning solutions that included their personal health information: *"This could also be like a HIPAA, PHI (Personal Health Information) type thing that we have to consider too. Because you don't want all your information out there... So we have to be safe around that"* (C9).

Visual representation of client information. Therapists thought they needed a visual representation of the issues that the client is facing to understand and manage the multitude of client problems. This could help the therapist and client to have aligned perspectives about the client's issues: *"A visual schematic in front of the client can help just acknowledge and validate all of the issues that they're going through and some sort of way to highlight... create more focus and get them more task-oriented"* (T12). Another therapist thought that a "visual representation of the client's social environment" could help understand the client better: *"like in social work, we often use kind of eco mapping tools and figuring out where's the client expending energy and their life versus where are they getting energy from and it becomes a very visual thing"* (T13). A visual timeline could include context in which change is happening, for example, life events such as injuries or illness and how these pose barriers over time: *"Maybe a client will have a big life event like they have an injury or I don't know, they get COVID or something happened, like track what went wrong or what posed a barrier along the way by seeing the change over time"* (T1-W).

Therapists (T1, T2, T9) wanted to have client values represented to deepen the client's connection to their goals, which could prove useful in reminding clients of the significance of completing between-session goals and maintaining client motivation: *"Values... could be really useful to connect*

to people's goals, like as part of deepening the goals or asking people 'okay, well, you've listed these values, you know, for Goal A, which values will help you move towards [goal] B?'... getting them to reflect a little bit more on why this all matters so that later, they can go back and see how they're doing and living out their values?" (T1-W).

5.2 Choosing which goals to focus on

Setting between-session goals is a collaborative activity between the client and therapist. The therapist seeks to understand the needs and barriers of the client and negotiates with them a goal and activities to work on. We identify challenges in choosing a goal that is meaningful to the client and in the client expressing their disagreement (RQ1). Participants discussed solutions around preparing a set of goals and problems of interest ahead of the session, and the tradeoffs associated with it (RQ2).

5.2.1 How clients and therapists jointly decided on between-session goals. Setting goals and defining homework activities in therapy are collaborative activities between the therapist and the client: *"Goal setting is part of establishing a relationship with a particular client and coming to a mutual agreement on an understanding of what the client wants to change in their lives, and what's important to them, rather than me as the therapist making his decision for them, about what I think is best" (T2).* Therapists and clients had conversations about their problems and defined the between-session goals that the client would work on until the next session. The process was guided by the therapist, focusing on the client's goals, what the client can achieve, and anticipating barriers that might come up outside of therapy: *"What do you feel like you're looking forward to, or what's something that you can keep in your mind? What's a tool that you can use if this comes up again?" (C2).*

To collaborate, therapists would assess with the client what goals to work on, and seek confirmation from the client about their goals: *"would have it be like a conversation... seems like this is kind of priority, or this is... Do you want to spend the next couple weeks... working through this for today's session? And then if they say, yeah, then we'll switch over" (T10).* T10 expressed that weekly goals are a good starting point for mini goals that they could track progress on over time in relation to larger overarching goals.

Sometimes, clients and therapists negotiate and compromise on what goals to focus on. For example, T2 did not insist on setting between-session goals with the client when the client did not want to do activities because that would be a worse client experience: *"So if they don't do it [between-session goals], and they give me push back, I might just say, okay... because I don't want to make it an aversive experience and for it to feel like a chore because they're not going to do that" (T2).*

5.2.2 Challenges in choosing goals collaboratively: Discomfort expressing disagreement. Therapists felt that clients were not always comfortable disclosing disagreement about care plans with them: *Even when you directly ask them, 'Do these goals feel like they fit for you?', they're not always honest, when they answer" (T1).* Therapists attributed that to the power differential between clients and therapists (T1), and to trying to please the therapist (T2). This was seen as particularly unhelpful to making progress on therapy goals: *"that doesn't really help because that's not helping either of us because then you're not going to do it" (T2).* Clients did not express disagreement about the relevance of the goals set: *"Clients don't feel able to tell you that the goals you're helping them set aren't fully what they want to be focusing on, or don't fully capture what matters to them" (T1).* They also did not feel comfortable sharing that goals were not useful: *"People don't want to tell you... I thought it was a terrible idea. It was not helpful at all" (T2).*

5.2.3 Proposed solutions for choosing goals collaboratively. Clients and therapists discussed that it could be useful to have a tool for the client to prepare topics of conversation ahead of time and to provide feedback on the relevance of the goals and the relationship with the therapist.

Making it easier to bring up problems of interest. Participants discussed approaches that could help the client communicate information that they might be reluctant to share during therapy sessions (T7, C10). One type of information that therapists found useful was to know issues that the client wanted to discuss during therapy sessions but might be reluctant to bring up. They discussed this in the context of a "wish list" that clients could bring into the session. T7 thought that it could be helpful for the client to keep track of what they might want to discuss in the moment during a therapy session: *"If they could... write it down in the moment, maybe it'd be easier to bring it up. Or if I have access to see it, then I can bring them up"* (T7-W). Preparing a wish list ahead of time could also help expand what is being discussed in a limited amount of time during therapy sessions (T2, T10): *"In our sessions, it's creating an agenda... normally the first five-ish minutes... that's always helpful if they kind of start to think about stuff beforehand... instead of jumping in and small talk and like, 'oh, what should we discuss?'"* (T10-W).

T2 had concerns about the client preparing ahead of the therapy sessions because they might intentionally avoid bringing up important topics that the client wanted to avoid: *"She hasn't decided about her job... that's a huge thing that's going on... And then she said also, 'I went to the movies, and I was really anxious about seeing other people there'. Well, that's important. And that might have caused you distress this week. But there's something that was really important for us to talk about. So I want to make sure that doesn't get lost"* (T2-W). T2 also cautioned that having materials that the client prepares ahead of time can be a problem if they are not reviewed because it can get perceived as the therapist not being interested: *"I wouldn't want the person to feel like I was disregarding what they were interested in"* (T2-W).

Assessment of working alliance and feedback to therapist. T13 suggested a digital tool to assess the working alliance that could be used outside of the session if the goal-related activity was not completed: *"So maybe the tool could prompt for assessment of working alliance if homework isn't completed"*. That assessment could indicate poor therapy fit or client-therapist relationship problems that influence engagement with goals. The therapist suggested that a consistent assessment of the working alliance can be important when the client is not sharing all their thoughts about the between-session goals, so the therapist can work with the client to address what is wrong: *"You probably need to reevaluate... the therapeutic relationship, and ask yourself 'Why is the client agreeing to a goal that's not relevant to them? Is it because the therapy isn't a good match? Is it because they're not ready for this type of work?'... every therapist-client relationship isn't perfect. So making sure that you better understand why the client is continuing in therapy, if they're working on things that are not relevant to them"* (T13). Therapists found it important to get feedback from the client, for example, knowing whether clients felt the between-session goals were easy or difficult. That feedback could be used for clients and therapists to collaboratively decide on an achievable goal activity: *"I thought this one like something that allows them to rate how challenging the goal was. So if they do... like for determining achievable goals... checking the pulse on how difficult it [goal] so that can inform the next goals that we choose"* (T7).

5.3 Formulating goals in light of progress towards the goal

Therapists discussed the challenge of setting goals that are not achievable and clients not being able to make progress toward their goals (RQ1). They discussed how lack of progress can be difficult for clients, but seeing small progress can be rewarding (RQ2).

5.3.1 Challenges in setting goals the client can pursue. Tensions in anticipating what goals are achievable for the client. Therapists followed a collaborative process of setting between-session goals with the client. However, clients and therapists had different perspectives on what the client could achieve. This occurred either because the client or the therapist was overly optimistic about the goals set. The misalignment in perspectives required negotiation and assistance from both to calibrate appropriate goals. At times, clients set overly ambitious goals because they did not feel comfortable saying "no" to the therapist.

Therapists proposed goals that they wanted the client to achieve, but at times were overly ambitious for what the client could accomplish once they left the therapy session: *"it could be like ego on my part, or the part of the therapist in general... I know you can do it... and kind of setting that [too difficult] goal... I think that's maybe like more optimism or more like eagerness on my part than they're ready for"* (T7). In such cases, the clients might not have been ready to engage in the proposed goals (T7). However, they were not willing to communicate that. Therapists saw the different perspectives as an opportunity for the client and therapist to collaborate around shared goals: *"They don't want to say no, it's hard to say 'No, I don't think I can do that this week'... and advocate for something else. Which is where the collaboration comes back in"* (T7).

In contrast, at times, the clients were overly optimistic about what they could achieve. For example, it could be difficult to estimate how much time a client can spend on a behavior, or delay a behavior, so the therapist assisted the client in being more realistic about the goals. Sometimes, clients thought setting a small goal was too easy for them and wanted to push themselves to do more, but the therapist anticipated it could be difficult and encouraged experimentation to understand if the goal was actually too easy: *"they might go, 10 minutes is easy... let's try to do 10 minutes every day and see how that goes"* (T11). Clients also overestimated how much they can hold off on doing an undesirable behavior, like purging, to which the therapist helped calibrate: *"a new client... sometimes be like, I can do an hour [without purging]. And I'm like, can you really do an hour? And often, it's maybe five to 10 minutes"* (T4).

Embarrassment about lack of progress. Therapists reported that clients felt stigma around their experiences (T3), or were embarrassed or anxious about being honest when they could not accomplish goals agreed upon with the therapist: *"patients feel embarrassed when you say what can get in the way or like you're not doing it. And it's not meant to be a shaming thing... a lot of times people get embarrassed, mostly... 'I'm going to do it this week. I forgot this week, but I'm going to do it next week.' And so it becomes this thing of where they just shut down and then you can't talk about it"* (T2).

5.3.2 Proposed solutions to understanding client progress. Therapists believed that visualizing progress toward goals could support clients to increase their self-awareness and to align with their therapist about their therapy needs moving forward: *"Bring us back to... what actually did you come in here for?... what are you wanting to work on? And are we actually making improvement on this? Or do we need to add a different goal?"* (T10). However, progress can be difficult to represent visually when it is subjective and not necessarily related to the number of goal-related activities that the client completed. Each person is different in how each activity helps them progress toward a goal: *"How do you know how much progress? It's not that simple... Everybody's different in how long it takes to work through that kind of thing"* (T7).

Therapists and clients had different awareness levels of the client's progress. Therapists expressed that any progress at all would be meaningful for the client to see because clients often lack the perspective to see how far they have come. While therapists might see dramatic change over time, it would be good for the client to see the information they have entered in their own words and how they have changed throughout the treatment: *"People get mired in their day-to-day struggle"*

and forget ... where they started and how much things have changed... to see the information they themselves have entered in their own words, and how that's changed, I think could be really impactful" (T1-W).

5.4 Pursuing goals: Information needs

To support the client in pursuing goals, therapists wanted to understand the client's experiences in pursuing goals. Therapists felt that client self-report may not be enough for the therapist because it may be biased (RQ1). Therapists proposed solutions that could help surface data that the client might not share (RQ2). Sensing technology could help gather accurate in-the-moment data, and therapists also wanted to be able to talk to others in the client's life to get less biased data. Participants suggested that client data should be integrated in one place so it is easier to visualize and understand over time.

5.4.1 Challenges in gathering between-session information. Therapists could not gather the information needed to help the client from the self-report alone, as it would not show the full picture of what they are experiencing: *"You don't have the perspective to see... there's something about the lens through which you're viewing your problem that's clouding your ability to see the full context. And so writing about it- you're not going to capture it without discussion with the person who knows your mind, who's helping you"* (T1-W). Therapists thought that sensing technologies or relying on people in the client's life (e.g., friends and other health providers) could help gather data that presented overall would give them a more accurate perspective of the client's life.

Therapists had difficulty learning relevant information about the client. T9 wanted to understand how the client actually attempted to complete the between-session goal: *"Let's say the goal for them was to go and talk to 10 different people. Did they walk down the street and just go Hi, hi... Do like a small little wave and count that? Or did they go out to the store and strike up a conversation?"* Therapists wished they could get more honest answers from clients about their environment (T1, T2, T4): *"I wish I knew the truth, for clients who aren't honest about it in session, about the client problems, goals, barriers, everyday life"* (T4), and about their internal struggles: *"I wish I could see... what's going on internally for them, thoughts, emotions, dissociation"* (T5). The therapeutic relationship could support the client in sharing information with the therapists (T9).

5.4.2 Proposed solutions for understanding client behavior between-session. Clients discussed how sensing technologies could help complement the data they bring into therapy. Therapists added to that by also envisioning social systems that help share information about the client.

In-the-moment experiences: tracking and information from sensors. Participants (T7, C10, C11) thought of ways to help the client capture what was important to them outside the therapy session and bring those into the session. This could involve keeping track of things that they think of in the moment but might not remember to bring up in the session: *"write it down in the moment, maybe it'd be easier to bring it up. Or if I have access to see it, then I can bring them up"* (T7-W). C11 wanted to voice record their thoughts and feelings in the moment when they happened because that was easier than writing when the goal-related activity got overwhelming due to their anxiety: *"when things are happening in the moment, it's happening so fast, and you know, my feelings and emotions are just kind of like all over the place."*

Some therapists wanted more accurate in-the-moment information about the client: *"I would really love to be able to more easily collect data on the fly through ecological momentary assessment... have more information about what is actually happening internally"* (T8). Such information could help surface situations that are useful to discuss in the therapy session and the clients might not realize are occurring: *"You've been feeling really X, Y, Z this week? Can you tell me more about it? What's going on?... Are there things that come up that you wouldn't otherwise realize?"* (T2-W).

Similar needs were expressed by some clients. C2 mentioned that it can be difficult to be aware of feelings. C2 suggested that emotion and mood trackers could be incorporated into therapy to help the client identify their feelings. This could support the client and therapist in discussing the client's feelings in specific situations: *"I can skip all of the background information and just be like, 'okay, during this time and date this happened, and I was anxious... but I don't know why, and I don't know how to fix that problem'"* (C2).

However, T8 recognized that having technologies capture data can be restrictive due to cost: *"That's just so expensive to get the equipment... there's a lot of information that we don't have, and there's a lot of information that we could have. If we had the tools to really do it in a way that was financially possible, I think that would be awesome"*.

Information from other people: a less biased perspective. Other therapists thought that clients interpreted their problems through a biased lens. To better understand the client's life outside of therapy sessions, T11 felt that they needed to overcome the client's self-bias over their experiences by talking to family, friends, people they work with, or getting more information from other health providers: *"Clients generally give you... a very biased perspective... sometimes I would love to know from other people in that person's life how they're actually doing or what they're saying. Some clients will tell me that they're really not doing well. But if I were to survey their employer and their friends, like, no, they're doing great... I definitely wish I would have more objective data about how clients are doing"* (T11). T11 thought this could help them in surfacing to the client things that the client might not see on their own: *"A lot of socially anxious clients... they would say all of my friends and all of my family think x y z when in reality, they don't think that at all...it's good to kind of challenge some those thoughts"* (T11).

5.5 Supporting pursuing goals: Client-therapist communication between-sessions

Clients faced a multitude of internal and external factors that impacted their engagement with goals between therapy sessions. Clients and therapists expressed that clients had challenges in pursuing goals and desired support and encouragement (RQ1). They proposed solutions for how the therapist and client could interact between sessions through lightweight interactions and supporting the client's agency in problem-solving (RQ2).

5.5.1 Challenges in client-therapist communication between sessions. Clients expressed a need to get support from the therapist between therapy sessions in pursuing their goals. However, the therapists discussed the challenges of not having time to communicate with the client and not wanting the client to be dependent on the therapist.

Getting support from therapist between sessions. Clients found it challenging to get started working on homework plans they set during therapy. They thought therapists could support them with check-in messages between sessions when they felt uncomfortable starting the goal activities or to receive encouragement (C8, C9): *"midweek kind of, hey, how you doing? How's it going? What's going on today?... This is what's happening and I just need some extra support around this right now"* (C9). Some clients felt that encouraging or motivational messages from the therapist would be helpful when they were experiencing depressive and anxiety symptoms: *"If I feel like I'm very discouraged to do anything, like it's just one of those days... I think those are the times that I would usually want to talk to my therapist more"*. They felt that the therapist conversation would be more helpful than talking to a friend: *"My friends would probably just tell me like, 'Oh... We all feel this way sometimes'. But... it's different talking to my therapist, just because my therapist can give me a little bit more insight on maybe why I'm feeling the way I'm feeling"* (C11).

Limiting communication with clients. Therapists (T1, T2, T9) expressed major concerns about providing support to the client outside of therapy sessions, explaining that clinicians are often

underpaid for their emotional labor, and outside communication would add *"additional emotional burden on top of the really difficult work that we already do"* (T1-W). Some therapists thought that it would be detrimental for the therapist to check in with the client's progress between therapy sessions because it would create over-reliance on the therapist and limit the client's independence (T4, T9, T2): *"I don't love it when I'm in a role where I have to be the person being like, 'Hey, did you do your thing yet?' Because then that's not going to work, right? They can't be dependent on me forever to poke at them to do their homework"* (T4). Further, therapists did not have enough time to be in contact with clients between sessions (T3, T4, T5, T6): *"I don't have a lot of contact with patients in between sessions. And part of that is by design, because I'm in just part-time"* (T3).

5.5.2 Proposed solutions for client-therapist communication: lightweight communication. Brief interactions with the client. Therapists had varying views about when to communicate with clients, but overall, they agreed that communication should be limited. Therapists thought it was appropriate to be in touch with clients in exceptional situations *"with most of my clients, we don't [get in touch between sessions] ... with a handful of clients, if they're in crisis, or if there's... a specific reason"* (T11). Some therapists felt that it would be appropriate to communicate and provide encouragement to clients sometimes. In such situations, therapists preferred communication to be lightweight. For example, T11 used emojis with a client and brief check-ins if she didn't receive an update from the client: *"one client whose homework was to do behavioral activation every day. And to keep her doing that, she would send me an emoji text message of a person dancing to tell me... I did my behavioral activation... if I didn't get that dancing message from her, I would text her to be like, what happened?"* (T11).

Semi-automated interaction with the client. Reminders to engage in goal-related activities and messages of encouragement were seen as useful interventions by both clients and therapists. Therapists did not want to take the lead in sending the reminders but rather have them be sent automatically: *"Making sure that the therapist has time to send their reminders or if they can be like automatically sent, that would be preferable"* (T13). Messages could be pre-written based on different situations the client could go through and then sent automatically after the client has been through the situation: *"if in this tool or this app, I get a message that they did the thing that was so hard for them to do, when I see it, I can send a message like, Hey, I'm so proud, that must have been a really difficult thing that you accomplished or something like that"* (T1). Therapists also mentioned a "portal" with "pre-written responses that the therapist can set" and sending them to a client: *"can click a button to send something that they might frequently send to all 'great work' or something"* (T1-W).

Automated support with therapist oversight. A modality in which the therapist could stay connected with the client's experiences outside of the therapy was to have some oversight of the client's activities without direct engagement. Therapists envisioned this by imagining tools that supported sharing content between the client and therapist. For example, therapists wanted a tool that would automatically support the client through reminders but bring awareness of the problems and goals clients engaged in throughout the week for work in the therapy session: *"If there were reminders, and the client has done it, the client could probably turn them off or to say, 'Yep, taken care of'... if you can review kind of like a dashboard if they say yes to having done this before the therapy session, then that would really impact how you started your next therapy session with them"* (T13). Clients and therapists also envisioned that technologies could provide automatic support through surfacing the value of goal activities (C8), checking in with the client on whether they have engaged in the goal activities (T4, T7), and providing accountability for engaging in goal activities (T4).

6 Discussion

Research in the mental health domain has started identifying features that are important in the design of tools that support engagement with between-session goals through self-monitoring, supporting learning, connecting with others who can support homework engagement, and supporting the completion of homework [118]. Through our results, we expand the current insights on the design of technology to support engagement with therapy goals by highlighting a need to balance the client self-report with other sources of data, supporting communication between client and therapist outside of the session, and using digital captured information to support different stages of goal setting and pursuit.

6.1 Aligning perspectives through data

6.1.1 Supporting comfort in sharing information. A client-centered approach to goal setting implies involving and collaborating with clients in the consultation and decisions made during therapy sessions. This approach enhances communication success and trust, which supports the working alliance between the client and therapist [66, 98, 117]. Clients and providers can foster a closer relationship through effective communication [85], such as being able to communicate directly with each other outside of clinical settings without interference or blockages in the communication [28]. However, our results show that clients might not be comfortable sharing data with the therapist.

Participants discussed how asynchronously keeping track of discussion topics can make it easier for the client to communicate to the therapist what the client would like to prioritize. Prior work indicates that "design for autonomy-supported communication" instead of directive or judgmental communication could help the client perceive the environment as safer and facilitate better collaboration [95]. However, in designing asynchronous tools for generating discussion topics, system designers should account for the domain-specific issues, such as the client's tendency to focus on urgent items or to avoid difficult problems [3]. Among challenges in aligning perspectives, participants reported clients' resistance to sharing information due to the embarrassment of not engaging in goal-related activities. People can feel reluctant to track lack of success [35, 110], as it can be the case of clients who avoid goal-related activities. An approach to addressing the perception of failure at goal-related activities might be through re-framing activity failures to activity experiments [60, 73, 95].

Asynchronous communication could be used when clients do not feel comfortable disclosing disagreements about care plans face-to-face with the therapist. Participants suggested that it is important to re-assess the working alliance between client and therapist. Clients and therapists could use text messages between sessions to track sensitive topics for discussion, disagreement about goals, or working alliance assessment. This could encourage the client to open up about emotions and opinions more so than compared to face-to-face communication [79, 120].

6.1.2 Using data to facilitate decisions. Therapists wanted to know a range of information about the client to support shared decision-making. A multimedia dashboard that includes visual and auditory information could help support a positive working alliance by being centered on the client's needs, having the client make decisions, and supporting the therapist in having in-depth discussions. Therapists could collaborate with each client to define the client's preferred way to represent how they felt about a particular goal activity, skill, challenge, etc. HCI research could borrow concepts from art therapy, including non-verbal communication and the creation of a safe space [71] to explore how therapists could support clients in creating a dashboard that works for their goals and needs. For example, clients could choose sounds or symbols for moods or emotions that represent their feelings during that week, how much effort they thought they put into the goal

activity, or how successful they thought they were with the goal activity practice. Clients could add information to the dashboard as needed, outside of sessions.

HCI research has shown that visualizations can support people with chronic health conditions to recognize connections and share information with providers. That supported the person in feeling understood and working on their goals [105]. Visualizing information and getting support from a trained interventionist to visualize connections helped people with multiple chronic health conditions in self-management [15]. Part of the therapy session is used for sharing information and to support the client's understanding of connections [15]. Visualizations during the therapy session could support aligning perspectives between therapist and client. The therapist could convey information and more easily show the client the progress that they are making. Visualizations and connections between information can help participants have a holistic understanding of their needs and responsibilities beyond their chronic health issues. This, in turn, can lead participants to prioritize their needs and, consequently, achieve a more sustainable self-management [105].

6.2 Clients as unreliable sources of data: social and sensing technologies as proxies for client experiences

To support clients in engaging in goals, therapists relied on information shared by the client. However, in different ways, the client was perceived as an unreliable source of data. First, because they might not remember or might not be thinking of sharing how they felt and what they did as they tried to engage with their goals. Second, the client's view of their life might be misrepresenting what the client is actually experiencing.

Use of qualitative contextual data. Therapists wanted to understand how clients experienced barriers to engaging in a behavior, such as exactly what the client tried and what happened when they did, consistent with prior work [3]. Past work in managing chronic disease has shown that self-monitoring journaling tools can help people capture unforeseen circumstances in the care process through categorizing data based on their unique practices [114, 115]. When barriers come up and/or the user needs change, the tags are open-ended and can be used within that new context, needs, or goals [114, 115]. Contextual data can be difficult to capture because the nature of it is subjective and often includes contextual aspects of what is occurring around the person. Past work in diet management has shown that photos can be a lightweight way for the client to capture contextual information [32]. Photos can be a low-burden method to capture context, which can be helpful when clients are facing barriers to engaging with goal-related activities [32]. Imagery, photos, or icons can provide engaging representations of people's actions [55, 114, 115] and has been used for communicating data to providers in domains like pain, migraine, multiple sclerosis, or diet management [6, 32, 75, 109]. Although most data tracking tools support quantitative measure capture, the nature of mental health experiences might require supporting different types of media (e.g. numerical, imagery) for different clients [75]. Data collected through sensors, EMAs data, and contextual images captured by the client, among others, could support client-therapist collaboration when they need to discuss and make decisions about goals. That data could be organized in a dashboard to facilitate shared decision-making, as exemplified in section 6.3.2.

Use of clinical data. Therapists and clients also discussed the need for sharing information with different health providers about the client's health. One such approach is through The Collaborative Care Model, which is a collaborative approach between primary care and mental health providers to provide systematic mental health care delivery to people [123]. That collaboration can involve patients and their caregivers [13, 14]. As collaborative care is increasing in medical practices, technologies have the potential to support sharing information across providers about the client's health and context [50, 57, 116]. Previous research has explored how technology could support health providers to record and share information (e.g., notes from clinical visits) between them and

collaborate on decisions about patients' care [57], and the potential for Electronic Health Records (EHRs) to share notes from other providers about a client to support the mental health treatment [50]. The Health Information Exchange (HIE) supports sharing EHR data about patients between providers in different facilities if the client allows it [17]. However, many clinics and hospitals do not have EHR interoperability [74, 100] and, even when they do, providers can spend half of their time on EHR documentation [100, 113], and some providers never review this data (e.g. in an emergency department) [81]. Large Language Models (LLMs) are starting to support clinicians in taking medical notes, saving them time each day [48]. LLMs could support providers' collaboration by summarizing notes from different providers for the therapist to review quickly, as well as sharing a summary of the therapists' notes with other providers without increasing their workload.

Use of quantitative and sensed data. To inform decisions about goals, therapists wanted to understand the client's experiences in engaging with the goals they set out, specifically how people felt when they tried to engage with goals, whether successfully or not. This involved capturing data about their experiences. Therapists saw favorably the opportunity to capture in-the-moment data through approaches like Ecological Momentary Assessments (EMA) or sensed data about mood because it does not rely solely on memory, which can be influenced by bias and mistakes [112]. However, self-reporting of perceived stress [34] regularly can be burdensome [10], people can avoid monitoring negative feelings [110], and need to report mood during a short time frame from the stressor exposure to avoid errors [36]. Therapists desired to use sensing technologies, but technologies are limited. They cannot measure stress perfectly because its biomarkers (e.g., increased blood pressure) can also indicate other states, such as excitement [36]. The way someone responds to stress in one situation can be different from another situation [36]. Providers would need to develop expertise in interpreting such data. Sensing-related research has shown that many types of data can be useful to predict mental health states such as location [46], being near others [46], being at home or at work [94], or use of screen time [94]. Past work has surfaced that providers might be interested in data such as physical activity as a form of objective data [83]. However, our participants did not bring up such types of data in their needs to support clients with therapy homework. This might be a limitation of our focus on supporting homework activities. We believe that a future study focused more on personal data use and sensing technology use in therapy sessions would surface more about how providers might desire and use sensed data.

Considerations for using data. While therapists were optimistic about using sensor data, its relevance in practice might not meet the expected value that therapists hoped to get from it. Moreover, health data privacy was a concern for participants in this study, and it is a concern in digital mental health literature [19, 59]. Sensors should keep data storage to a minimum and avoid data exchange [47] beyond sending it to the therapist. Clients should be able to define the data they prefer to share with their therapist, according to their needs [11]. Even though such considerations are discussed in research, recent reviews of mental health apps for depression show that most privacy policies do not convey security and privacy, and most privacy policies are only shown to users after data is entered into the app [91]. Researchers have been raising attention to stronger regulation of health apps [91].

6.3 Supporting the client on engaging in goals: tiered communication between therapist and client

Participants thought it would be helpful to have digital client-therapist communication between therapy sessions, which could be synchronous or asynchronous. That communication could also range from a quick check-in to in-depth communication depending on the client's needs and the therapist's availability. Client-therapist communication can provide supportive accountability to the client to keep engaging with the therapy activities [79]. Sending reminders to clients can increase

their attendance in therapy sessions [21]. Therapists discussed their interest in supporting clients outside of therapy, which is in tension with their availability to do so. Since 2019, psychologists have experienced a significant amount of stress, with 36% of therapists feeling burned out in 2023 and a large number planning to reduce their work hours [5]. Traditional psychotherapies could incorporate digital features to adjust communication needs according to the available resources (e.g., therapists' availability). Further, therapists did not want clients to become over-reliant on them by communicating too much between sessions.

However, the interest in engaging in communication with the client raises the opportunity for lightweight communication or mixed-initiative systems where the therapist has some input into an automated system. Prior work has shown that technology should enable flexibility for the type of communication the client needs [90]. The severity of depression symptoms can vary depending on the moment, with clients needing varying support [69, 90]. When clients need encouragement to engage with goals, then simpler communication, such as positive reinforcement and reminders, could provide enough support. Such communication could be designed to be delivered asynchronously at predetermined times (e.g., when the client and therapist established it would be good to get a reminder about the goal activity). Therapists could support clients through a set of motivational text messages that they have written in advance, personalized to each client, based on the issues that the client might face. Because providers find it burdensome to write messages for clients, Large Language Models (LLMs) could help write engaging messages personalized [76] to each client's context and values. Therapists could review those messages before they are sent to make sure they are contextualized in the therapeutic alliance and therapist-client discussions. When the client reaches out to the therapist with a problem that does not require a live therapy session or medical support, the client could receive one of the pre-written messages from the therapist. Asynchronous communication often takes more effort to write because of the lack of environmental cues that support the meaning of the message [79, 125].

When clients need time-intensive support, such as when they feel low due to mental health symptoms or need to problem-solve a situation according to what they learned in therapy, a chatbot could provide regular check-ins with the client. Chatbots could provide more engagement than preset reminders because of their conversational nature [68]. Some therapy techniques, such as motivational interviewing, could be used in this case to guide the client to problem-solve their issues without live support from the therapist. However, it is important to recognize that available chatbots are often not tailored to each person's needs [80] and still have usability issues, such as not understanding nuances of human speech, which can cause distress [20]. Clients mentioned preferring to talk to their therapist rather than someone else because their therapist has more insights into their problems. Communication between therapy clients' peers could be a compromise when clients wish for synchronous communication but do not want automated messages. Peer-based chats can be helpful for clients to discuss their mental health symptoms synchronously and according to their communication needs [90].

7 Limitations

Only one therapist in our sample had more than 10 years of experience, and all had at least 3 years of experience. This reflects a younger sample of therapists. Our therapist sample might be more accustomed to novel technologies and be more open to using technologies as part of their practice, compared to a more senior sample of therapists. It is also possible that a more experienced sample of therapists might have different communication practices with their clients that we might have not captured in our data. Among clients we interviewed, we had a larger number of women than the typical therapy population. Our data may reflect themes around communication and information

sharing that are biased toward women's preferences. More work is needed to understand if our insights apply to a client group that is more gender diverse.

8 Conclusion

We describe the challenges and opportunities around mental health therapy goals and homework activities based on the experiences of therapists and clients. Therapists wanted to better understand information about the client to support them in creating relevant goals. Client data could be gathered between sessions through sensors and from other people. That data could be integrated through multimedia to facilitate a holistic understanding. Therapists and clients can collaborate to set goals and create activities based on the discussions they have around that data. That technology can be designed to enhance the therapist-client relationship, or working alliance, which supports clients to feel more comfortable in opening up to therapists. Consequently, they can collaborate to define more relevant goal activities for the client. Clients faced a multitude of factors between-sessions that influenced their engagement with their goals. Technology could help therapists and clients in communicating between-sessions across various levels of conversation, or *tiered communication*, so it fits the needs of both therapists and clients.

Acknowledgments

This work is supported by the National Science Foundation award IIS-2233738 and the US National Institute of Mental Health award P50MH115837. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health or the National Science Foundation. We thank Ariel Chen for her contributions to part of the data collection and analysis, and for creating wireframes for the interview study.

References

- [1] Ana M Abrantes, Claire E Blevins, Cynthia L Battle, Jennifer P Read, Alan L Gordon, and Michael D Stein. 2017. Developing a Fitbit-supported lifestyle physical activity intervention for depressed alcohol dependent women. *Journal of substance abuse treatment* 80 (2017), 88–97.
- [2] Zachary Adams, Miyah Grant, Samantha Hupp, Taylor Scott, Amanda Feagans, Meredith Lois Phillips, Kristina Bixler, Phani Teja Nallam, Dorothy La Putt, et al. 2021. Acceptability of an mHealth app for youth with substance use and mental health needs: iterative, mixed methods design. *JMIR formative research* 5, 12 (2021), e30268.
- [3] Elena Agapie, Patricia A Areán, Gary Hsieh, and Sean A Munson. 2022. A Longitudinal Goal Setting Model for Addressing Complex Personal Problems in Mental Health. *Proceedings of the ACM on Human-Computer Interaction* 6, CSCW2 (2022), 1–28.
- [4] Patricia A Areán, Patrick Raue, R Scott Mackin, Dora Kanellopoulos, Charles McCulloch, and George S Alexopoulos. 2010. Problem-solving therapy and supportive therapy in older adults with major depression and executive dysfunction. *American Journal of Psychiatry* 167, 11 (2010), 1391–1398.
- [5] American Psychological Association. 2023. Psychologists reaching their limits as patients present with worsening symptoms year after year: 2023 Practitioner Pulse Survey. "<https://www.apa.org/pubs/reports/practitioner/2023-psychologist-reach-limits>". (2023).
- [6] Amid Ayobi, Paul Marshall, and Anna L Cox. 2020. Trackly: A customisable and pictorial self-tracking app to support agency in multiple sclerosis self-care. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. 1–15.
- [7] David Bakker, Nikolaos Kazantzis, Debra Rickwood, Nikki Rickard, et al. 2016. Mental health smartphone apps: review and evidence-based recommendations for future developments. *JMIR mental health* 3, 1 (2016), e4984.
- [8] Stinne Aaløkke Ballegaard, Thomas Riisgaard Hansen, and Morten Kyng. 2008. Healthcare in everyday life: designing healthcare services for daily life. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 1807–1816.
- [9] James C Ballenger. 2000. Anxiety and depression: optimizing treatments. *Primary care companion to the Journal of clinical psychiatry* 2, 3 (2000), 71.
- [10] Jakob E Bardram, Darius A Rohani, Nanna Tuxen, Maria Faurholt-Jepsen, and Lars V Kessing. 2017. Supporting smartphone-based behavioral activation: a simulation study. In *Proceedings of the 2017 ACM International Joint*

Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2017 ACM International Symposium on Wearable Computers. 830–843.

- [11] Victoria Bellotti and Abigail Sellen. 1993. Design for privacy in ubiquitous computing environments. In *Proceedings of the Third European Conference on Computer-Supported Cooperative Work 13–17 September 1993, Milan, Italy ECSCW'93*. Springer, 77–92.
- [12] Dror Ben-Zeev, Emily A Scherer, Rui Wang, Haiyi Xie, and Andrew T Campbell. 2015. Next-generation psychiatric assessment: Using smartphone sensors to monitor behavior and mental health. *Psychiatric rehabilitation journal* 38, 3 (2015), 218.
- [13] Andrew BL Berry, Catherine Lim, Andrea L Hartzler, Tad Hirsch, Edward H Wagner, Evette Ludman, and James D Ralston. 2017. How values shape collaboration between patients with multiple chronic conditions and spousal caregivers. In *Proceedings of the 2017 CHI conference on human factors in computing systems*. 5257–5270.
- [14] Andrew BL Berry, Catherine Y Lim, Andrea L Hartzler, Tad Hirsch, Evette Ludman, Edward H Wagner, and James D Ralston. 2017. "It's good to know you're not a stranger every time" Communication about Values Between Patients with Multiple Chronic Conditions and Healthcare Providers. *Proceedings of the ACM on Human-Computer Interaction* 1, CSCW (2017), 1–20.
- [15] Andrew BL Berry, Catherine Y Lim, Calvin A Liang, Andrea L Hartzler, Tad Hirsch, Dawn M Ferguson, Zoë A Bermet, and James D Ralston. 2021. Supporting Collaborative Reflection on Personal Values and Health. *Proceedings of the ACM on Human-Computer Interaction* 5, CSCW2 (2021), 1–39.
- [16] Arpita Bhattacharya, Roger Vilardaga, Julie A Kientz, and Sean A Munson. 2017. Lessons from practice: designing tools to facilitate individualized support for quitting smoking. In *Proceedings of the 2017 CHI conference on human factors in computing systems*. 3057–3070.
- [17] Meryl Bloomrosen, Eta S Berner, et al. 2023. Findings from the 2023 Yearbook Section on Health Information Exchange. *Yearbook of Medical Informatics* 32, 01 (2023), 195–200.
- [18] Cindel Bounneux, Gustavo Rovelo, Paul Dendale, and Karin Coninx. 2019. A comprehensive approach to decision aids supporting shared decision making in cardiac rehabilitation. In *Proceedings of the 13th EAI International Conference on Pervasive Computing Technologies for Healthcare*. 389–398.
- [19] Dionne Bowie-DaBreo, Corina Sas, Heather Iles-Smith, and Sandra Sünram-Lea. 2022. User perspectives and ethical experiences of apps for depression: a qualitative analysis of user reviews. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems*. 1–24.
- [20] Kyle Boyd, Courtney Potts, Raymond Bond, Maurice Mulvenna, Thomas Broderick, Con Burns, Andrea Bickerdike, Mike Mctear, Catrine Kostenius, Alex Vakaloudis, et al. 2022. Usability testing and trust analysis of a mental health and wellbeing chatbot. In *Proceedings of the 33rd European Conference on Cognitive Ergonomics*. 1–8.
- [21] Christopher E Branson, Philip Clemmey, and Preetika Mukherjee. 2013. Text message reminders to improve outpatient therapy attendance among adolescents: a pilot study. *Psychological services* 10, 3 (2013), 298.
- [22] Virginia Braun and Victoria Clarke. 2006. Using thematic analysis in psychology. *Qualitative research in psychology* 3, 2 (2006), 77–101.
- [23] Lene Bru, Roar Solholm, and Thormod Idsoe. 2013. Participants' experiences of an early cognitive behavioral intervention for adolescents with symptoms of depression. *Emotional and behavioural difficulties* 18, 1 (2013), 24–43.
- [24] Brian E Bunnell, Lynne S Nemeth, Leslie A Lenert, Nikolaos Kazantzis, Esther Deblinger, Kristen A Higgins, and Kenneth J Ruggiero. 2021. Barriers associated with the implementation of homework in youth mental health treatment and potential mobile health solutions. *Cognitive therapy and research* 45, 2 (2021), 272–286.
- [25] Michelle Nicole Burns, Mark Begale, Jennifer Duffecy, Darren Gergle, Chris J Karr, Emily Giangrande, and David C Mohr. 2011. Harnessing context sensing to develop a mobile intervention for depression. *Journal of medical Internet research* 13, 3 (2011), e1838.
- [26] CDC. Accessed January 14, 2023. About Mental Health. "<https://www.cdc.gov/mentalhealth/learn/index.htm>".
- [27] CDC. Accessed May 28, 2023. Mental Health Conditions: Depression and Anxiety. "<https://www.cdc.gov/tobacco/campaign/tips/diseases/depression-anxiety.html>".
- [28] Yunan Chen, Charlotte Tang, Victoria Doung, Victor Ngo, Yang Huang, and John Mattison. 2017. "I don't bother with the phone!": Feeling Closer to Physician using Secure Messaging. (2017).
- [29] Bruce F Chorpita, Eric L Daleiden, and John R Weisz. 2005. Identifying and selecting the common elements of evidence based interventions: A distillation and matching model. *Mental health services research* 7, 1 (2005), 5–20.
- [30] Chia-Fang Chung, Jonathan Cook, Elizabeth Bales, Jasmine Zia, and Sean A Munson. 2015. More than telemonitoring: health provider use and nonuse of life-log data in irritable bowel syndrome and weight management. *Journal of medical Internet research* 17, 8 (2015), e203.
- [31] Chia-Fang Chung, Kristin Dew, Allison Cole, Jasmine Zia, James Fogarty, Julie A Kientz, and Sean A Munson. 2016. Boundary negotiating artifacts in personal informatics: patient-provider collaboration with patient-generated data. In *Proceedings of the 19th ACM conference on computer-supported cooperative work & social computing*. 770–786.

- [32] Chia-Fang Chung, Qiaosi Wang, Jessica Schroeder, Allison Cole, Jasmine Zia, James Fogarty, and Sean A Munson. 2019. Identifying and planning for individualized change: Patient-provider collaboration using lightweight food diaries in healthy eating and irritable bowel syndrome. *Proceedings of the ACM on interactive, mobile, wearable and ubiquitous technologies* 3, 1 (2019), 1–27.
- [33] Deborah J Cohen, Sara R Keller, Gillian R Hayes, David A Dorr, Joan S Ash, and Dean F Sittig. 2016. Integrating patient-generated health data into clinical care settings or clinical decision-making: lessons learned from project healthdesign. *JMIR human factors* 3, 2 (2016), e5919.
- [34] Sheldon Cohen, Tom Kamarck, and Robin Mermelstein. 1983. A global measure of perceived stress. *Journal of health and social behavior* (1983), 385–396.
- [35] Felicia Cordeiro, Daniel A Epstein, Edison Thomaz, Elizabeth Bales, Arvind K Jagannathan, Gregory D Abowd, and James Fogarty. 2015. Barriers and negative nudges: Exploring challenges in food journaling. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*. 1159–1162.
- [36] Alexandra D Crosswell and Kimberly G Lockwood. 2020. Best practices for stress measurement: How to measure psychological stress in health research. *Health psychology open* 7, 2 (2020), 2055102920933072.
- [37] Frank M Dattilio, Nikolaos Kazantzis, Gregg Shinkfield, and Amanda G Carr. 2011. A survey of homework use, experience of barriers to homework, and attitudes about the barriers to homework among couples and family therapists. *Journal of Marital and Family Therapy* 37, 2 (2011), 121–136.
- [38] Carole Doherty and Charitini Stavropoulou. 2012. Patients' willingness and ability to participate actively in the reduction of clinical errors: a systematic literature review. *Social science & medicine* 75, 2 (2012), 257–263.
- [39] Thomas J D'zurilla, Arthur M Nezu, and Albert Maydeu-Olivares. 2004. Social problem solving: theory and assessment. (2004).
- [40] Hayley Irene Evans, Catherine R Deeter, Jiawei Zhou, Kimberly Do, Andrew M Sherrill, and Rosa I Arriaga. 2022. Perspectives on Integrating Trusted Other Feedback in Therapy for Veterans with PTSD. In *CHI Conference on Human Factors in Computing Systems*. 1–16.
- [41] National Center for Science and Engineering Statistics (NCSES). 2022. Survey of Earned Doctorates. (2022).
- [42] Garth Fowler, C Cope, D Michalski, P Christidis, L Lin, and J Conroy. 2018. Women outnumber men in psychology graduate programs. *Monitor on Psychology* 49, 11 (2018), 255–278.
- [43] Gillie Gabay. 2015. Perceived control over health, communication and patient–physician trust. *Patient education and counseling* 98, 12 (2015), 1550–1557.
- [44] Katleen Gabriels, Tania Moerenhout, et al. 2018. Exploring entertainment medicine and professionalization of self-care: interview study among doctors on the potential effects of digital self-tracking. *Journal of medical Internet research* 20, 1 (2018), e8040.
- [45] ST Gaynor, PS Lawrence, and RO Nelson-Gray. 2006. Cognitive-behavioral therapy for adolescent depression: Review, preliminary findings, and implications for theory and practice. *Behavior Modification* 30 (2006), 647–672.
- [46] Asma Ghandeharioun, Asaph Azaria, Sara Taylor, and Rosalind W Picard. 2016. “Kind and Grateful”: A context-sensitive smartphone app utilizing inspirational content to promote gratitude. *Psychology of well-being* 6, 1 (2016), 1–21.
- [47] Alberto González-Pérez, Miguel Matey-Sanz, Carlos Granell, Laura Díaz-Sanahuja, Juana Bretón-López, and Sven Casteleyn. 2023. AwarNS: A framework for developing context-aware reactive mobile applications for health and mental health. *Journal of Biomedical Informatics* 141 (2023), 104359.
- [48] Sagar Goyal, Eti Rastogi, Sree Prasanna Rajagopal, Dong Yuan, Fen Zhao, Jai Chintagunta, Gautam Naik, and Jeff Ward. 2024. HealAI: A Healthcare LLM for Effective Medical Documentation. In *Proceedings of the 17th ACM International Conference on Web Search and Data Mining*. 1167–1168.
- [49] Andrea K Graham, Jennifer E Wildes, Madhu Reddy, Sean A Munson, C Barr Taylor, and David C Mohr. 2019. User-centered design for technology-enabled services for eating disorders. *International Journal of Eating Disorders* 52, 10 (2019), 1095–1107.
- [50] Shefali Haldar, Hannah Studd, Novia Wong, David C Mohr, Madhu Reddy, and Emily S Miller. 2022. Collaboration Challenges and Technology Opportunities at the Intersection of Perinatal and Mental Health Journeys. *Proceedings of the ACM on Human-Computer Interaction* 6, CSCW2 (2022), 1–28.
- [51] Sylvia Helbig and Lydia Fehm. 2004. Problems with homework in CBT: Rare exception or rather frequent? *Behavioural and cognitive psychotherapy* 32, 3 (2004), 291–301.
- [52] Adam O Horvath and Leslie S Greenberg. 1994. *The working alliance: Theory, research, and practice*. Vol. 173. John Wiley & Sons.
- [53] Adam O Horvath and B Dianne Symonds. 1991. Relation between working alliance and outcome in psychotherapy: A meta-analysis. *Journal of counseling psychology* 38, 2 (1991), 139.
- [54] Jonathan D Huppert, Deborah Roth Ledley, and Edna B Foa. 2006. The use of homework in behavior therapy for anxiety disorders. *Journal of Psychotherapy Integration* 16, 2 (2006), 128.

- [55] Priscilla Jimenez Pazmino and Leilah Lyons. 2011. An exploratory study of input modalities for mobile devices used with museum exhibits. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 895–904.
- [56] Eunkyoung Jo, Myeonghan Ryu, Georgia Kenderova, Samuel So, Bryan Shapiro, Alexandra Papoutsaki, and Daniel A Epstein. 2022. Designing Flexible Longitudinal Regimens: Supporting Clinician Planning for Discontinuation of Psychiatric Drugs. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems*. 1–17.
- [57] Bridget T Kane, Pieter J Toussaint, and Saturnino Luz. 2013. Shared decision making needs a communication record. In *Proceedings of the 2013 conference on Computer supported cooperative work*. 79–90.
- [58] Jonathan W Kanter, Patrick S Mulick, Andrew M Busch, Kristoffer S Berlin, and Christopher R Martell. 2007. The Behavioral Activation for Depression Scale (BADs): psychometric properties and factor structure. *Journal of Psychopathology and Behavioral Assessment* 29, 3 (2007), 191.
- [59] Nicole R Karcher and Nan R Presser. 2018. Ethical and legal issues addressing the use of mobile health (mHealth) as an adjunct to psychotherapy. *Ethics & Behavior* 28, 1 (2018), 1–22.
- [60] Ravi Karkar, Jasmine Zia, Roger Vilardaga, Sonali R Mishra, James Fogarty, Sean A Munson, and Julie A Kientz. 2016. A framework for self-experimentation in personalized health. *Journal of the American Medical Informatics Association* 23, 3 (2016), 440–448.
- [61] Nikolaos Kazantzis, Frank P Deane, Kevin R Ronan, and Luciano L'Abate. 2005. *Using homework assignments in cognitive behavior therapy*. Routledge.
- [62] Nikolaos Kazantzis, Luciano L'Abate, et al. 2007. *Handbook of homework assignments in psychotherapy*. Springer.
- [63] Nikolaos Kazantzis and Allen R Miller. 2022. A comprehensive model of homework in cognitive behavior therapy. *Cognitive Therapy and Research* 46, 1 (2022), 247–257.
- [64] Nikolaos Kazantzis and Gregg Shinkfield. 2007. Conceptualizing patient barriers to nonadherence with homework assignments. *Cognitive and Behavioral Practice* 14, 3 (2007), 317–324.
- [65] Nikolaos Kazantzis, Craig Whittington, and Frank Dattilio. 2010. Meta-analysis of homework effects in cognitive and behavioral therapy: A replication and extension. *Clinical Psychology: Science and Practice* 17, 2 (2010), 144.
- [66] Nancy L Keating, Tejal K Gandhi, E John Orav, David W Bates, and John Z Ayanian. 2004. Patient characteristics and experiences associated with trust in specialist physicians. *Archives of internal medicine* 164, 9 (2004), 1015–1020.
- [67] Christina Kelley, Bongshin Lee, and Lauren Wilcox. 2017. Self-tracking for mental wellness: understanding expert perspectives and student experiences. In *Proceedings of the 2017 CHI conference on human factors in computing systems*. 629–641.
- [68] Rafal Kocielnik, Lillian Xiao, Daniel Avrahami, and Gary Hsieh. 2018. Reflection Companion: a conversational system for engaging users in reflection on physical activity. *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies* 2, 2 (2018), 1–26.
- [69] Rachel Kornfield, Renwen Zhang, Jennifer Nicholas, Stephen M Schueller, Scott A Cambo, David C Mohr, and Madhu Reddy. 2020. "Energy is a Finite Resource": Designing Technology to Support Individuals across Fluctuating Symptoms of Depression. In *Proceedings of the 2020 CHI Conference on Human factors in Computing systems*. 1–17.
- [70] Jennifer Elston Lafata, Heather L Morris, Elizabeth Dobie, Michele Heisler, Rachel M Werner, and Levent Dumenci. 2013. Patient-reported use of collaborative goal setting and glycemic control among patients with diabetes. *Patient education and counseling* 92, 1 (2013), 94–99.
- [71] Amanda Lazar, Jessica L Feuston, Caroline Edasis, and Anne Marie Piper. 2018. Making as expression: Informing design with people with complex communication needs through art therapy. In *Proceedings of the 2018 CHI conference on human factors in computing systems*. 1–16.
- [72] Liana S Leach, Helen Christensen, Andrew J Mackinnon, Timothy D Windsor, and Peter Butterworth. 2008. Gender differences in depression and anxiety across the adult lifespan: the role of psychosocial mediators. *Social psychiatry and psychiatric epidemiology* 43, 12 (2008), 983–998.
- [73] Jisoo Lee, Erin Walker, Winslow Burleson, Matthew Kay, Matthew Buman, and Eric B Hekler. 2017. Self-experimentation for behavior change: Design and formative evaluation of two approaches. In *Proceedings of the 2017 CHI conference on human factors in computing systems*. 6837–6849.
- [74] Edmond Li, Jonathan Clarke, Hutan Ashrafian, Ara Darzi, and Ana Luisa Neves. 2022. The impact of electronic health record interoperability on safety and quality of care in high-income countries: systematic review. *Journal of medical Internet research* 24, 9 (2022), e38144.
- [75] Yuhan Luo, Peiyi Liu, and Eun Kyoung Choe. 2019. Co-Designing food trackers with dietitians: Identifying design opportunities for food tracker customization. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. 1–13.
- [76] SC Matz, JD Teeny, Sumer S Vaid, H Peters, GM Harari, and M Cerf. 2024. The potential of generative AI for personalized persuasion at scale. *Scientific Reports* 14, 1 (2024), 4692.
- [77] Carmen P McLean, Anu Asnaani, Brett T Litz, and Stefan G Hofmann. 2011. Gender differences in anxiety disorders: prevalence, course of illness, comorbidity and burden of illness. *Journal of psychiatric research* 45, 8 (2011), 1027–1035.

- [78] Jingbo Meng, Syed Ali Hussain, David C Mohr, Mary Czerwinski, and Mi Zhang. 2018. Exploring user needs for a mobile behavioral-sensing technology for depression management: qualitative study. *Journal of medical Internet research* 20, 7 (2018), e10139.
- [79] David C Mohr, Pim Cuijpers, and Kenneth Lehman. 2011. Supportive accountability: a model for providing human support to enhance adherence to eHealth interventions. *Journal of medical Internet research* 13, 1 (2011), e30.
- [80] Joonas Moilanen, Aku Visuri, Sharadhi Alape Suryanarayana, Andy Alorwu, Koji Yatani, and Simo Hosio. 2022. Measuring the Effect of Mental Health Chatbot Personality on User Engagement. In *Proceedings of the 21st International Conference on Mobile and Ubiquitous Multimedia*. 138–150.
- [81] Alexandra K Mullins, Helen Skouteris, David Rankin, Heather Morris, Kostas Hatzikiriakidis, and Joanne Enticott. 2022. Predictors of clinician use of Australia’s national health information exchange in the emergency Department: An analysis of log data. *International Journal of Medical Informatics* 161 (2022), 104725.
- [82] Sean A Munson, Jessica Schroeder, Ravi Karkar, Julie A Kientz, Chia-Fang Chung, and James Fogarty. 2020. The importance of starting with goals in N-of-1 studies. *Frontiers in digital health* 2 (2020), 3.
- [83] Ada Ng, Rachel Kornfield, Stephen M Schueller, Alyson K Zalta, Michael Brennan, and Madhu Reddy. 2019. Provider perspectives on integrating sensor-captured patient-generated data in mental health care. *Proceedings of the ACM on human-computer interaction* 3, CSCW (2019), 1–25.
- [84] UC Bureau of Labor Statistics. Accessed May 28, 2024. Labor Force Statistics from the Current Population Survey. "<https://www.bls.gov/cps/cpsaat11.htm>".
- [85] Institute of Medicine. 2001. *Crossing the quality chasm: a new health system for the 21st century*. National Academies Press.
- [86] National Institute of Mental Health. Accessed January 14, 2023. Anxiety disorders. "<https://www.nimh.nih.gov/health/topics/anxiety-disorders>".
- [87] National Institute of Mental Health. Accessed January 14, 2023. Depression. "<https://www.nimh.nih.gov/health/publications/depression>".
- [88] US Office of the National Coordinator for Health Information Technology. Accessed May 1, 2024. What is a Patient Portal. "<https://www.healthit.gov/faq/what-patient-portal>".
- [89] US Office of the National Coordinator for Health Information Technology. Accessed May 1, 2024. What is an Electronic Health Record. "<https://www.healthit.gov/faq/what-electronic-health-record-ehr>".
- [90] Kathleen O’Leary, Stephen M Schueller, Jacob O Wobbrock, and Wanda Pratt. 2018. “Suddenly, we got to become therapists for each other” Designing Peer Support Chats for Mental Health. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. 1–14.
- [91] Kristen O’Loughlin, Martha Neary, Elizabeth C Adkins, and Stephen M Schueller. 2019. Reviewing the data security and privacy policies of mobile apps for depression. *Internet interventions* 15 (2019), 110–115.
- [92] Committee on Quality of Health Care in America. 2001. *Crossing the quality chasm: a new health system for the 21st century*. National Academies Press.
- [93] Lucille ML Ong, Johanna CJM De Haes, Alaysia M Hoos, and Frits B Lammes. 1995. Doctor-patient communication: a review of the literature. *Social science & medicine* 40, 7 (1995), 903–918.
- [94] Pablo Paredes, Ran Gilad-Bachrach, Mary Czerwinski, Asta Roseway, Kael Rowan, and Javier Hernandez. 2014. PopTherapy: Coping with stress through pop-culture. In *Proceedings of the 8th international conference on pervasive computing technologies for healthcare*. 109–117.
- [95] Dorian Peters. 2023. Wellbeing supportive design—Research-based guidelines for supporting psychological wellbeing in user experience. *International Journal of Human-Computer Interaction* 39, 14 (2023), 2965–2977.
- [96] Rory A Pfund, James P Whelan, Andrew W Meyers, Samuel C Peter, Kenneth D Ward, and Tori L Horn. 2020. The use of a smartphone application to complete therapeutic homework in cognitive-behavioral therapy for gambling disorder: A pilot study of acceptability and feasibility. *Journal of Technology in Behavioral Science* 5 (2020), 156–163.
- [97] Adrienne Pichon, Kayla Schiffer, Emma Horan, Bria Massey, Suzanne Bakken, Lena Mamykina, and Noemie Elhadad. 2021. Divided we stand: the collaborative work of patients and providers in an enigmatic chronic disease. *Proceedings of the ACM on human-computer interaction* 4, CSCW3 (2021), 1–24.
- [98] Rafael Zambelli Pinto, Manuela L Ferreira, Vinicius C Oliveira, Marcia R Franco, Roger Adams, Christopher G Maher, and Paulo H Ferreira. 2012. Patient-centred communication is associated with positive therapeutic alliance: a systematic review. *Journal of physiotherapy* 58, 2 (2012), 77–87.
- [99] Amy Przeworski and Michelle G Newman. 2006. Efficacy and utility of computer-assisted cognitive behavioural therapy for anxiety disorders. *Clinical Psychologist* 10, 2 (2006), 43–53.
- [100] Miriam Reisman. 2017. EHRs: the challenge of making electronic data usable and interoperable. *Pharmacy and Therapeutics* 42, 9 (2017), 572.
- [101] David B Reuben and Mary E Tinetti. 2012. Goal-oriented patient care—an alternative health outcomes paradigm. *The New England journal of medicine* 366, 9 (2012), 777.

- [102] Johanna Roos and Andrzej Werbart. 2013. Therapist and relationship factors influencing dropout from individual psychotherapy: A literature review. *Psychotherapy research* 23, 4 (2013), 394–418.
- [103] Heleen Rutjes, Martijn C Willemsen, and Wijnand A IJsselstein. 2019. Beyond behavior: the coach's perspective on technology in health coaching. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. 1–14.
- [104] Kathleen Ryan, Samantha Dockray, and Conor Linehan. 2022. Understanding How eHealth Coaches Tailor Support For Weight Loss: Towards the Design of Person-Centered Coaching Systems. In *CHI Conference on Human Factors in Computing Systems*. 1–16.
- [105] Hyeyoung Ryu, Andrew BL Berry, Catherine Y Lim, Andrea Hartzler, Tad Hirsch, Juanita I Trejo, Zoë Abigail Bermet, Brandi Crawford-Gallagher, Vi Tran, Dawn Ferguson, et al. 2023. "You Can See the Connections": Facilitating Visualization of Care Priorities in People Living with Multiple Chronic Health Conditions. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*. 1–17.
- [106] Johnny Saldaña. 2021. The coding manual for qualitative researchers. *The coding manual for qualitative researchers* (2021), 1–440.
- [107] Jessica Schroeder, Chia-Fang Chung, Daniel A Epstein, Ravi Karkar, Adele Parsons, Natalia Murinova, James Fogarty, and Sean A Munson. 2018. Examining self-tracking by people with migraine: goals, needs, and opportunities in a chronic health condition. In *Proceedings of the 2018 Designing Interactive Systems Conference*. 135–148.
- [108] Jessica Schroeder, Jane Hoffswell, Chia-Fang Chung, James Fogarty, Sean Munson, and Jasmine Zia. 2017. Supporting patient-provider collaboration to identify individual triggers using food and symptom journals. In *Proceedings of the 2017 ACM conference on computer supported cooperative work and social computing*. 1726–1739.
- [109] Jessica Schroeder, Ravi Karkar, Natalia Murinova, James Fogarty, and Sean A Munson. 2019. Examining opportunities for goal-directed self-tracking to support chronic condition management. *Proceedings of the ACM on interactive, mobile, wearable and ubiquitous technologies* 3, 4 (2019), 1–26.
- [110] Stephen M Schueller, Martha Neary, Jocelyn Lai, and Daniel A Epstein. 2021. Understanding people's use of and perspectives on mood-tracking apps: interview study. *JMIR mental health* 8, 8 (2021), e29368.
- [111] Peixia Shi, Aigang Yang, Qing Zhao, Zhaohua Chen, Xiaomei Ren, and Qin Dai. 2021. A hypothesis of gender differences in self-reporting symptom of depression: implications to solve under-diagnosis and under-treatment of depression in males. *Frontiers in psychiatry* 12 (2021), 589687.
- [112] Saul Shiffman, Arthur A Stone, and Michael R Hufford. 2008. Ecological momentary assessment. *Annu. Rev. Clin. Psychol.* 4 (2008), 1–32.
- [113] Christine Sinsky, Lacey Colligan, Ling Li, Mirela Prgomet, Sam Reynolds, Lindsey Goeders, Johanna Westbrook, Michael Tutty, and George Blike. 2016. Allocation of physician time in ambulatory practice: a time and motion study in 4 specialties. *Annals of internal medicine* 165, 11 (2016), 753–760.
- [114] Cristiano Storni. 2011. Complexity in an uncertain and cosmopolitan world. Rethinking personal health technology in diabetes with the Tag-it-Yourself. *PsychNology Journal* 9, 2 (2011).
- [115] Cristiano Storni. 2014. Design challenges for ubiquitous and personal computing in chronic disease care and patient empowerment: a case study rethinking diabetes self-monitoring. *Personal and Ubiquitous Computing* 18 (2014), 1277–1290.
- [116] Jina Suh, Spencer Williams, Jesse R Fann, James Fogarty, Amy M Bauer, and Gary Hsieh. 2020. Parallel journeys of patients with cancer and depression: Challenges and opportunities for technology-enabled collaborative care. *Proceedings of the ACM on Human-computer Interaction* 4, CSCW1 (2020), 1–36.
- [117] Tomoko Takayama and Yoshihiko Yamazaki. 2004. How breast cancer outpatients perceive mutual participation in patient–physician interactions. *Patient Education and Counseling* 52, 3 (2004), 279–289.
- [118] Wei Tang, David Kreindler, et al. 2017. Supporting homework compliance in cognitive behavioural therapy: essential features of mobile apps. *JMIR mental health* 4, 2 (2017), e5283.
- [119] Emily P Terlizzi and Tina Norris. 1921. Mental health treatment among adults: United States, 2020. (1921).
- [120] Lisa Collins Tidwell and Joseph B Walther. 2002. Computer-mediated communication effects on disclosure, impressions, and interpersonal evaluations: Getting to know one another a bit at a time. *Human communication research* 28, 3 (2002), 317–348.
- [121] Michael A Tompkins. 2002. Guidelines for enhancing homework compliance. *Journal of clinical psychology* 58, 5 (2002), 565–576.
- [122] John Torous, Patrick Staples, and Jukka-Pekka Onnela. 2015. Realizing the potential of mobile mental health: new methods for new data in psychiatry. *Current psychiatry reports* 17, 8 (2015), 1–7.
- [123] Jürgen Unützer and Mijung Park. 2012. Strategies to improve the management of depression in primary care. *Primary Care: Clinics in Office Practice* 39, 2 (2012), 415–431.
- [124] Greg Wadley, Reeve Lederman, John Gleeson, and Mario Alvarez-Jimenez. 2013. Participatory design of an online therapy for youth mental health. In *Proceedings of the 25th Australian Computer-Human Interaction Conference*:

Augmentation, Application, Innovation, Collaboration. 517–526.

- [125] Joseph B Walther. 2002. Cues filtered out, cues filtered in: Computer mediated communication and relationships. *Handbook of interpersonal communication* 3 (2002), 529.
- [126] Peter West, Max Van Kleek, Richard Giordano, Mark J Weal, and Nigel Shadbolt. 2018. Common barriers to the use of patient-generated data across clinical settings. In *proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. 1–13.
- [127] Yiran Zhao, Yoojung Kim, Calvin Apodaca, Regina Casanova-Perez, Shefali Haldar, Sonali R Mishra, Julia C Dunbar, Ari Pollack, and Wanda Pratt. 2021. Supporting Goal-Based Collaboration for Hospitalized Children. *Proceedings of the ACM on Human-Computer Interaction* 5, CSCW1 (2021), 1–22.

Received January 2024; revised April 2024; accepted May 2024