

“I Just Can’t Help But Smile Sometimes”: Collaborative Self-Management of Depression

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Depression is a challenging condition that requires individuals to manage their moods and emotions over time. Within CSCW, there has been an interest in understanding how individuals seek and share support on social media and in online communities. However, less attention has been paid to how collaboration as an aspect of self-management of depression unfolds in people’s daily lives. In this paper, we explore the collaborative self-management work of 28 individuals managing depression who live in the United States. Data collection included remote semi-structured interviews with an associated cognitive mapping exercise. Our findings describe who participants turn to for day-to-day collaborative support, how collaborative activities are enacted (across both mood-focused and preventative support practices), and where these often technology-mediated interactions occur across text, phone, video, and picture-based channels. We discuss collaborative self-management in the depression support context, including key characteristics: agency, reciprocity, time, and interaction. We also present a four-step model of how the process occurs over time (awareness, planning, interaction, and reflection). We conclude by discussing how technology ecosystems support individuals’ collaborative self-management.

CCS Concepts: • **Human-centered computing** ~ **Human computer interaction (HCI)** ~ **HCI theory, concepts and models**

Additional Key Words and Phrases: Depression; collaborative self-management; technology ecosystems; communication channels; social support; mental health; polymedia; roles; social network

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1 INTRODUCTION

Depression is a major contributor to the global burden of disease, affecting 264 million people worldwide [108]. Individuals who manage depression often experience feelings of sadness, negative thoughts, lack of enjoyment of activities, lack of motivation, and agitation and sleep disruption [10]. A key symptom of depression is the tendency to isolate oneself from others, yet social interactions are important for self-managing the condition over time. While previous CSCW literature has underscored the importance of social support for individuals managing mental

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health needs (e.g., [5,35,106]), we still need to better understand, from the individuals managing depression themselves, how they collaborate with others to support their mental health, across the variety of their day-to-day interaction contexts.

Prior work in the HCI and clinical literature has often conceptualized self-management as a set of individual activities undertaken to support one's health, such as taking medications and exercising. This perspective is reflected in many individual-focused digital mental health support technologies (e.g., smartphone apps [8,81]). While individual self-management work is important, this perspective fails to capture the breadth of collaborative activities that individuals engage in with others as part of their self-management. However, CSCW health researchers have shown the importance of collaboration as a part of self-management, looking at contexts such as communication with caregivers, friends, and family [12,23,35,59,79], peer texting technology [85], and online communities [49,75,90], among others. To better conceptualize collaboration as part of wider self-management in the mental health context, we explore the term *collaborative self-management* [14] in this paper.

Collaborative self-management as discussed in the clinical chronic disease literature largely focuses on patient-provider communication and teaching strategies to manage physical effects of chronic disease (e.g., pulmonary disease [15,77]; asthma [73,82]). However, in contrast to this physical symptom orientation, individuals managing mental health needs are likely to have different collaboration goals to support mood and emotion management. In addition, the individuals who support collaborative self-management in the mental health context often extend beyond a clinical care team to include friends, family members, and others [18,93]. Depression is an important context to explore collaborative self-management because key symptoms include social withdrawal (the tendency to isolate oneself from others) and lack of energy and motivation [10]. These symptoms create barriers to collaboration, yet collaborative engagement is often important to combat these symptoms.

In this paper, we explore the characteristics of collaborative self-management in the context of depression with particular focus on the ways that individuals collaborate using one-on-one or small group social technologies (e.g., texting, phone/video calls, social media). Within self-management of depression, we were interested in these questions: (1) what are participants' collaboration practices and how do they unfold over time? (2) how do participants handle any collaboration challenges? and (3) how do participants select technologies to mediate this work? To answer these questions, we conducted remote semi-structured interviews with an associated cognitive mapping activity with 28 individuals managing depression who live in the United States. These data, collected from May-July 2020, includes participant collaborative experiences both prior to and during the COVID-19 pandemic. We discuss our approach in our Methods section. We describe the network of people *who* individuals managing depression collaborate with to support their mental health, *how* collaboration unfolds through a variety of practices (both mood-focused and preventative), and *where* this often technology-mediated work occurs between text, phone, video, picture-based, and in-person interactions.

This paper contributes to the CSCW literature by presenting 4 key characteristics of collaborative self-management: agency, reciprocity, temporality, and interaction. Our work also highlights the *process* of these day-to-day interactions through 4 steps taken by the individual managing depression: moving between awareness, planning, interaction, and reflection. We present this rich contextual understanding to guide the development of future digital mental health tools sensitive to the needs of these individuals and their social networks.

2 BACKGROUND

Depression is a common mental illness affecting millions of people worldwide. In the United States alone, in 2016, approximately 16.2 million U.S. adults experienced a diagnosable depressive episode [109]. Although common, depression is often difficult to self-manage. Symptoms of depression include negative thoughts, feelings of sadness, lack of enjoyment of activities, agitation, sleep disruption, and lack of motivation [10]. These symptoms can make self-management more difficult because, for instance, motivation and energy are required for the simple self-management activity of a brisk walk [92]. Adding to the complexity of self-management, individuals often experience depression alongside other mental and physical conditions (e.g., anxiety). To overcome difficulties associated with depression symptoms, individuals develop strategies to accomplish self-management activities.

2.1 Collaborative Self-Management

Broadly defined, self-management involves disease, role, and emotion management [28,65]. Both for chronic physical conditions and mental illness, self-management encompasses tasks to control physical aspects of illness(es) as well as psychosocial coping [65]. Research across HCI and CSCW in this area has largely focused on understanding self-management practices in the context of chronic disease. Previous studies have investigated the self-management activities of individuals managing cancer [41,51,52,62], diabetes [57,74], and chronic kidney disease [1,36,100], among others. The medical literature (e.g., [9,77]) similarly focuses on chronic disease self-management and the activities necessary to physically manage one’s condition. However, across both the HCI and medical literature, the ways that individuals self-manage mental illness is less clear. Recent HCI research has begun to explore self-management in the context of depression [35,64], bi-polar disorder [8], and eating disorders [34], however, the bulk of self-management research in HCI remains focused in the physical disease context.

Previous research in mental health has largely investigated individually-focused self-management activities (e.g., [9,16]) such as taking medications, reading health-related information, and exercising. This perspective is also reflected in the design of mental health support technologies that primarily focus on individual support, for instance, reframing negative thoughts and suggesting mood boosting activities (e.g., [8,66,81]). While individual activities are certainly important for health maintenance, collaboration is also an important aspect of self-management. Chapman et al. [36] underscore the important role that others can play in a person’s motivation and ability to self-manage long-term. Furthermore as Kendall et al. [61] argue, we need to move beyond current conceptualizations of self-management as a static set of best-practice activities, toward an verb-tense of “self-managing,” which encompasses evolving activities influenced by one’s external environment especially one’s social network.

A term from the medical chronic disease literature that encompasses these activities is *collaborative self-management* [73]. This literature describes collaborative self-management activities largely in the pulmonary rehabilitation context. Activities include clinician-led education to promote adherence to medical recommendations, improve patient self-efficacy, and discuss care plans [15,16,77,77]. Within CSCW, while collaboration in health has long been of interest (e.g., [45,59,78,79]), there has been less conceptualization of the role of collaboration in self-management. Here, we use the term collaborative self-management to analytically focus on the work of the individual managing depression as they plan, seek, receive, and reflect on support from others. We define collaborative self-management in the depression context as the intentional engagement in activities involving others as a part of mental health and wellness self-

management. In doing so, we focus on mood and emotion management, extending beyond the information (e.g., [13,19,36,62]) and physical maintenance activities (e.g., [46,56,60,74]) detailed in much of the previous self-management literature.

2.2 Depression and Social Support

Much of the psychology research that has investigated collaboration between individuals managing depression and others in their social network draws on the broad concept of *social support*. As described by Rueger et al.'s recent meta-analysis [93], social support research in the depression context has primarily focused on the people who are supporting individuals with depression, high-level activities they do together, and how to measure social support (e.g., [27,98]). For individuals managing depression, key roles that provide ongoing support include spouses, family, and friends [93]. Furthermore, researchers delineate social support activities into several high-level categories: emotional, instrumental, informational, and appraisal support [27]. Studies distinguish between effects of the structure of social support networks (e.g., *how many friends do you have?*) and the functions of the network (e.g., *do you have someone you can talk to about personal problems?*) [26]. However, there is a disconnect between the broad work categories and structures identified in previous research, and the interaction-level understanding we need to understand the day-to-day support experiences of individuals managing depression. While the psychology literature underscores the importance of collaboration, we still need to better understand the granular details of how these supporting interactions take place. By understanding people's lived experiences, we can build better types of support for these collaborative activities. Specifically, beyond friends and family, *who* else in individuals' social networks support their depression self-management? *How* do these broad categories of support (e.g., emotional, instrumental) take place in day-to-day interactions? Finally, *where* do these interactions occur, particularly through which mediating technologies? We use the term collaborative self-management to conceptually orient us toward these interaction-level questions in this paper.

The challenges that people experience asking for and managing social support in the mental health context are unclear. Individuals managing depression can have difficulty establishing and maintaining social relationships [18,106] and feelings of isolation and loneliness may lead to reoccurring challenges in symptom management [53,88]. In addition, some researchers (e.g., [29]) discuss stigma around mental illness as an ongoing issue influencing individual's considerations about collaborative support activities. Along with individuals managing other health conditions, individuals managing mental illnesses continue to be viewed negatively and experience negative interactions because of the stigma around their illness both in the U.S. and worldwide. Because of concerns about stigma, individuals managing depression often carefully consider how and with whom to disclose their illnesses and support requests.

On one hand there are numerous reasons why individuals might seek support. Confiding relationships can provide protective factors that support mental health including intimacy, social integration through shared concerns (e.g., similar goals), reassurance of worth, the opportunity to be nurtured by others, a sense of reliable alliance, and guidance [26]. However, on the other hand, supportive individuals can become embroiled in a crisis themselves (e.g., miscarriage, the passing of a loved one). Consequently, a social support relationship does not mean it is always positive or that a particular individual is the right person to turn to in all situations. Some relationships can be more demanding than supporting and can actually increase psychological distress [91]. For example, these type of role-based relationships can disproportionately affect women, particularly lower-income women, because of additional expectations of support they will provide for children

or sick family members [58]. In sum, depression presents an important and complex context to study collaborative self-management.

2.3 Technology Tools for Depression Support

Many previous HCI studies have focused on detecting signals of depression, however, fewer have investigated how to manage or treat depression. For instance, previous detection studies have used data from social media and online forum activity [22,24,31,70,94,97,99,102,107], multimodal behavioral signaling [7,33,55,105], and device sensing [20,25,63,87,95,101,103] (e.g., smartphones) to try to determine if individuals were suffering from the condition. While early detection of depression can be useful, we still have more to learn about approaches to support individuals to manage and reduce their symptoms of depression over time.

Many individual-focused depression support technologies were made through a process where best practices from therapy and other clinical practices were developed into mental health support technologies [72]. Technologies following this approach include the IntelliCare suite of apps [66,81] and a variety of mood support tools (e.g., [47,63,76]). Beyond these clinically focused applications, recent literature has started to explore the emergent ecology of technologies that individuals use for self-management support. Technologies used in the depression support context include social media, online communities, one-on-one calls, music, online multiplayer and phone games, calendar apps, journals, texting and messenger apps, and phone and video calls [35,54]. For example, Kornfield et al. [64] and Eschler et al. [54] observed day-to-day practices of individuals managing depression. These studies describe how people appropriate a variety of technologies (e.g., calendars, music, paper notes) to self-manage in ways that support the ebbs and flows of depressive episodes, motivation, and energy. However, what remains unclear is how individuals select from among these tools and services in the context of a technology ecosystem [32], particularly to facilitate collaborative self-management. Types of support and stigma are likely to contribute to decisions regarding which technologies to use to connect with others, but there may be other issues motivating people to use certain tools. Consequently, as part of examining collaborative self-management, we want to understand the role that the ecosystem of technologies plays, particularly the ways that certain assemblages of technologies enable and constrain desired collaboration.

2.4 Social Networks and Depression Support

Within CSCW, much of the previous depression literature exploring collaboration has focused on social interaction and support-sharing within social media and online communities. This work is important to help us understand collaborative support but presents a particular perspective that may not show an individual’s full support experiences offline and online. Within online support contexts, researchers observed behavioral differences between individuals managing depression and their non-depressed peers. In a Facebook study of college-aged participants, Park et al. [88] found that depressed individuals had smaller networks of comments and likes and a tendency to be “more passive in communicating with others.” Similarly, Homan et al. [48] in their study of TrevorSpace, an online community for LGBTQ youth, found that individuals managing depression were not as well integrated into the social fabric of TrevorSpace. Other researchers found that online depression support groups were important conduits for support. Zhang et al. [106] and Li et al. [68] studied online depression support groups in China, finding that these were key avenues for information-sharing and collective support in a context where many users had few other

resources and high stigma. In addition, Andalibi et al. [5] investigated picture-sharing activities on Instagram for support, establishing the importance of visual imagery as a vehicle for expressing aspects of depression. People managing depression sought virtual spaces to interact, express positive emotions, and provide support. Overall, while these studies underscore the importance of collaboration through public and semi-public technologies, the ways that other aspects of collaboration unfold in-person and through one-on-one and small group technology interactions (e.g., texting, voice calls) is less clear. Indeed, as Newman et al. [84] note in their study titled “*It’s Not That I Don’t Have Problems, I’m Just Not Putting Them on Facebook*,” deriving understanding of support discussions solely from posted online content is unlikely to show us the full picture of an individual’s health-related activities.

A few studies have begun to investigate the work of individuals managing depression and their close social networks. Burgess et al. [35] underlined the importance of sociality as a key ingredient in the self-management of individuals with depression. In this prior work, we described key collaborative activities including expressing moods, co-creating solutions, and de-escalating moods. For college students managing depression, Lattie et al. [38] note the importance of a diversity of interactions with known peers, as well as the ancillary roles of unknown peers and non-peers (e.g., faculty, parents) that supported their day-to-day self-management. On the other side of these interactions, Yamashita et al. [104], described the challenges of caregivers supporting depressed family members in Japan. Caregivers sought information about how to best support their loved one who was managing depression and created some boundaries to support their own mental health and wellbeing.

This paper builds upon the findings of these earlier studies to investigate the breadth of social network individuals who support the collaborative self-management work of people managing depression. In addition, we also present considerations that drive people to use certain technology channels to facilitate this connective work.

2.5 Summary

While in HCI and CSCW we know much about self-management in chronic disease contexts, we still have much to learn about self-management for mental illness. Given previous work showing the importance of social interactions for promoting mental health, here we focus on conceptualizing the collaborative aspects of self-management activities of our participants. While researchers have outlined broad activities of self-management and some role categories of supportive relationships, we still need to know more about day-to-day interactions in these contexts across an ecosystem of technologies beyond public online platforms. We also need to better understand with *whom*, *how*, and *where* people are engaging in collaborative activities, as well as their challenges in doing so. We fill these gaps by describing the collaborative support activities of our participants and conceptualizing the characteristics and process of this work.

3 METHODS

We conducted a qualitative study with 28 participants who were managing depression, consisting of remote semi-structured video interviews aided by a cognitive mapping elicitation. All research was conducted in the United States and received ethical clearance from the authors’ University Institutional Review Board. Participant compensation for the study was \$25.00 sent through PayPal.

3.1 Participants

We recruited participants who were at least 18 or older, lived in the U.S., had previously received a diagnosis of depression, and had experienced symptoms of depression within the past 12 months (Table 1.). We considered interviewing friend/family/caregiver dyads but decided for this study to identify the breadth of supportive connections from the perspective of the individual managing depression. Another reason for this methodological decision was to ensure that participants felt comfortable discussing any collaboration challenges.

Participant Number	Age	Gender	Years Managing Depression*
P01	21	Female	2
P02	66	Female	21
P03	28	Female	9
P04	38	Male	10
P05	34	Female	20
P06	38	Female	23
P07	38	Male	11
P08	35	Male	19
P09	36	Female	9
P10	32	Female	9
P11	28	Female	6
P12	25	Left blank	5
P13	62	Male	21
P14	39	Female	25

Participant Number	Age	Gender	Years Managing Depression*
P15	30	Female	12**
P16	33	Male	4
P17	60	Female	33
P18	24	Female	5
P19	26	Female	20
P20	23	Female	8
P21	24	Female	3
P22	25	Female	10
P23	33	Female	11
P24	54	Male	35
P25	36	Male	10
P26	25	Male	10
P27	62	Male	27
P28	23	Female	A few months

* ‘Years managing depression’ was in response to the question “When were you diagnosed with depression?” Participants may have managed depression before their official diagnosis, so this number gives us some idea but not necessarily the full period of management. ** P15 noted that she had been managing “since high school” so this is our estimate given current age

Twenty-eight people participated in this study. 75% of our participants were White/Caucasian. Of the remaining 25%, two participants were Hispanic (from Guatemala and Mexico, respectively), two participants were White and Hispanic (Puerto Rican; Mexican), one participant was White and Asian, one participant was African American and Asian, and one participant was Mixed Race. 64.3% of our sample were Female, 32.1% of our sample were Male, and one participant (3.6%) left the gender question blank. Participants ranged from 21 to 66 years of age, with 36 as the mean age.

Participants managed their depression in several ways and often combined strategies (e.g., medication and therapy). In their responses to the background questionnaire, 67.8% of participants noted that they used medication and 42.8% of participants participated in therapy (including cognitive behavioral therapy, talk therapy, EMDR Therapy, and group therapy). One participant (3.6%) reported using psychiatric care. Four participants (14.3%) noted that they did not formally manage their mental health. Participants had managed depression from a few months to 35 years.

3.2 Data Collection

Recruitment and data collection occurred from May to July 2020. Due to the COVID-19 pandemic, all recruiting for this study occurred online. Recruiting occurred primarily through a research

registry database operated by a behavioral health group within the authors' University. We know that the lived experiences of non-white participants can often be distinct, and we wanted to gather this diversity of experience managing depression. To do so, we sought participant diversity through connecting with a community organization focused on peer-based mental health support to share our study recruiting materials. We also shared recruitment materials with student organizations at the author's university focused on supporting individuals in minority populations. However, while we tried these different methods to increase diversity in our sample, the recruitment occurred just as the U.S. was experiencing racial justice protests. In consideration of this we did not request further send-out of recruitment materials so that our partner organization could attend to emergent priorities in supporting the mental health of their members during that distressing time.

3.2.1 Study Process. Potential participants filled out a short study screener on REDCap a browser-based software for designing clinical and translational research databases. The first author then directed potential participants to the online consent form and e-signature followed by a background questionnaire asking about demographics, current depression treatment routines, and technology device and online platform use. Participants received a Zoom login link along with instructions: a request for the participant to have a piece of paper and a pen or markers for the upcoming activity (cognitive mapping exercise), and to gather mental health management tools near their computer.

Semi-structured interviews are a standard method in CSCW research, particularly for qualitative health researchers seeking to understand people's thoughts and life experiences (e.g., [5,19,35,59,104]). During the interview the webcam was by default on for both the researcher and the participant, with the option to turn off the video based on comfort and/or internet connection quality. The researcher followed a semi-structured approach coupled with an interview guide. Major topic categories included: a) mental health management, b) support network experiences, c) the mapping activity, and d) design questions. Sample questions included: *"Can you tell me a story about a recent time someone in your support network was able to help you out with a bad mood or an emotional issue?"*; *"Which technologies do you use the most often to connect with others?"* Some participants shared artifacts with the researcher including showing: their phone screen for a visual of a game or app, a smartwatch technology, or a journal. When this occurred, the researcher asked the participant to hold the artifact steady and took a screenshot.

After about 30 minutes of discussion came the mapping activity phase. The Nielsen Norman group [43] defines cognitive maps as "any visual representation of a person's (or a group's) mental model for a given process or concept. Laying out and connecting concepts can enable identification of themes across different concepts and surface new patterns and connections. The mapping instructions included the following: *"Please map out the people or groups who you feel help support your mental health as well as the people who you help to support, leaving some space between them for connections."* Participants were instructed to follow a talk-aloud protocol. Then, the researcher prompted the participant to note their communication channels, *"Now, what are the ways that you connect with these people? Feel free to create links or note however you'd like to show these connections."* Further prompting included asking about in-person groups, online communities, and group texts.

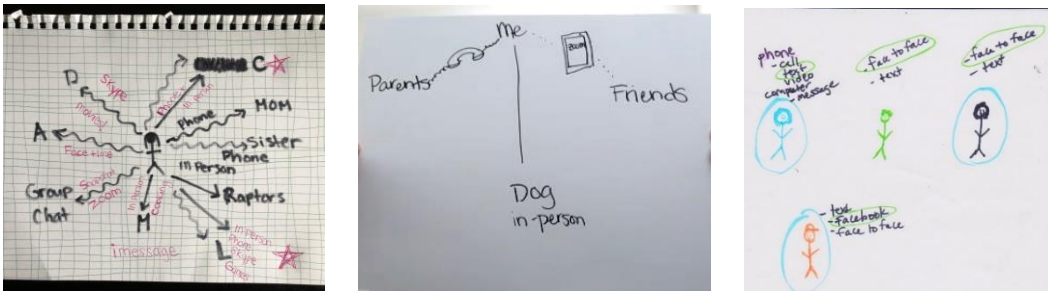


Fig. 1. Selection of Participant Cognitive Maps

As Figure 1. shows, individuals detailed their support networks by using circles, stick figures, arrows, links, colors, and text in creative ways. Once the participant finished, the interviewer took a screenshot of the participant’s map as they held it up to their webcam. Then, using the picture as a shared visual artifact, the interviewer asked follow-up questions. These included asking about the frequency of communication with each person/group, whom the participant would turn to if they had a bad day, which communication technology they used the most frequently, and the perceived strengths and challenges of the technologies noted on their map, and how they might redesign the technologies or structure of the map to better fit their collaborative self-management goals. Video and audio files of the interviews and screenshots were recorded locally and then stored in our secure password-protected and HIPAA-compliant University server.

3.3 Data Analysis

The first author led the analysis process and regularly discussed ongoing analytical approaches and emerging themes with her co-authors. Our author team has HCI and clinical psychology backgrounds with many years of experience working in digital mental health. The role of the clinical psychologist was to vet the interview guide and ensure clinical relevance of the study, advise on the management of participant risk such as suicidal ideation, and provide feedback and advice on clinical context for the interpretation of the findings. The data collected for this study included examples from both prior to and during the COVID-19 pandemic. Overall, participants did not report many new routines or technologies for connection and collaboration during the pandemic. Instead, the technical infrastructure was largely already in place between participants and their social support networks.

We used the cognitive maps primarily to elicit greater detail from participants regarding their social support network and communication technologies for their network. We analyzed the maps by numbering the individuals and groups on each map as well as the number and type of communication channels. For the interview transcripts, we followed Braun and Clarke’s thematic analysis method [17]. We began by open-coding several participant transcripts to gain familiarity with the data. We primarily coded at the sentence level, but some coding took place at the paragraph level to understand sequences of collaborative interaction(s). Through a process of iterative analysis and comparison we arrived at a set of axial codes reflected in the themes of this paper (Table 2.).

Table 2. Example Open Code to Axial Code Transitions

Open code	Axial code	Theme
She saw that watching the movie helped her roommate reduce emotionality and get ready for bed	Reflection on the collaborative interaction	Collaborative Support Practices
Marco Polo for awareness; Zoom for actual support call	Channel-switching	Technology Use

3.4 Study Ethics and Reflexivity Statement

We took care as researchers to build trust and to develop a process that prioritized participant comfort in discussing the sensitive nature of their depression management and social relations. The research team included an experienced clinical psychologist who provided guidance throughout all stages of the study design and data collection and offered clinical guidance when needed. Participants selected a time for the interview that best fit their schedule, with opportunities to carry out the interview on weekends and after work hours. While the remote nature of the interviews meant that participant privacy was not something the researcher could control, through study emails, the researcher recommended finding a quiet, private place for the interview, noting that there would be a discussion of potentially sensitive mental health topics. A few participants rescheduled the interview due to unexpected events. When this occurred, the researcher rescheduled for a better interview time for the participant.

None of the authors of this paper live with a mental illness and there are aspects of the lives of the participants that we cannot empathize with personally. To understand their experiences, we took a user-centered approach to support participants in expressing their lived experience, their goals, and their daily activities. We tried to frame questions to enable individuals to reflect as they saw fit on potentially sensitive past experiences.

4 FINDINGS

To support their mental health, participants described a diversity of collaborative self-management interactions. These interactions could occur frequently or infrequently depending on the participant. For instance, some participants worked with others on a daily basis to support their depression self-management, but for others this happened every few weeks or months. In the following sections we describe (4.1) the diversity of people *who* participants connected with to accomplish this work, (4.2) *how* these interactions occurred, and (4.3) *where* the interactions occurred (e.g., via technology or in-person).

4.1 “Who”: Roles Supporting Collaborative Self-Management

Our participants connected with family, significant others, friends, medical professionals, peers managing depression, coworkers, and strangers as part of their mental health self-management. Below, we describe participants’ selection criteria for supportive connections and their collaboration challenges.

4.1.1 Selecting Collaborators. Participants described criteria guiding the decision of who they to turn to for support: (1) how well the individual(s) understood them as a person, (2) whether they were in physical proximity, (3) whether the individual(s) had experience or knowledge of managing mental illness, and (4) how frequently they communicated.

First, participants described the importance of turning to individuals who understood them well as a person – their common behaviors, their values, how they think, and effective support

approaches. Many participants used the phrase “know me well enough to [do X]”. For example, P02 discussed how her family members noticed cues when she might be struggling. In one instance, she left a video message for her brother using the Marco Polo video messaging application to congratulate him on a new job. Her brother noticed that something was wrong from her facial expression and voice in the message. Later that day, she received a message from him asking, “what’s going on?” which led to a phone conversation. During their call, she realized that she was experiencing emotional issues from pandemic-related experiences.

A second factor was physical proximity. Many individuals had supportive interactions with people they lived with. When in the same physical location, participants described how others could see their need (and they could see other’s need) without even asking for help. For example, one evening when P01’s roommate (who was also managing mental health needs) had been having “*a really shit day*,” P01 spent her evening supporting her friend. She made an evening plan for them to eat food, have drinks, and watch a funny TV show:

“We fixed ourselves two G&Ts and put on Miranda which is our favorite cheesy British sitcom and made ourselves a bowl of popcorn...I was like, ‘You can cry if you like. We’re going to put this on, and you don’t have to watch. You can just curl up in my lap and cry but we’re going to do it in a way that’s slightly less, um, depressing and just feeding the mood than alone under our duvet.’ And, I was like, ‘I don’t mind if you cry, I don’t mind if it’s the worst night ever but I’d rather we do it together and not by yourself.’” (P01)

Watching the show together did not necessarily solve the issue, but P01 felt that in these situations, “*it’s just nice to have someone else sitting there.*” After the show, P01 observed that her roommate was not crying as much and seemed to be feeling better.

Third, participants collaborated with others who understood the challenges of managing mental illness. Some of these individuals were also managing depression while others were managing conditions such as anxiety, ADHD, and OCD. These friends often suggested strategies that worked for their own mental health management. P21 described that her friend who also had depression and anxiety could understand her thought processes: “*We’ll talk to each other about things that are sort of like the irrational things that we do, or that we think, and we definitely have different conversations about it. It’s a lot of laughing about it.*” This shared experience with depression and anxiety enhanced their ability to understand and support each other. Many HCI researchers have observed similar types of peer support (e.g., depression [85,86], cancer [41]). Other collaborators learned how to provide mental health support either by having a close family member who experienced mental illness or through job-related mental health support training. For example, P03’s mentor at work had a younger brother who had died by suicide. Furthermore, both P03 and her mentor were in child protection services and in that capacity, they had also received crisis training for mental health. Her mentor, through that devastating experience and her training, had learned to recognize signs of crisis and to provide useful support. These findings are similar to Evans et al.’s [42] work in the veteran PTSD support context, where both peer support via collective identity and formalized mental health training in the service enabled beneficial support.

Finally, participants considered the frequency of communication with people in their networks. For P18, it was easier to be honest about how she was doing when she frequently communicated with her grandmother who was up to date with current happenings:

“I think also, especially because she checks in on me a lot. It’s very easy for me to just kind of be like, ‘Today’s kind of been a rough day.’ Or, ‘Today’s been a good day.’ And I know that if I do say

that today's been a rough day, she just always knows the right thing to say back to me to make me feel better." (P18)

Support can often be more usefully targeted or delivered more quickly when others are aware of ongoing issues. Collaborators who had more frequent interaction did not require as much background context of a participant's life and ongoing stressors, resulting in a supportive interaction focused on taking action on a mood or issue instead of catching up with the background details. Next, we describe how participants managed collaboration challenges.

4.1.2 Challenges with Collaborative Self-Management. While many collaborative experiences were helpful, collaboration could sometimes be challenging. To collaborate, participants needed people in their support networks who were available and could be relied upon to provide support in effective ways sensitive to their needs. However, participants described challenges including dealing with small support networks, fear of burdening others, unmet expectations, and ineffective support.

First, small support networks can be a particular challenge. From past experiences, P06 knew that she is likely to upset her mom (or vice versa) if she turns to her for support. *"I mostly talk to my mom about emotional stuff. Unfortunately, she's not in a great space herself, so a lot of times we end up upsetting one another."* She described how she also tried to talk about things with her friend who has a new baby:

"She and I are probably the closest as far as what we're experiencing, but she's also had a baby screaming at her for 3 months and trying to teach. So, we've been kind of trying to lean on each other, but it's not exactly the same experience. And, while misery loves company, it's not always good to have both of you dig yourselves into a hole. So, we've been kind of limiting our conversations to more superficial stuff just to avoid upsetting each other." (P06)

P06 also recently had a falling-out with her previous best friend, so she described that she does not have anyone to turn to who would provide good support. For now, she keeps her moods and needs to herself. Her small support network means that even if she wanted to engage in collaborative self-management activities, she would need to undertake the difficult work of making new connections or try to repair other relationships.

Second, some people felt that their problems were too severe and therefore would burden others. For P17, after several negative experiences attempting to discuss her past with others, she concluded that her past experiences were too much to put on another person's shoulders. She therefore maintains her support interactions with others at a "superficial" level to avoid getting hurt. Now P17 supports her mental health through her religion and regular prayer.

Third, challenges can also occur when support requested does not match one's expectations. For instance, when P16 was in Europe, he asked his girlfriend at the time to send texts to him while he was traveling. When she did not do so, he had several panic attacks. Asking her to send him a supportive text was something P16 perceived as relatively easy to do that he knew would be helpful in supporting his mental health while away from home. However, it was devastating when that did not happen and resulted in the pair eventually breaking up.

Finally, participants also had to manage situations where people tried to provide support but were ineffective. Many participants described that some people in their networks did not "get it" regarding how to effectively support their needs as someone who was managing depression. Participants discussed aspects that others did not understand about depression, including signs and symptoms and what it is like to feel sad and not be able to "get over it". This meant that participants sometimes had to exert tiring effort to try to teach others about the experience of

depression. Without the personal experience of managing mental illness, participants described how they perceived it was difficult for others to have true empathy with their needs.

In the next section, we describe the specific practices of collaborative self-management.

4.2 “How”: Practices of Collaborative Self-Management

Participants collaborated with others in many ways. Below, we describe a selection of collaborative activities (see Table 3.). While we separate them here conceptually for clarity purposes, in practice, they could occur simultaneously or overlap with each other. We separate collaborative self-management practices into two categories: mood-focused support and preventative support. We distinguish these below and note the importance of both as part of collaborative self-management.

Table 3. Key Collaborative Self-Management Practices

List of Practices	
Mood-Focused Support	Checking-In
	Sharing Stories, Venting & Empathetic Listening
	Making Sense of Situations Collaboratively
	Sharing Advice
	Affirming, Encouraging & Calming
Preventative Support	Engaging in Shared, Group & Community Activities
	Sharing Humor
	Setting Boundaries

4.2.1 Mood-Focused Support. Participants described a variety of stressors, often related to work or interpersonal relationships, that could trigger a negative mood or emotion. When either the participant or someone around them became aware of the (potential) need to address a mood, they engaged in mood-focused support practices (Table 3.). The practices of sharing stories, venting & empathetic listening, and sharing advice are similar to findings of previous mental health CSCW literature [5,35], so for space purposes, we focus on the three other practices.

Checking-in often happened when an individual noted that another person’s emotional state or behaviors differed from the norm. For example, P16’s mom talked to him because he had been waking up very late and watching TV shows all night. P16 assured her everything was okay and that he was doing this to help him to cope during a time when his community artistic pursuits were inaccessible due to COVID-19: “*And she goes, ‘Oh, good. Okay. So, I don’t have to worry about you if you’re up at 3:00 [am] still watching TV shows?’ Like, ‘No, it’s actually – That’s fulfilling.’*” By checking in, P16’s mom was able to note her awareness of his behavior and find out if he was struggling or needed support. P16 then had agency to share his thoughts and decline her support.

Participants also described **making sense of situations collaboratively**. Events in participants’ daily lives could sometimes feel overwhelming or difficult to figure out on their own and this affected their mood. When this happened, participants talked through the situation with others whom they trusted to better understand the distressing situation. For example, P04 was accused of a human resources violation at work. This caused him intense emotional distress and he took a leave of absence from work. He connected with his brother to interpret the confusing situation to understand if he was at fault. Through several conversations over a two-week period,

across text, phone calls, and finally also with a collaborative Google document, P4 reflected that he felt confident enough to move forward with addressing the issue.

Participants also described the importance of **affirmation and encouragement** and actions to exert a **calming presence**. Affirmative words helped participants to counter negative thoughts like feeling worthless or unlovable. P17 shares words of affirmation with her daughter and vice versa, *“My one daughter, she’s always telling me when I get really down that her kids love me and that I’m loved and I’m needed and useful because she knows that’s what I need to hear to keep moving forward.”* Similarly, P18’s grandmother sent a nice message and a video via Facebook Messenger to support her when she had messaged to say that she was feeling down:

“Because I think when I get super anxious and stressed, my brain just takes over and I can’t think of anything else...When I get anxious, it’s just almost like a whirlwind of emotions. And I can’t think about anything else at all...I found myself on several occasions when I do get that nice text from a friend or my mom or my grandma, I just can’t help but smile sometimes. And it brings me back to reality again.” (P18)

After interacting with texts from loved ones, P18 reflected on the affirmation and encouragement to help her to re-center her mind and cut through her emotional whirlwind.

People could also act as a calming presence. This included providing hugs, cuddles, and having calming conversations. When P16 became aware that his co-worker was struggling with a work task he knew what to do because he recognized being in *“panic mode”* himself: *“So, I stepped in and tried to be the calming presence and say, ‘We’ll get through this. Yes, this is shit right now, but if we can look past that, let’s just do what we can do and say what we can say.’”* Many other participants also provided affirming, encouraging, and calming support to others in their social networks. Next, we describe preventative support practices not directly tied to a negative mood or emotion.

4.2.2 Preventative Support. Participants also described engaging in “preventative” practices. We use this description to mean that they did not engage in these interactions to address a specific negative mood or emotion. Rather, they engaged in these activities to help maintain their mental wellness. In these practices, unlike for mood-focused support, the other parties may not even be aware that the participants were managing depression.

The most frequent practice was **shared, group, and community activities**. Examples of shared and group activities included having meals, sharing drinks, and participating in group exercise. For many participants, it was important that they felt they were part of the community through social activities. They described the positive benefits of going to a restaurant or a bar after work with colleagues. Participants also described the mental health benefits of participating in community activities. For example, P02 volunteered locally, started her own business, and joined a photography class to combat her tendency to self-isolate. For P28, joining a new church during the pandemic was a wonderful source of community support. She attended weekly sermons hosted via Facebook Live, participated in discussions via live commenting, and joined group discussions after the sermon. As a Black and queer woman, she found companionship and shared experiences with others in her church focused on supporting a predominately Black and LGBTQ congregation.

Participants also **shared humor**. For example, P09 often called her mom. Her mom would listen to her and then make her laugh with her humorous responses. This practice also includes sharing funny and stupid memes. P12’s friends’ group chat was a place to *“talk about the dumbest of things”* and to comfort each other. Similarly, P21 described sharing memes with her friend who was also managing depression. They would often share dark or black humor about mental illness.

In addition, P16 described how he could tell that his friend who is a police officer in a large city in the U.S. was doing okay emotionally because his friend consistently sent professional wrestling memes and videos. P16 was worried about his friend’s wellbeing during a time of continued protests against police brutality and calls to reduce police department funding. Therefore, this consistency in communication showed P16 that his friend was still able to spend time keeping up with a shared hobby that they both loved.

Finally, participants *set boundaries* to support their mental health. This practice recognizes that not all interactions were helpful. For example, after many years of exhausting work to emotionally support her parents, P15 recently set firm boundaries to preserve her emotional energy and not let the issues that her parents were dealing with upset her mood:

“Being able to say to them, ‘I need this time to work on myself and work on my own mental health. And I don’t have the mental energy to necessarily process your beef with my aunt, so to speak, or to process your fear over having to go to the pharmacy.’” (P15)

Her interactions with her parents occurred primarily through Facebook Messenger, so she also set boundaries by alerting them when she would be muting the group chat for a day or longer for this purpose. Setting boundaries also sometimes occurred in response to specific moods. P11 described how she could feel a depressive episode coming and told this to her boyfriend. He asked her several questions, including: *“Is there anything I can do?; Can I listen?; Can I give you a hug?”* Her answer to all of these was *“no.”* After their conversation, she went to her room (thereby creating a physical boundary) to cry and then reflect on her feelings. As she thought through her mood, she was able to use her boyfriend’s phrases to combat her negative thoughts. Similarly, after a bad day, P07 preferred to zone out with TV rather than talk to his wife about his mood. Coming home and turning on the TV signified a boundary and P07’s preferred coping strategy at that moment. Through these examples, we see that there can sometimes be overlap between preventative and mood-focused practices, depending on the issue and resulting behavior(s).

In the next section, we describe the technologies used to mediate these practices.

4.3 “Where”: Technology Channels and Collaborative Self-Management

In the previous two sections, we discussed collaborators and collaborative support practices. Here, we turn our attention to the technologies used to mediate these practices. We note that there are not specific relationships between collaborator roles or practices and the selected types of mediating technologies. Rather, participants used a diversity of tools to adapt to in-the-moment contexts. Participants used a diversity of technology channels within their technology ecosystem [32] to support collaborative self-management interactions. Text, voice, video, and picture-sharing technologies each afforded different types of support, ways of expressing oneself, and speed of response.

Text-based technologies. These included native SMS technologies such as iMessage and Android messenger and text-based social media technologies including Facebook Messenger, Instagram Direct Messages, Twitter Direct Messages, Telegram, WhatsApp, LinkedIn and GChat. Participants also used email and physical letters, though much less frequently than texting. While some participants occasionally interacted with others on online forums (e.g., Facebook groups, subreddits), most text-based communication involved one-to-one or small group interactions with individuals that participants knew well. Participants used text-based technologies to coordinate in-person interactions, share information, and ask for and provide support. For example, P22 uses WhatsApp to keep in touch with her large family. She can share topics on her mind and family members can respond at their convenience:

“We have several different chat groups, and I have family across in different towns, so I’ve found it’s really nice to – just to get it out there. Even if they don’t see it right away, it’s in their hands and they’ll get to it when they get to it. For me, also, verbalizing or vocalizing what’s on my mind really helps me to process and get a better understanding. But then, it’s reassuring and nice when they can respond.” (P22)

While participants viewed text-based applications as convenient, they also noted their challenges. Specifically, it could be difficult to interpret the tone and meaning of the words. Because of this, many participants carefully proofread their messages to ensure that their words were as clear as possible before sending. For example, P03 revised a text message several times when she wanted her work mentor to know she was struggling and needed support but did not want her to call the suicide prevention hotline.

Voice Call Technologies. Participants used landlines and cell phones as well as voice call technologies such as Discord and the voice call functions on Skype, WhatsApp, and Facebook Messenger. A call often signified a higher immediacy or intensity of need than a text message. Phone calls provided the tonal context of another person’s voice and often showed emotion. For example, during a regularly scheduled call, P11 realized from hearing her mom’s voice that her mom was upset. Hearing this, P11 was able to respond in the moment by letting her know how much she admired her. Similarly, P21 described how she feels more connected to people when she can talk to them via the phone and have conversations flow from one topic to the next. She also was able to share emotion more easily on the phone. However, participants also acknowledged that phone calls could put the other person on the spot to respond immediately and not necessarily at their convenience. This resonates with Nardi et al.’s [83] concept of media “interruptiveness.” Other participants described difficulties paying attention while on the phone. P23 easily became distracted when trying to listen on the phone to her grandmother or to her friend who can be “long-winded.” Similarly, P05 would weed in her garden, pet her dog, or play with Legos to maintain attention while listening to others on a phone call.

Video Technologies. Participants used a variety of video technologies including FaceTime, Skype, and Zoom, the video function on other communication platforms (e.g., WhatsApp), and video-based asynchronous communication via platforms such as Marco Polo. Video was the main way that participants in support groups communicated with their groups. Many participants considered video as more authentic because it provided body language cues. P04 described how video was particularly helpful when he was in distress because he could see the support in others’ faces. At the same time, video was also the most challenging channel to use. First, there were bandwidth limitations. Participants who lived or worked in rural areas, lived in high-density dwellings like apartment complexes, and worked in the top levels of city skyscrapers all experienced frequent Internet connection difficulties. Second, tele-therapy, often conducted via video, also raised some issues. For example, P23 had previously participated in in-person group therapy but because of the pandemic was attending video-based group therapy. She described the lack of body language (the videos were focused on the faces only) and eye contact as challenging. In comparison to the previous easy flow of conversation during in-person interactions, the flow of conversation was often disrupted over video. People would either be silent or interrupt each other. P23 also described becoming very aware of her own image, a feature of many video software systems: *“I get really distracted by my own image, and I find myself staring at myself. I’m listening, but I’m really not thinking about stuff to say, I’m thinking about like, oh, what do I look like.”* While video supported visual communication unlike text and voice, it also had more challenges than other channels.

Picture-sharing Technologies. Participants described the benefits of using technology to share pictures (sometimes accompanied by text). This included platforms such as Snapchat, Instagram, SMS applications, and to a lesser extent, Facebook. For example, P17’s son and daughter regularly send her pictures of her grandkids. When asked what benefit she gains from these photos, she said, “hope.” Participants also used pictures to share mood status. For individuals battling a negative mood, expressing oneself can sometimes be a challenge: “*when I’m having a really bad day, I almost can’t even get the words out*” (P18). When in this state, P18 will send a Snapchat of her face to her friends. She feels that the Snapchat image captures her “*true, honest self*” to share with them:

“I’ve sent a sad face selfie to my friends and been like, ‘No job yet.’ Full honesty that only my best friends would see. And then, seeing their face in response to that has been kind of helpful in a supportive way...They usually will just say kind of like a soft smile back usually, or [friend] will send like a photo of her dog. And they’ll always say something like, ‘I have my fingers crossed for you. Something will come along soon,’ or they’ll just remind me the job markets are really tough right now.” (P18)

Picture-sharing platforms also facilitated easy sharing of memes and funny content. Many participants described using Instagram Direct Messages when sending memes because Instagram was the source of many of their memes and it was easier to share through the same platform than through any other tool.

In addition, many participants described that in-person communication was particularly effective in supporting their moods and emotions. For example, P21 thinks of technology-mediated connections as a “supplement” to in-person interactions. Similarly, for participants for whom physical affection was especially important, in-person interaction offered opportunities that were not possible via technology-mediated interaction. P22 spoke about how she would be excited for a future where there could be teleportation to share hugs with her loved ones: “*Yeah, technology is amazing, but it definitely lacks that human connection, that physical connection.*” Therefore, while technology-mediated collaborative self-management was certainly prevalent in our study, participants also valued in-person activities.

4.3.1 Technology Channel Challenges. In the previous section we discussed benefits and challenges of the 4 main communication technology channels. Here, we discuss 4 overarching issues: managing conversations across multiple applications, managing privacy, seeing negativity on social media, and connectivity issues.

First, some participants struggled to manage conversations across multiple social media and messaging applications. P19 describes this diversity:

“I’m pretty sure I have three conversations going with my one friend right now but they’re all different. On Instagram it’s about random food things – posts we’ve seen or recipes. And then, on Facebook Messenger it’s whatever random news story, and then on text it’s our lives.” (P19)

Some participants had difficulty remembering the most recent communication channel used to connect with someone, and which channel they would respond to the most quickly. For example, P08 knew that his friend had a limited smartphone data plan. When he wanted to connect with her for support, as part of a planning process, he described needing to carefully contemplate sending a message over Internet-supported Facebook Messenger or cell-service supported text messenger based on which one she would likely see first. Second, participants also had to consider the privacy of different channels, both in terms of who could see the digital text within the channel as well as who might physically overhear their conversations. Third, for participants in

general and especially those who were particularly empathetic, seeing toxicity and negativity on social media along with news stories about negative events could easily impact their mental health if they spent too long using these platforms. Engaging with negative posts or arguments could also sap participant's limited mental energy and motivation [54]. Taking breaks from using social media sites and limiting daily social media use were common participant approaches to using social media in ways that remained positive. Finally, challenges with Wi-Fi and cellular coverage led to frustrations with not being able to respond quickly to others and issues of choppiness, lag, and echoes during support conversations. For example, P03 and her co-workers used Snapchat via Wi-Fi to communicate instead of SMS texts because of the poor cell service coverage in her rural area. However, P03 would often experience what she called "brain fog," an issue with short-term memory. For this participant, past messages would disappear, and she often found herself looking at her co-worker's response with no recollection of what she had just asked them.

In summary, our findings described *who* participants engaged with to reach their collaborative self-management goals, *how* these activities occurred, and *where* these often technology-mediated interactions took place. Next, we discuss how these findings help us to conceptualize collaborative self-management in the mental health context.

5 DISCUSSION

To manage their depression, our participants carried out individual self-management activities, for instance, taking medicine, journaling, solitary exercise, or meditation. However, they also described interactions with others as a significant part of their mental health self-management. This supports recent CSCW research findings (e.g., [5,35,48,68,88]) underscoring the important role that social networks play in supporting individuals managing depression. While some of our participants collaborated much more frequently than others (e.g., multiple times daily versus every few months), being able to connect with others to feel soothed, see new perspectives, and enjoy social experiences were key elements in how individuals managed their depression. Thus, through our analysis, it became clear that self-management was not only an individual activity but also a collaborative one.

While social support for mental health management has been explored previously (e.g., [18,26,27]) and researchers have described broad work activities [26,98] and roles [18] involved in these processes, we did not yet have an understanding of the granular detail of these interactions nor how they were carried out on a daily basis. In short, the social support literature presented the broad framework, but did not unpack the practices that people engage in on a day-to-day basis. Consequently, we undertook this study to better understand the work of the individual managing depression to facilitate these supportive interactions.

Our work builds on Kendall et al.'s [61] recent critiques of the medical literature's focus on self-management as a cost-cutting mechanism and the providence of healthcare professionals who deliver expertise to passive participants. They state, "This narrow view of self-management fails to acknowledge the importance of the complex sociocultural, political and economic contexts within which it is embedded and the relationships that make self-management possible." Instead, the authors push for an organic and dynamic conceptualization of "self-managing" that is self-defined, encompasses the lived expertise, and recognizes the diversity of individuals who support self-management processes. We build on these ideas to show that a crucial aspect of self-management is the interplay between one's social network, technologies, and self-management goals. While collaborative self-management has been used in the chronic disease context to promote adherence to medical recommendations [15], here, we explore the term in the mental health domain. We use

it to analytically focus on the work of the individual as they plan, seek, receive, and reflect on support from others. We define collaborative self-management in the depression context as the intentional engagement in activities involving others as a part of mental health and wellness self-management.

Below, we discuss 4 key characteristics of collaborative self-management and present a process to help us understand how this work unfolds over time. We then discuss the technology ecosystems utilized in collaborative self-management and conclude with study limitations.

5.1 Characteristics of Collaborative Self-Management in the Depression Context

To make sense of the collaborative interactions we described in the Findings and to understand what comprises the work of collaborative self-management, a major contribution of this paper is to identify 4 key characteristics of this work: agency, reciprocity, temporality, and interaction. Because the term “collaborative self-management” was previously used in the medical literature in the chronic disease context, we wanted to identify characteristics of collaborative self-management that were relevant to the depression context. By understanding these key characteristics, we can start to consider approaches to better create future interventions to support this work.

First, we found that individuals had a great deal of agency in collaborative self-management activities. As Coyle et al. [30] state, agency is “a person’s innate sense of being in control of their actions and through this control of being responsible for, or having ownership of, the consequences of those actions.” To collaborate effectively with others, participants described many decisions through which they demonstrated their agency: determining when to collaborate, who to contact, which channel(s) to use for the interaction, and what type of support they needed at a particular time. For example, the first aspect of agency is to determine when collaboration would be beneficial – moving from self-management to collaborative self-management. As described in the findings, several participants attempted to address a mood or issue themselves (e.g., through journaling) and then would reach out to others if they needed additional support. When participants determined that reaching out would be helpful, they first identified their current need and then directly asked a person or group in their network for the support they desired. Similar to cancer patients [51,52], our participants maintained close control over how to best address their needs. For instance, there were times when others initiated an interaction, for instance, when P16’s mother checked-in about his TV-watching habits. However, participants described that it was up to them to decide to respond to other’s concerns and if they did respond, what shape that response would take (i.e., a quick text or longer conversation).

Secondly, the characteristic of reciprocity highlights the role that many participants took on also as providers of support. While individuals managing depression are often positioned as the recipients of care [4,18], we found that our participants also actively supported other people managing mental health needs. However, for some, supporting others could be emotionally taxing and required participants to actively draw boundaries to ensure that providing this support did not negatively affect their mental health. This resonates with Andalibi et al.’s [3,4] findings regarding reciprocity and decisions to offer support in social media contexts. Specifically, the authors present a decision-making framework whereby people choose to respond to an online disclosure through a public comment, private communication, or choose not to respond. Our findings align with their “well-being concerns” consideration within the self-related category. Other categories in their model include context-related and poster-related considerations. Our participants described the shared experience with what they called the “irrationality” of depression. For instance, this shared

experience allowed participants to support others (and receive support in return) through humor (e.g., sharing darkly humorous memes with friends). Being able to laugh at the experience of having a difficult condition enabled much-needed spontaneous relief. Furthermore, having to deal with depressive episodes over time meant that individuals often developed a set of strategies that worked for them, which they could then suggest to others in need. O’Leary et al. have also found that peer conversations can be particularly helpful for individuals managing mental health needs [85,86]. Our findings underscore the reciprocal nature of collaborative self-management, pushing back against the framing of these individuals as simply the recipients of support. While supporting others’ mental health can certainly be taxing, it can also be fulfilling, enabling individuals to feel competent and an important part of their networks and communities.

Third, the temporal characteristic highlights the role that time plays in these activities. One instance of collaborative self-management can be instantaneous, can happen over the course of a day, or can unfold over multiple days or weeks. For example, in our findings, we reported several instances of participants calling or texting a friend and receiving a response that same day. However, we also presented an example where P04 worked with his brother to address an issue over the course of two weeks. Similarly, some support interactions occurred right after a major shock and others developed or become apparent during regularly scheduled support or catch-up time (e.g., P11 noticing her mom’s distress during their weekly catch-up call). Quick issue-support timelines are common, yet also, for larger, ongoing issues, participants described the importance of time to think and to plan an interaction. This reflection work was important to address internally experienced moods and emotions (e.g., by applying new ways to view a situation) and to determine specific actions to move forward with ongoing issues (e.g., addressing a work-related issue that triggered the mood). So, for a longer-lasting mood or issue, there might be multiple interactions. Therefore, the temporal bounding of collaborative self-management between when an issue first occurs, when collaboration with others occurs, and when the individual managing depression feels that an issue is resolved (or decides to stop trying to collaborate) can vary by a magnitude of hours or weeks depending on the issue and available support.

Finally, collaborative self-management can manifest itself through different forms of interaction. For example, we distinguish in our findings between mood-focused support practices and preventative support practices. In essence, some practices are directly tied to a current negative mood, and some are broader proactive practices. We found that participants also benefited from being around others in shopping malls or movie theaters even if they did not directly engage with them. This indirect interaction falls within Burgess et al.’s [35] concept of “diffuse sociality” – being proximate to others but not interacting directly as a part of self-managing one’s depression. A similar concept of community “belongingness” [71] described in the social support literature also helps us understand that there are mental health benefits to feeling like part of a community. Our work continues to underscore that this community feeling can be experienced beyond direct face-to-face interaction. Engaging with others in a community is one structural aspect of social support that produces a sense of bond or social identity without requiring deep personal interactions. Relatedly, we also distinguish between social interactions which are verbal and others that are non-verbal/action-based. Many of the examples described in the Findings, particularly the mood-focused support practices, involved conversation or discussion, often about the mood or issue. Technology-mediated interactions (through text, voice, video, and pictures) facilitated much of the work of collaborative self-management, and text was the primary technology used for this purpose. However, shared activities that involved nonverbal support usually occurred in-person so many of the current technologies (texting, phones) were not

as helpful in facilitating non-verbal collaborative self-management. Technologies that support shared presence, for instance the always-on webcam [80], or virtual or mixed reality experiences [69], might be able to better support nonverbal shared experiences.

5.2 Process of Collaborative Self-Management

While several recent HCI and CSCW studies have shown the importance of social network support for individuals managing depression (e.g., [6,35,38,40,54]), the *process* by which individuals determine the need for and carry out these interactions is less clear, particularly in environments beyond online communities [106] and social media [2,3,40]. To better understand the flow of practices in our Findings, from the perspective of the individual managing depression, we identified 4 key components of the process of collaborative self-management (see Figure 2.). Understanding this process enables us to identify where breakdowns might occur and to understand the specific types of support that might be useful depending on the immediate process goal (e.g., *Who should I reach out to?* vs. *How can I act on what I learned?*). This process highlights the importance of the pre- and post-interaction work of the individual managing depression to facilitate and benefit from collaborative interactions. This process presents a single instance of collaborative self-management. While we describe the process in a linear chronological manner, in practice, the ways that collaboration occurs can be messier and can repeat and circle back to earlier steps, which we note with circular arrows.

We first describe the process using examples from mood-focused support activities, and then we describe the process, often playing out over longer time periods, for preventative support. At the beginning of the process, individuals will sometimes experience a trigger leading to a negative mood or emotional issue. Trigger examples in our data included stressful situations at work or at school, feelings about and impacts of the pandemic, losing valuable items, getting laid off, people moving away, and interpersonal issues (e.g., with family members and significant others). However, not all negative moods have an identifiable trigger. For example, several participants described times when negative moods arose without warning.



Fig. 2. Collaborative Self-Management Process

The first part of the collaborative self-management process is *awareness* of mood. Participants described times when they could feel an oncoming “negative spiral” of emotions, felt paralyzed by a seemingly endless number of tasks, or had a negative experience. Often, others noted affect changes via body language, facial expression, and voice pitch when participants showed signs of a negative mood. For instance, as described in the Findings, P01 became aware that her roommate was having a very rough day. Crucially, awareness is pre-cognitive – people have not yet made a decision about how to act regarding combating or soothing the mood.

Then, *planning* occurred to determine what supportive interaction would take place. Planning could occur both deliberately, through a conscious, thoughtful process, or more automatically, building on processes that the individual used more habitually. Some individuals tried to work on a mood individually (e.g., through journaling) and then if that was not successful, would reach out to others. From the participant’s perspective, this planning stage often

encompassed reaching out to others to see if they were free to talk or do an activity together. Planning was often technology-mediated, usually via text. For example, as described in the Findings, P08 was in the planning stage when he was deciding whether to contact his friend via Facebook Messenger or text. However, sometimes planning was unnecessary if someone else noticed their mood and offered support. In this case, they seamlessly moved to the next stage of the process: the interaction.

Individuals carried out supportive *interaction* through a variety of practices. Many practices could occur within a single phone call where individuals might, for instance, check-in, vent, share advice, and share emotional support all within a 20-minute call. These interactions could occur in-person or be mediated by technology (e.g., text, phone, video, pictures). During the interactions, participants often articulated how they were feeling to others. This could be challenging, because in contrast to other health-related information, for instance, data that can be captured by sensors (e.g., blood pressure, insulin level), sharing one's mood is an internal experience that can be hard to communicate. Adding to this complexity, identifying and communicating mood and emotional state can be particularly challenging for individuals managing depression [21]. Our participants spoke about this difficulty, and several were actively building skills in this area. For example, P20 was working on identifying her mood and articulating it to others because she did not learn how to properly do so while growing up. Similarly, when asked by supportive others, not all participants could articulate their current mood or what caused it. Therefore, interactions also required managing the disclosure of feelings and the anticipated or perceived reactions of others.

Finally, after the interaction occurred, participants *reflected* on the support, considering what the interaction meant for their mood, and what their future action(s) would be. For instance, when P15 talked with her husband about an issue with a frustrating client, talking through the issue with him enabled her to feel empowered in her own ability to tackle the problem, but she still needed to identify further actions to solve the work issue. Participants who offered reciprocal support often looked to the other person to say whether the interaction was helpful. As described in the Findings, between conversations with his brother, P08 reflected about what the interactions meant for his mood and his next steps in tackling his issue at work. At this stage, participants decided what their next steps would be, including reaching out to other people, reaching out to the same person again, or taking action in different ways on the mood or issue at hand.

Similarly, this 4-step process also helps us understand how individuals seek preventative support. For preventative support interactions, individuals described how they gained *awareness* over time of behavioral patterns such as a tendency to self-isolate [10], and realized they needed to shift their behaviors to counteract those inclinations. Instead of awareness of mood (the emotional trigger) as discussed earlier in the section, awareness for prevention is somewhat different, as there is not necessarily a strong emotional trigger. Therefore, individuals may pay attention to small shifts in mood or patterns that they know are potential indicators of risk, such as increasing social isolation or the impulse to socially isolate. Awareness and planning are often tightly coupled, where individuals remember past actions and see patterns. To structure preventative activities, *planning* could include signing up for a class or volunteer activity, setting up a group text with friends, or considering the need to state one's boundaries. Then individuals carried out a diversity of *interactions* (e.g., sending funny memes, participating in group activities, setting boundaries). The main distinction here between preventative and mood-focused activities is that the "loops" of the collaborative self-management stages are often longer for preventative activities. For instance, there might be multiple interaction instances (e.g., volunteering over the course of several weeks) before reaching the *reflection* stage, where an individual might consider, in this

example, whether the volunteer work is helping them reach their goals of managing depression or of preventing a worsening of their depression.

In the next section, we discuss the ways technology ecosystems mediated this work.

5.3 Technology Ecosystems and Polymedia

Using the concept of collaborative self-management, we can start to see how technology-mediated communication practices stretch across individuals’ social networks and interplay with a diversity of technology channels as individuals seek support to manage their depression. Previous work showed how individuals managing depression used social media platforms [5,31,44], online communities [48,68,106], and individual-focused technologies [54,64] (e.g., music, calendars, meditation apps) as part of their day-to-day routines. In this paper, we found that the communication technologies used by many individuals worldwide – text/SMS, video, voice, and picture applications – play a major role in the collaborative self-management work of individuals managing depression. In order to understand how these ecosystems of technologies [32] are used in concert with each other, we draw on Miller and Sinanan’s [80] concept of “polymedia” – understanding each channel in the context of all the others. The authors describe how dynamism exists not only in a diversity of communication channels but also “*in respect to their changing relationship to each other.*” For example, study participants often used text to determine the availability of the other person and to prepare implicated individuals for a channel shift to a more intensive phone call, video call, or in-person supportive connection. This is similar to observations by Isaacs et al. [50] of channel-blending behaviors to create coherent conversations across multiple media. The concept of polymedia allows us to attend to why individuals use a variety of channels for collaborative self-management. To select between multiple communication channels (technology-mediated or in-person), in addition to the channel-specific factors described in the findings, participants used the channel most preferred by the person they wanted to reach or used a channel that best fit their cognitive needs in the moment.

Individuals selected certain channels because they knew that the person they were attempting to reach would respond to a message in that channel more quickly. For example, as described in the Findings, P08 considered between sending a message over Internet-supported Facebook Messenger or cell-service supported SMS based on which one his friend would likely see first. He considered her likely location and her limited smartphone plan. Overall, when a participant initiated communication, they were more likely to adapt to the other person’s preferences than to ask the other person to cater to their preferences. However, individuals managing depression are not entirely beholden to the technology preferences of the people they turn to for support. Communication channel selection could also be the result of consensus among the support network. For example, P09 used Facebook Messenger with her support network because everyone already had it and knew how to use it. Even though individual people (e.g., P09’s mom) might prefer other channels, Facebook Messenger was a compromise that enabled the group to communicate.

People also adapt their communication strategies to account for the cognitive symptoms of depression, such as concentration and memory difficulties. In previous literature in the romantic couples context, Scissors et al. [96] found that individuals channel-switched to avoid conflict escalation, manage one’s emotions, and attempt to reach a resolution. In our study, *cognitive state* was another contextual consideration influencing media choice. Especially when in distress, many participants used text-sharing technologies to craft their message. For example, one participant revised an SMS message several times when she wanted her work mentor to know she was

struggling and needed support but did not want her to call the suicide prevention hotline. Texting also allows individuals to send a single message versus the effort required to carry on a conversation via phone call. This may be related to concentration [14] and decision-making [89] challenges especially while in distress. Individuals managing depression can adapt their need to communicate in the moment by selecting a channel to best help them feel comfortable and receive useful support.

However, technologies can also exacerbate cognitive issues (known to be a challenge for individuals managing depression [10]). For example, as described in the Findings, P03 and her co-workers used Snapchat via Wi-Fi to communicate instead of SMS texts because of the poor cell service coverage in her rural area. However, P03 would often experience what she called “brain fog,” an issue with short-term memory. Her past messages disappeared (as per usual for the ephemeral messaging platform) and then she would receive her co-worker’s response with no recollection of what she had just asked them. The impacts of depression on memory and cognitive state in high-distress and often complex situations is important for researchers and designers of mental health support technologies to understand. Eschler et al. [54] noted that participants used note-taking applications on their phones to keep track of important items they needed to remember. Therefore, two ways that individuals managing depression adapt to cognitive challenges while carrying out collaborative self-management is by spending more time editing and crafting messages and ensuring that they have a record of past messages to refer back to over time.

5.3.1 Design Implications for Supporting Collaborative Self-Management. Understanding the multi-channel context of collaborative self-management prompts questions for future design: *How can we better support individuals within their current ecosystems? What technologies or tools could be incorporated within these current working configurations?* Specifically, we would like to consider solutions that enhance individuals’ current toolsets instead of entirely reimagining their current processes. One question to explore is whether the uses of current technology tools and services appropriately support user’s mental health. When individuals appropriate these general tools for collaborative self-management, are there any harms or challenges that occur that would be absent from a specifically-designed and guided mental health tool? And secondly, what do these appropriations tell us about general features that can support mental health? Given the ways that individuals conduct collaborative support work within communication channels (e.g., SMS, picture-sharing apps), it is likely that as future communication platforms for general use (e.g., not specific to mental health) are developed, individuals managing depression will use them for collaborative self-management purposes.

We see several opportunities to create complementary technologies as “connective tissue” within individuals’ ecosystems to facilitate and augment current practices. First, some participants had trouble remembering the preferred communication channel of the person they wanted to reach for support. Therefore, a tool to suggest the best communication channel(s) to reach out to key contacts could be beneficial. Kornfield et al. [64] describe that it is useful to accomplish this kind of “setup” work when an individual is feeling well so that the tool is ready when a depressive episode occurs and an individual has lower cognitive and energy bandwidth to make decisions. Second, supporting reflection after collaborative interactions could be useful because of the important role that reflection plays in an individual’s collaborative self-management process. Participants described reflecting about their next steps to resolve the situation or issue that triggered their mood and whether they needed to talk to other people to receive further support.

Epstein et al. [39] also noted the importance of reflection as a key step within their lived informatics model. A possible support tool could assist people managing depression to note and refer back to ongoing issues, advice, and next steps which might be otherwise hard to remember. Technology supporting reflection processes could be integrated with self-tracking tools (e.g., [56,60,63,67,76]) to provide individuals with more insight over time about their mood and self-management activities, addressing both the temporal and the conceptual cycles identified in the technology-mediated reflection model [11].

Third, prior to but with increasing speed during the COVID-19 pandemic, individuals are becoming more fluid in moving between different communication channels and platforms (e.g., a variety of video applications, texting apps, phone calling apps). We note the critical importance of the ability for individuals managing depression to move between different intensities of interaction and modes of communication to adapt to changing goals and contexts. Given frequent challenges with memory, tools that can aggregate and help individuals to keep track of conversations across multiple platforms are likely to be very helpful. However, any aggregation tool would need to support user privacy. Several participants were concerned about whether social media sites were collecting data on them or “listening in” to what they were saying through collecting user metadata. For instance, Facebook’s data policy [110] (as of February, 2021) notes that they collect user information about content, networks and connections, usage, user devices, and information other users provide about the user. Ellison et al. [37] describe a common process where people negotiate privacy concerns and social capital needs in social media environments. Overall, given the stigma [2,29] that individuals managing depression may experience, it is especially important for this population to easily understand the privacy and data policy implications of messaging platforms used to share sensitive information during collaborative self-management.

5.4 Limitations and Future Work

Our work presents rich details about the collaborative self-management work of individuals managing depression. However, there are a few limitations to our current investigation and areas for future work. First, we present the perspectives of people living in the United States experiencing the U.S. healthcare system. While some participants described experiences living in and having family in international locations, our findings do not necessarily relate to the experiences of individuals facing different cultural and healthcare system stressors [68,106]. However, one benefit of our remote interviewing procedure is that we were able to analyze across both urban and rural perspectives in the U.S. We also sought racial diversity in our sample (see Methods section for our process) but were only able to recruit 25% of our participants from minority populations. In future studies, we will continue to partner with organizations to reach more racially diverse individuals managing mental health needs. Next, our participants largely fit within the “moderate” and “moderately severe” depression categories based on their PHQ-8 scores. We had one participant score in the severe depression range, but beyond that participant, our work is unlikely to speak to the experiences of individuals suffering from severe depression, which would be an intriguing population for future work.

Regarding our recruiting and study practices, digital recruiting may have left out people who we could have reached through in-person flyers (which was our plan prior to COVID-19) who did not have access to the digital channels. Additionally, while not a limitation in the traditional sense, we realized that managing depression can affect people’s ability to quickly recall memories. All participants were able to discuss how they interacted with others for support, however, the

practice of asking retrospective questions can be potentially challenging for some members of this population. Part of the issue for a few participants was that the pandemic had disrupted and lessened their day-to-day social interactions. Finally, we decided to interview exclusively individuals managing depression for this study because we wanted to understand the breadth of their support networks. We also wanted participants to feel comfortable describing any collaboration challenges they experienced. We recognize that collaborative self-management might look different for supportive others in the social network. Future work investigating the perspectives of collaborators who support individuals managing depression would build upon the findings discussed here and continue to deepen our understanding of collaborative self-management.

6 CONCLUSION

It is of crucial importance to understand and better support self-management practices in mental health. To do so, we must view self-management as not solely an individual activity but also a collaborative one [61] which encompasses evolving activities influenced by one's goals, technology channels and social network. In this paper, we discuss collaborative self-management in the depression support context. Collaborative self-management draws our attention to the goals that individuals managing depression hope to achieve through working with others as well as the details of daily collaborative practices. Furthermore, while not explicitly focused on design, we hope this paper opens a dialogue regarding future solutions that account for how this work is mediated across the diversity of tools and services in individuals' technology ecosystems. Finally, we must consider the critical role that collaboration with individuals' social networks of family, friends, peers, co-workers, and even encounters with strangers in one's community plays in individual's self-management practices. We present this rich contextual understanding to guide development of future digital mental health tools, educational resources, and services to support and augment current practices enabling collaborative self-management of depression.

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