UNIVERSITY OF CALIFORNIA,
IRVINE

Evaluation of a Pilot Implementation of a Digital Cognitive Behavioral Therapy Platform for Isolated Older Adults in County Mental Health Services

THESIS

submitted in partial satisfaction of the requirements
for the degree of

MASTER OF ARTS

in Psychological Science

by

Rosa Hernandez-Ramos

Thesis Committee:
Associate Professor Stephen M. Schueller, Chair
Professor Jessica Borelli
Associate Professor Kristine M. Molina

2024

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGEMENTS

This work was funded by Help@Hand (agreement number 417-ITS-UCI-2019), a project overseen by the California Mental Health Service Authority (CalMHSA). CalMHSA reviewed the manuscript for confidentiality. The information or content and conclusions presented here are those of the authors and should not be construed as the official position or policy of, nor should any endorsements be inferred by, the participating Help@Hand Counties and/or CalMHSA.

I would like to thank my advisor and committee chair, Dr. Stephen M. Schueller for being an amazing mentor. I'm forever grateful for your expertise, guidance, and kindness. I would also like to thank my committee members, Drs. Jessica Borelli, and Kristine M. Molina for their encouraging feedback on this manuscript. Finally, I would like to thank all the participants in this study. Without you this work would not have been possible.

Beyond everything, I would like to express my sincerest gratitude to my friends and family for their unconditional support.

ABSTRACT OF THE THESIS

Evaluation of a Pilot Implementation of a Digital Cognitive Behavioral Therapy Platform for Isolated Older Adults in County Mental Health Services

by

Rosa Hernandez-Ramos

Master of Arts in Psychological Science

University of California, Irvine, 2024

Associate Professor Stephen M. Schueller, Chair

The mental health workforce is insufficient to meet the current needs of service utilization, particularly with regards to geographic distribution and ethnoracial diversity. Technology-enabled services (TESs) have the potential to increase access by overcoming barriers related to clinician availability and geography. However, little research has focused on how TESs can be integrated into publicly funded service settings. As part of the state-wide Help@Hand project, Marin County conducted a single-site six-month pilot implementation of myStrength, a digital cognitive-behavioral therapy platform, to explore its potential to reduce loneliness amongst isolated older adults. We evaluated the pilot impact using the Reach, Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) framework. English and Spanish-speaking isolated older adults ($N = 30$) received a digital literacy course followed by eight weeks of myStrength access and human support from a nurse intern, promotore, or in-house county staff ($N = 20$). We evaluated factors related to reach, effectiveness, adoption, and

implementation using self-report measures of platform users and pilot staff. Descriptive statistics were used to examine reach, adoption, and implementation. Nonparametric tests, including Friedman and Wilcoxon Signed-Rank were used to examine pilot effectiveness. Results are as follows. *Reach:* Compared to overall county demographics, platform users were majority female (93.1% v. 50.5%), ethnoracialized (62.1% v. 24.2%) and of lower socioeconomic status (*Md* = $35,000 v. $131,008). *Effectiveness:* Users experienced a significant decrease in loneliness ($z = -2.62$, $p < .001$). *Adoption:* Users logged into myStrength an average of 10 times ($SD = 11.7$) and completed 33 activities ($SD = 53.5$) during the eight weeks of myStrength use. *Implementation:* Each pilot staff member spent an average of 19.8 hours ($SD = 16.51$), over the course of the six-month pilot, supporting several aspects of myStrength use, including accessing technology, onboarding, and gaining digital literacy skills. Furthermore, in presenting, discussing, and delivering myStrength, pilot staff made several adaptations to meet the needs of platform users. Our results revealed several challenges and opportunities. Successes included reaching the target population, reducing loneliness, and gaining adoption by platform users. However, pilot staff had to invest significant time in various activities to support those with lower digital literacy skills. Thus, although TESs hold the potential to address access needs, their use with underserved populations, may require upfront and ongoing support provided by the settings where they are implemented.

INTRODUCTION

As of 2023, it is estimated that approximately 50% of all United States (U.S.) adults "often or always feel lonely, feel that they lack companionship, feel left out, or feel isolated from others" (U.S. Department of Health and Human Services, 2023). When segmented by age, these data reveal that older adults are at significantly higher risk for loneliness and social isolation. Prior to the COVID-19 pandemic about 24% (7.7 million) of community-dwelling older adults in the U.S. were typified as socially isolated, and 43% reported feeling lonely (Cudjoe et al., 2020; National Academies of Sciences, Engineering, and Medicine, 2020). Preliminary findings on the effects of COVID-19 on daily life have shown that physical distancing severely limited the ability of older adults to maintain social connections, worsening the prevalence of social isolation and loneliness amongst this population (Holt-Lunstad, 2021; Sepúlveda-Loyola et al., 2020). This is particularly alarming given that decades of research have shown that social isolation and loneliness are significantly associated with an increased risk of premature death, more severe symptoms of depression and anxiety, and the onset of dementia (National Academies of Sciences, Engineering, and Medicine, 2020; Santini et al., 2020; Smith et al., 2020).

Although considerable research has underscored the effectiveness of cognitive behavioral therapy (CBT) in treating a variety of mental health concerns, including loneliness (Hickin et al., 2021; Masi et al., 2011), treatment gaps persist. Of older adults with mental health concerns, more than half do not receive necessary or evidence-based mental health services (SAMHSA, 2020). Further, the literature shows that even those who do receive mental health services often receive these services months after the onset of symptoms (Garg et al., 2011). Persistent systemic inequities contribute to disparities in equitable access to mental health services for minoritized

populations. First, there is an insufficient workforce to meet the demand for mental health services. Over 80% of the counties in the U.S. are designated as health professional shortage areas based on the need for mental health care, and a ratio of residents to mental health providers (Ku et al., 2021). This also demonstrates that the mental health workforce is not uniformly distributed across the U.S., which is concerning given that demand is more severe in rural areas (James et al., 2017). Second, the existing workforce is not representative of the populations in need, especially for racial and ethnic, as well as sexual and gender minorities. As an example, in California, Latines represent 38% of the state's population, yet only account for 4% of its psychiatrists and 8% of its psychologists (Coffman et al., 2018). Lastly, even when services are available several logistical barriers, such as cost, disproportionately prevent or delay individuals with minoritized identities, including older adults, from accessing mental health services (Cook et al., 2017; Fonagy & Luyten, 2021).

Acknowledging that traditional one-on-one psychotherapy delivered by mental health professionals will never meet the current and projected demands for mental health services, Kazdin and Blasé (2011) called for an expansion of the portfolio of mental health services. One expansion proposed by Kazdin and Blasé (2011) are technology-enabled services (TESs). TESs, i.e., digital translations of psychological interventions paired with human support, hold the potential to expand the availability of mental health services by transcending space, time, culture, and language (Schueller et al., 2013). Further, TESs may provide cost-effective solutions to spread evidence-based interventions, including CBT, as far as possible given that they minimize the need for specialty mental health providers. Several reviews and an individual meta-analysis have concluded that the evidence demonstrates that digital CBT (dCBT; i.e., digital translations of CBT) is efficacious and effective (Dworschak et al., 2022; Hedman et al., 2011; Karyotaki et

al., 2021; Kumar et al., 2017; Linardon et al., 2019). The effectiveness of TESs, including dCBT, have led to the recommendation that it should be offered as a frontline treatment in the U.S. for common mental health concerns (Mohr et al., 2021).

TESs are already being widely deployed around the world to address a variety of mental health concerns. These include the MindSpot Clinic in Australia (Titov et al., 2020) and as part of the Improving Access to Psychological Therapies (IAPT) Program in the United Kingdom (Bennion et al., 2017; Duffy et al., 2020). Smaller deployments have also begun in the United States, including in health systems such as Kaiser Permanente (Mordecai et al., 2021), in cities and counties such as Reno, Nevada (Raue et al., 2022) and across California (Montgomery et al., 2021). Kaiser Permanente's Project Chamai created an ecosystem of multiple technology products, including dCBT and mindfulness apps, to provide to their members (Mordecai et al., 2021). In Project Chamai, materials were also developed to train providers about how to integrate these products into their workflow which includes information about the products and how they might supplement the care they provide. Reno piloted a deployment of Talkspace, a large virtual care platform that provides psychotherapy services via phone, video, and text messaging to Reno residents in need of care. All these examples demonstrate both the interest in integrating TESs into care delivery systems and the diversity of approaches to do so.

Despite the considerable evidence suggesting the effectiveness of TESs for mental health concerns, less research has focused on how TESs can be integrated into publicly funded mental health service settings. Such integration requires considering various implementation aspects such as characteristics of the intervention, people involved, settings, and implementation processes that might impact success and sustainment (Schueller & Torous, 2020). Some recent work has started to explore aspects of implementation into different care settings such as

community mental health and primary care clinics to understand how infrastructure and workflow in these settings, as well as those required by TESs, might support or impede implementation (Graham et al., 2020; Lattie et al., 2020). These explorations have demonstrated considerable interest and enthusiasm among providers for using TESs. However, practical concerns such as device availability, regulatory challenges, and referral pathways have all presented barriers. Pilot implementations may help uncover some of these challenges early on, especially those unique to specific settings or target population characteristics, and provide the opportunity to design aspects of subsequent deployments accordingly. Pilot implementations involve having a small group of users test out an evidence-based intervention in real-world settings and assessing the resources needed to deploy and sustain it long-term. Evaluations of pilot implementations can help local leaders of any given organization decide whether to scale up the tested evidence-based intervention; as well as determine the necessary supports and/or conditions for this scale-up.

A commonly used framework for the evaluation of the implementation of evidence-based interventions in real-world setting is the Reach, Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) framework. RE-AIM assesses the impact of an evidence-based intervention through the five dimensions that encompass the acronym (Glasgow et al., 1999; Glasgow & Estabrooks, 2018). Reach considers the representativeness of participants involved in the intervention relative to the characteristics of the target population. Effectiveness is assessed by measuring the impact of the intervention on clinical outcomes. Adoption can be measured at an individual and setting-level. Individual-level adoption is the users' use of the intervention, while setting-level adoption is the number and characteristics of settings and/or staff willing to initiate the intervention. Implementation refers to the strategies, adaptations, and related costs

needed for the target setting to apply the intervention as intended. Maintenance can be measured at an individual and setting-level. Individual-level maintenance is the sustained clinical effectiveness of the intervention. Setting-level maintenance is the extent by which the innovation becomes part of the organization's routine practice. From an evaluative perspective, the model redefines intervention impact by encouraging researchers to look beyond internal validity as a marker for success and consider the role of external validity factors (Tabak et al., 2012). The model accomplishes this by providing a structure to assess organizational factors (i.e., adoption and implementation), participant representativeness (i.e., reach) and continued use of the intervention following trial termination (i.e., maintenance) in the evaluation of the intervention (Glasgow & Estabrooks, 2018). The RE-AIM model has been widely used to evaluate the implementation of TESs in both clinical and community settings (Kwan et al., 2019; King et al., 2010; Ramos et al., 2023). Taken together, the RE-AIM model appears to be a good framework to evaluate the impact of the pilot implementation of technology-enabled mental health services as it may help uncover key issues prior to the institutionalization of the service.

Evaluating the Pilot Implementation of myStrength

To address gaps in access to evidenced-based mental health services Help@Hand, a large-scale roll-out of TESs across various counties in California, is seeking to leverage technology to support the mental health of diverse and underserved populations. These efforts have resulted in different deployments. One such deployment is the pilot implementation of myStrength, an internet-based self-help dCBT platform, at Marin County. myStrength was developed to offer users with timely, personalized, and evidence-based mental health support. Initial research on the impact and user experience of myStrength found that not only did the platform improve life functioning, but participants also enjoyed and appreciated the multi-

dimensional nature of the platform (Hirsch et al., 2011). Since then, myStrength has been involved in multiple trials including randomized controlled and pragmatic trials, which have collectively shown the effectiveness of myStrength in reducing symptom burden amongst individuals experiencing depression, anxiety, insomnia, stress, substance use, and chronic pain compared to treatment as usual (Hirsch et al., 2017; Schladweiler et al., 2017). Although myStrength has demonstrated effectiveness in addressing a wide range of mental health concerns, research evaluating how it can be integrated into publicly funded service settings, including county behavioral health, is lacking.

Advancing effective implementation of TESs requires understanding the roles of these within mental health service delivery, and the challenges and opportunities that arise in doing so. As such, the current paper aims to address these gaps in the literature by reporting on lessons learned from evaluating the Marin County's pilot implementation of myStrength with a sample of isolated older adults. Our research team organized the findings using the RE-AIM framework (Glasgow & Estabrooks, 2018) to better understand the opportunities and challenges of employing a TES in a county service setting.

METHODS

Design

The data reported herein draw from the California Mental Health Services Authority's (CalMHSA) "Help@Hand" statewide technology innovation project. As part of Help@Hand a single-site pilot implementation of myStrength (described further below) was conducted by Marin County Behavioral Health and Recovery Services with an embedded evaluation process conducted by our research team. The University of California, Irvine, Institutional Review Board approved the evaluation activities (review number: 20195406). As noted above, various aspects

of the pilot implementation were used as indicators of each of the RE-AIM dimensions, outlined in the Measures section below.

Participants

Platform Users

The target population for this pilot implementation were English and Spanish-speaking underserved (e.g., lower socioeconomic status, ethnoracially minoritized) isolated older adults residing in Marin County. To recruit this target population, Marin County enlisted the help of existing community partnerships, including the Marin County Division of Aging Telehealth Equity Project, the West Marin Senior Services, and an established network of promotores (i.e., lay health workers that specifically serve Spanish-speaking communities).

Recruited individuals were considered eligible to enroll in this pilot implementation as platform users if they were aged 60 years or older, were socially isolated[1], and were able to speak, read, and/or write in either English or Spanish. Individuals with any mental or physical challenges that could limit their ability to engage with myStrength, such as hearing or cognitive deficits, were deemed ineligible. Half of the platform users (n = 15) were English-speakers while the other half (n = 15) were Spanish-speakers (N = 30).

Pilot Staff

Several pilot-specific trained staff (N = 20), including nurse interns, promotores, and county leadership, were involved in the implementation of myStrength. Nurse interns (n = 13) were recruited from two local universities. Promotores (n = 4) were recruited from an established

[1] Interested individuals were identified as socially isolated based on staff discretion.

network of county volunteers. Marin County Behavioral Health and Recovery Services also enlisted the help of in-house staff (n = 3) to aid in these endeavors.

Procedure

Overview of Timeline

The pilot ran from January 2021 through April 2021, with data collection continuing through June 2021. Due to COVID-19, most pilot activities occurred remotely via Zoom or a phone call. The pilot implementation occurred in four phases. During Phase 1 (January to February), Marin County Behavioral Health and Recovery Services onboarded pilot staff and ensured that platform users without access to Wi-Fi and/or an internet connected device were provided with these necessities. Furthermore, pilot staff visited each platform user to ensure that platform users were able to access Zoom. During Phase 2 (February to March), platform users and pilot staff were invited to attend an optional virtual four-class digital literacy training course. During Phase 3 (March to April), platform users were given free access to the myStrength platform for a total of eight-weeks. During Phase 4 (May to June), platform users and pilot staff completed assessments on their experiences with the pilot. Figure 1 shows a detailed timeline.

Digital Literacy Training Course

As part of the pilot and in preparation for the myStrength use period, Marin County Behavioral Health and Recovery Services hosted a four-class digital literacy training course to ensure platform users had the technical readiness needed to use the myStrength platform. The training was developed in collaboration with Technology4Life—an organization whose mission is to teach adults of all ages how to use technology. Classes were voluntary and covered the following topics: computer basics, internet basics, email basics, and an introduction to myStrength.

myStrength Platform

Older adults in Marin County meeting eligibility criteria were provided with login credentials to myStrength for a total of eight weeks. myStrength is an internet-based platform that provides users with evidence-informed resources, including psychoeducational material based on CBT principles, mood tracking elements, and community forums. The platform is meant to function as a stand-alone tool to self-manage issues related to depression, anxiety, stress, substance use disorder, chronic pain, and sleep (myStrength, 2024). At the time of this pilot rollout, the platform's content (i.e., the resources) but not the platform layout (i.e., headings) had been fully translated to Spanish.

Human Support

To facilitate engagement with the myStrength platform, Marin County offered all platform users with access to human support. This support began at the start of the pilot (Phase 1), with pilot staff providing assistance with getting platform users set up with the infrastructure needed to use the myStrength platform (i.e., Wi-Fi and digital technologies). During the eight-week myStrength use period, pilot staff conducted weekly phone calls with platform users. The purpose of these calls was twofold. First, they allowed pilot staff to address any technical issues. Second, they provided pilot staff with the opportunity to encourage use of the platform.

Measures

As part of the pilot, platform users and pilot staff completed several measures. In particular, platform users completed three surveys. Platform users who participated in the four-class digital literacy training course (n = 28) were asked to complete measures pre- and post the course. These measures were collected as part of Survey 1 and Survey 2, respectively. The aim of these measures were to understand platform users' experience with the digital literacy

training course and to learn about the digital literacy skills they gained. All platform users (N = 30) were asked to complete measures pre- and post- their use of myStrength. These measures were collected as part of Survey 2 and Survey 3, respectively. The aim of these measures were to understand the impact of myStrength on loneliness. Pilot staff were also invited to take part in one survey at the end of the pilot. The main aim of this survey was to understand the staff's experience with the pilot implementation of myStrength. Socio-demographic variables were collected at the first completed survey time point for both platform users and pilot staff. All surveys were completed online or via a phone call, depending on respondent's preference. Platform users received a $10 gift card for each survey that they completed. Promotores received a $15 gift card for completing the survey at the culmination of the pilot. Due to organizational policy, Marin County in-house staff and nurse interns were unable to receive incentives.

Reach

To determine reach, the demographics of platform users were compared to the demographics of older adults (>65 years) in Marin County, using aggregated data from the U.S. Census Bureau and the California Department of Aging (California Department of Aging, 2020; U.S. Census Bureau, 2022).

Effectiveness

Effectiveness of the digital literacy training course was determined by change in platform users' digital literacy, i.e., "the ability to use emerging information and communication technologies to locate, evaluate, use, and create information" (Law et al., 2018). Digital literacy was measured using a 10-item scale developed by Technology4Life. Notably, no gold-standard measure of digital literacy exists; however, most scholars agree that digital literacy encompasses competence in four key areas: operational, navigational, communication, and content creation

skills (van Deursen et al., 2014). Within the context of TESs, operational skills can be understood as knowing how to use the device (e.g., the ability to navigate the computer mouse). Navigational skills involve knowing where to access information on the internet in a safe manner (e.g., the ability to navigate the App Store to download applications of interest without compromising the device). Communication skills refer to knowing how to communicate in virtual environments (e.g., the ability to exchange information with another person by sending a text message or commenting on someone's post). Content creation skills encompass knowing how to create and share content in virtual environments (e.g., the ability to upload a picture to a social media account). The scale developed by Technology4Life asked platform users to rate their perceived self-efficacy on 10 digital literacy skills, related to the aforementioned constructs, using a 5-point Likert-scale, ranging from 1 ("not at all confident") to 5 ("very confident"). For instance, "Please rate your confidence in participating in a discussion online." For our analysis, we summed the scores for the 10-items. The total score ranged from 10 to 50, with higher scores indicating higher levels of digital literacy. The scale was administered pre- (i.e., as part of Survey 1) and post- (i.e., as part of Survey 2) the four-class digital literacy training course. In our pilot implementation, the in-sample Cronbach alpha for this scale was $\alpha = 0.88$.

To determine the effectiveness of myStrength, we assessed change in platform users' loneliness using the UCLA 3-Item Loneliness Scale (Hughes et al., 2004). The scale was administered as part of user surveys 1, 2, and 3. The scale includes three statements measuring one of the three dimensions of loneliness: relational connectedness, social connectedness, and self-perceived isolation. It includes items such as "How often do you feel left out?". Each statement asks platform users to rate the question on a 3-point Likert-scale, ranging from 1 ("hardly ever") to 3 ("often"). The total score on this scale ranges from 3 to 9, with higher scores

indicating greater levels of loneliness. The scale has been shown to have good psychometric properties in both English-speaking and Spanish-speaking samples (Hughes et al., 2004; Trucharte et al., 2021). In our pilot implementation, the in-sample Cronbach alpha for this scale ranged from $\alpha = 0.66$ to 0.85, across the three surveys.

Individual-level Adoption

Given that user engagement is proposed as a key contributor to the effectiveness of digital mental health interventions (Yardley et al., 2016; Baumel, 2022), we assessed user engagement to determine individual-level adoption among platform users. Similar to other evaluations of the implementation of digital interventions (Gilbody et al., 2015; Hermes et al., 2019), our metrics included: 1) the average number of logins, 2) the frequency of visited programs, and 3) the average number of completed activities, over the eight-week myStrength use period. These data were collected within the myStrength platform and were provided by the vendor.

Setting-level Adoption

To determine the setting-level adoption of pilot staff, we summarized the demographic characteristics of pilot staff who provided support to platform users throughout the six-month pilot.

Implementation

To understand organizational aspects that emerged during the pilot implementation of myStrength, we assessed adaptations and related costs required to ensure platform users were able to use myStrength.

Adaptations were assessed using a three-item scale developed by our team specifically for this project. The scale was conceptually derived from the Framework for Reporting

Adaptations and Modifications-Expanded (FRAME) (Stirman et al. 2019). FRAME allows researchers to comprehensively catalog modifications, including the elements of the intervention that were modified, as well as when and how in the implementation process the modifications were made and by whom they were made. Because pilot staff were involved in the service delivery and operations of myStrength use, the scale was administered as part of the pilot staff's culmination survey. Pilot staff were asked to rate the extent to which they agree or disagree with three statements (see Figure 4) on a 5-point Likert-scale, ranging from 1 ("completely disagree") to 5 ("completely agree"). For instance, "I integrated supplemental content or strategies when I discussed myStrength with my clients". For our analysis, we summed the scores for the 3-items. The total score ranged from 3-15, with higher scores indicating higher amounts of modifications. In our pilot implementation, the in-sample Cronbach alpha for this scale was $\alpha = 0.68$.

Given that human support was a key component of this pilot implementation, related costs were measured by exploring the percentage of time myStrength-staff spent providing direct support to platform users throughout the six-month pilot, segmented by type of activity. Activities were divided into two main areas: preparatory activities (i.e., activities that occurred prior to platform users' use of myStrength) and service delivery and operation activities (i.e., activities that occurred during platform users' use of myStrength). This was done to uncover the extent of efforts needed to set up and maintain the use of myStrength with this population.

Data Analysis

Given the pilot nature of this implementation and the recruited sample size, data were primarily analyzed using descriptive and nonparametric statistics in SPSS Version 29. Missing data due to either attrition or nonresponse were handled using case-wise deletion for each

collected measure. Detailed analytical procedures for each RE-AIM dimension are described below.

Descriptive statistics, including measures of central tendency, frequency counts, and percentages, were calculated and reported for reach, adoption, and implementation. To evaluate the effectiveness of the myStrength platform, we used a Friedman test to assess within-subject changes in platform users' loneliness scores over time. This test was chosen because it is a nonparametric test analogous to the one-way repeated-measures analysis of variance. In case of a significant omnibus finding, i.e., a two-tailed $p < 0.05$, we planned to carry out post-hoc analyses with Wilcoxon Signed-Rank Tests for paired samples to test for pairwise comparisons (Pereira, 2015; Scheffe, 2016). To adjust our family-wise alpha level so it remains at our target of $\alpha = .05$, we used a Dunn-Bonferroni correction to partition the αFW across the three contrasts (αPC = .016). To evaluate the effectiveness of the four-class digital literacy training course we used the Wilcoxon Signed-Rank Test for paired samples to assess changes in digital literacy from pre- to post- the four-class digital literacy training course. Here, we considered a two-tailed $p<0.05$ to be statistically significant. We chose to use nonparametric tests, given our small sample size. Additionally, a Shapiro-Wilk test showed that our outcome variables (loneliness and digital literacy, respectively) did not meet the normality assumption.

RESULTS

Reach

The sociodemographic characteristics of the platform users are shown in Table 1. Platform users' mean age was 72 years (*SD* = 7.8), 93.1% were female, 62.1% identified as an ethnoracial minority, 62.1% reported having more than a high school education and 65.5% reported their yearly household income was less than $80,000. 51.7% reported having access to

mental health coverage via their insurance. In terms of technical readiness 41.3% of platform users were not confident using technology and 20.7% needed support getting connected to Wi-Fi, before initiating the pilot.

As shown in Table 2, when descriptively comparing the available demographics of our sample of platform users to Marin County demographics, our sample was composed of more females, fewer English-speakers, individuals with higher levels of education, a more diverse ethnoracial composition, and individuals with lower incomes compare to the county population in general.

Effectiveness

Effectiveness of the Digital Literacy Course

A Wilcoxon Signed-Ranks test for paired samples was used to compare digital literacy scores collected pre- and post- the four-class digital literacy training course. Data from 22 platform users were available at both time points[2]. As seen in Figure 2, the analysis revealed a nonsignificant increase in digital literacy scores from pre- (Md = 18.50) to post- (Md = 21.50) the four-class digital literacy training course, z = -1.63, p = .10.

Effectiveness of myStrength

A Friedman test was used to compare loneliness scores collected as part of platform user surveys 1, 2, and 3. Data from 20 platform users were available at all three timepoints[3].

[2] Out of 28 platform users that enrolled in the digital literacy training course, three did not completed the post-survey at all and two did not fully answer all the items in the measure in the post- survey.

[3] Out of 30 platform users that enrolled in the pilot implementation, 28 completed survey 1, 25 survey 2, and 23 survey 3. Additionally, three platform users did not fully answer all the items in the measures in survey 1, survey 2, and survey 3, respectively.

Loneliness was significantly different across these three timepoints ($\chi 2$ (2, n = 20) = 6.9, p = .03). Follow-up pairwise comparisons were conducted using a Wilcoxon Signed-Rank Test with a Bonferroni correction, to control for Type I errors. There were significant differences in loneliness between scores collected as part of user survey 1 and scores collected at user survey 3, $z = -2.62$, $p < .001$. There was no significant difference between scores collected as part of user survey 1 and scores collected as part of user survey 2, $z = -1.43$, $p = .15$; as well as between scores collected as part of user survey 2 and scores collected as part of user survey 3, $z = -1.48$, $p = .14$. These findings indicate that platform users' loneliness decreased significantly from Survey 1 (*Md* = 6.00) to Survey 3 (*Md* = 5.00). See Figure 3.

Adoption

Individual-level Adoption: Platform User Engagement

All 30 users logged into the platform at least once, over the course of the eight-week use period. Over the course of the eight-week myStrength use period, platform users logged into myStrength an average of 10 times (*SD* = 11.7, *range* = 1-59). Data from 28 platform users were available to determine the frequency of visited programs. In descending order, platform users visited the following programs over the course of the eight-week myStrength use period: anxiety (5 visits), depression (4 visits), insomnia (4 visits), mindfulness and stress reduction (4 visits), chronic pain (4 visits), mindfulness and meditation (3 visits), PTSD (2 visits), bipolar disorder (1 visit), and an unspecified program (1 visit). Data from 17 platform users were available to determine average number of completed activities. Over the eight-week myStrength use period platform users, on average, completed 33 activities (*SD* = 53.5, *range* = 1-198).

Setting-level Adoption: Characteristics of Intervention Agents who Initiated the Program

Of the 20 pilot staff involved in the implementation of the pilot, 19 completed a debriefing survey. The sociodemographic characteristics of these 19 pilot staff are shown in Table 3. On average, pilot staff were aged 33 years (*SD* = 12.4), 84.2% were female, 94.7% identified as an ethnoracial minority, and 52.6% reported having less than a high school education. As part of their involvement in the project, 89.5% onboarded platform users onto the pilot and 78.9% attended the four-class digital literacy training course with platform users.

Implementation

Adaptations

Of the 20 pilot staff involved in the implementation of the pilot, data from 15 pilot staff were available to determine the extent to which pilot staff adapted the original protocol to fit platform users' needs. The average score on our three-item scale was 10.67 (*SD* = 2.02; *range* 7-14), which was above the midpoint (*Md* = 6.00) of the overall scale, suggesting pilot staff made several modifications in their presentation, discussion, and delivery of myStrength to platform users. Figure 4 shows a visual representation of the exact distribution of answers for each of the three questions on the scale.

Related Costs: Supporter Time

Descriptive analysis demonstrated that pilot staff spent a substantial amount of time providing support to platform users. Overall, during the six-month pilot, pilot staff spent 217 hours across seven major areas (see Table 4 for definitions): logistics, user feedback, digital literacy training, tech assistance, referrals, supervision, and translations. Figure 5 shows a breakdown of the total time per activity in hours and percentages. Each pilot staff member spent an average of 19.8 hours (*SD* = 16.51, *range* = 1-47) providing support to platform users over the course of the six-month pilot. When segmented by area, the data showed that pilot staff

dedicated more time to preparatory activities than service delivery and operation activities. Specifically, pilot staff spent a total of 140 hours or 64% of their time on preparatory activities, averaging about 22.4 hours (*SD* =4.99) per week. Meanwhile, they spent a total of 77 hours or 35% of their time on service delivery and operation activities, averaging about 12.2 hours (*SD* = 2.73) per week.

DISCUSSION

Principal Findings

The purpose of this paper was to conduct an evaluation of Marin County's pilot implementation of myStrength. Using RE-AIM metrics, the results of this evaluation showed that both successes and challenges arose during the pilot implementation of myStrength in a county service setting. We next discuss these findings in more detail, and what implications they may have for the future of TESs in publicly funded service settings.

Reach

This pilot implementation was successful in reaching the intended population. While our recruited sample of platform users was not a one-on-one representation of Marin County demographics, Marin was able to recruit an over selection of underserved individuals, including ethnoracial minorities and those with lower socioeconomic status. This is crucial given that previous research has demonstrated that these individuals often depend on publicly funded service settings to access healthcare (Diep et al., 2022). Furthermore, despite its potential for reducing disparities, technology-enabled service research begets the paradox that although they were created to increase access amongst those who would otherwise not have any, the communities that could benefit the most from this service delivery paradigm are underrepresented in research that evaluates such interventions (Chou et al., 2017).

Effectiveness

Concerning effectiveness of myStrength, platform users experienced improvement in mental health symptomatology. This is consistent with previous research showing that myStrength can effectively improve an array of mental health concerns (Hirsch et al., 2011; Hirsch et al., 2017; Schladweiler et al., 2017). However, it is important to understand these results in the context of considerable interaction between pilot staff and platform users. Although significant reductions were found between loneliness scores collected before the digital literacy training course and those collected after the use of myStrength, given the digital literacy training, it is impossible to disentangle the impact of that training and the myStrength platform. It is possible that reductions in loneliness were the result of increased interactions with pilot staff in setting up and supporting the myStrength use period rather than using the myStrength platform. This would align with previous research that shows that forming new positive relationships can buffer feelings of loneliness (Lieberz et al., 2021). Another possible explanation is that we did not have enough power to detect significant changes in loneliness pre- and post- myStrength use. While we cannot disentangle what led to the difference, myStrength itself, the human support, or the combination of the two, it is important to acknowledge that this type of deployment is consistent with the notion of a TES. As such, with respect to loneliness, our results support the effectiveness of myStrength paired with human support in real-world settings, albeit with a small, but diverse, sample.

Concerning the effectiveness of the four-class digital literacy training course, although platform users experienced some improvement in digital literacy, these were not statistically significant. These non-significant findings may be the result of methodological limitations. Similar to our previous argument, our sample size may not have given us the necessary power to

detect significance. It may also be possible that our digital literacy scale did not measure applicable constructs. To illustrate, the scale asked platform users to rate their confidence in removing a virus from an infected computer, avoiding online scams, and downloading and saving music. These topics were neither covered in the digital literacy training course nor necessary for using myStrength. It could also be possible that skill acquisition may have also occurred or was further intensified during the myStrength use period—which we did not measure. In a separate publication (Borghouts et al., 2022), we discuss the role of support in the pilot from the perspective of platform users, who confirmed that some did not feel "confident enough after the training to use web-based tools on their own for mental health". As such, continued practice may mediate the relationship between digital literacy training and improvements in digital literacy. Future implementations targeting populations with limited digital literacy would benefit from using and adapting measures and skill training approaches that map onto the skills that are deemed necessary to use the respective platform. Additionally, future research should focus on uncovering the nuanced effects of digital literacy training on adoption, adherence, and clinical outcomes.

Adoption

Regarding adoption, platform users appeared to have engaged with the platform. Additionally, the county was able to build strong community partnerships to offer human support in preparation for and throughout the six-month pilot.

Results pertaining to user engagement with the myStrength platform revealed that all 30 users logged into the platform at least once, over the course of the eight-week use period. On average, over the course of their eight -week use, platform users logged onto myStrength once per week to complete four activities. This engagement is relatively higher than what is typically

found in real-world deployments of TESs. As an example, previous research has found that in real-world deployments of similar platforms, most users (up to 88%) only log in once at the beginning of the deployment period and rarely, if ever, complete platform activities (Fleming et al., 2018). Given our sample size, we did not have statistical power to determine whether engagement was a mediator of benefit. Thus, we cannot conclude that this amount of engagement constituted clinically meaningful use. Further, no standards for sufficient usage exist due to the novelty of TESs. What is known is that user engagement is proposed as a key contributor to the effectiveness of digital mental health interventions (Yardley et al., 2016; Baumel, 2022). As such, future research would benefit from unpacking dosage effects and engagement as a mechanism of change for myStrength specifically and dCBT more broadly, especially in real-world settings.

Descriptive analysis pertaining to the profiles of pilot staff revealed that this sample was primarily composed of females with at least one minoritized identity (i.e., race, ethnicity, educational background, income, etc.). This finding is unsurprising given that previous research has revealed that the majority of lay and non-specialty peer supporters, such as community health workers and promotores, aiding in the delivery of evidence-based interventions tend to be ethnoracial minorities (Barnett et al., 2018; Chapman et al., 2022). This same research has also shown that the demographics of these peer supporters tend to mirror the populations they serve; such that Latine lay and non-specialty peer supporters tend to work with Latine populations. As such, it seems that, in general, individuals with similar sociodemographic backgrounds to the target population may be more inclined to be involved in the preparation, delivery, and support of novelty programs, such as TESs. Reasons behind this finding remain, for the most part, largely unexplored. It could be that those with similar sociodemographic backgrounds might be

the most connected to their community and want to engage and support them to help reduce inequities. Researchers in this line of work are called to consider analyzing the motives for involvement in the implementation of TESs amongst lay and non-specialty peer supporters, as well as the potential risk and benefits of these observed patterns.

Implementation

In assessing aspects that arose during implementation we observed that to ensure platform users were able to use myStrength, pilot staff 1) extemporized their delivery of myStrength and 2) spent a substantial amount of time offering and facilitating support to platform users.

Although some level of adaptation is expected to occur in implementations, rarely are modifications reported. This is particularly problematic given that previous research has shown that modifications can impact participant engagement and clinical outcomes. Specifically, adaptations that increase the fit between the intervention and the target population can lead to higher participant engagement (Bernal & Domenech Rodríguez, 2012). On the other hand, adaptations that remove key intervention elements can negatively impact improvement in clinical outcomes (Kumpfer et al., 2020). This gap may be further intensified in real-world settings given that fidelity is rarely incentivized, monitored, and harder to quantify. In our evaluation, we attempted to bridge this gap. In doing so, we uncovered that pilot staff made considerable modifications to how they presented, discussed, and delivered myStrength as indicated by an average score, on our three-item scale, that was higher than the midpoint. However, we cannot determine the extent to which these modifications deviated from the original protocol. There are two main reasons for this. First, pilot staff were not provided with a detailed script on how to discuss or deliver myStrength while onboarding or providing continued support to platform

users. They were simply provided with content overview and were given free creative control. This might explain why a large majority of pilot staff reported making some modifications to how they talked about or engaged with myStrength in the presence of platform users. Second, we collected no data on the interactions between pilot staff and platform users. Given the pragmatic nature of our evaluation, we did not probe for additional details. As such, we cannot know if these modifications were made uniformly or on a case-by-case basis. It could also be possible that the low levels of digital literacy and confidence in using technology among platform users necessitated the pilot staff to make more modifications to make the information more relevant, simple, and digestible. Further studies could evaluate this in more detail.

When this pilot was launched it was unknown how much human support would be required. This evaluation showed that although most platform users were enthusiastic about participating in the pilot, they generally lacked the technical readiness to dive into the platform. Some of the challenges included a lack of devices or internet connection at home, low levels of digital literacy, lack of support from friends or family due to social isolation, and additional challenges around meeting people in person to provide needed support and or training created by the safety concerns and lockdown requirements surrounding the COVID-19 pandemic. In this way, our findings mirror the experience of several providers and researchers who, during the COVID-19 pandemic, noted that vulnerable populations had a much harder time accessing TESs amidst the shift from person-facing to strictly remote approaches (Inan et al., 2020; Kaihlanen et al., 2022; Hernandez-Ramos et al., 2021).

Collectively, on average, staff spent close to 35 hours per week offering and facilitating support to platform users. A key finding of this evaluation was that only a minority of pilot

staff's time was focused on activities related to gathering feedback and engaging in service delivery. Primary activities conducted by pilot staff were in preparation for the launch of the myStrength use period. This finding aligns with prior research indicating that people from lower socioeconomic backgrounds and with limited digital skills are keen on utilizing digital platforms for health management. However, they might need extra initial assistance from humans to access these platforms (Avila-Garcia et al., 2019; Fontil et al., 2016; Schueller et al., 2017).

Implications

Based on RE-AIM, this evaluation provides preliminary support for delivering myStrength in county mental health service settings. More specifically, the pilot implementation of myStrength at Marin County was successful in reducing loneliness amongst its sample of platform users. Furthermore, the county successfully engaged a population, isolated older adults, who are typically not the focus of TES research and are also less likely to receive mental health services. This is crucial given that, thus far, TESs seem to be mostly reaching young upper middle class, white cisgender females (Adu-Brimpong et al., 2023). The pilot was also successful in gaining adoption of myStrength by platform users. Not only did platform users engage with the platform (i.e., they logged in), they also used the platform (i.e., they opened programs within the platform and completed activities), which is usually not the case in real-world deployments of TESs (Baumel et al., 2019). The ability of this pilot to not only recruit its target population, but also gain adoption of myStrength by platform users, may be attributable to Marin County's use of existing community partnerships throughout the pilot. Undeniably, over the last couple of years, community-based recruitment approaches have shown promise in recruiting underrepresented populations onto TESs research (Clark et al., 2019; Nebeker et al., 2017). Previous research has also shown that active community involvement in both planning

and implementation has the potential to increase the acceptability of an innovative program amongst end-users (Haldane et al., 2019). In this pilot implementation, Marin County recruited a large portion of platform users via a multipronged approach in which they relied on community partnerships to share pilot information with their consumers. Marin County also leveraged its existing community partnerships to offer a priori digital literacy training course and create a coalition of human supporters. Together, this suggest that community-engagement may be a key contributor to the success of TESs implementation, particularly for underserved populations with limited digital literacy.

While the digital literacy training course did not significantly improve digital skills, a growing body of research has shown that these types of programs are effective in increasing access to and the use of TESs (Bevilacqua et al., 2023; Camacho & Torous, 2023; Heponiemi et al., 2022). This is crucial given that previous research has shown that individuals with limited digital literacy access TESs at a lower rate and, as such, are less likely to benefit from these innovative approaches (Haimi, 2023). Still, relatively little is known about the specific strategies that promote optimal skill acquisition and lead to long-term use in TESs. Indeed, not all digital literacy training courses with statistically significant improvements in digital literacy impact intervention use. To illustrate, one previous study evaluating a digital literacy training that focused on teaching older adults, with limited digital literacy and comparable demographic to that of our sample, the necessary skills to use online patient portals found that although their training led to statistically significant improvements in digital literacy, this did not translate in individuals using or even logging into the platform (Lyles et al., 2019). Our evaluation showed the opposite, statistically non-significant improvements in digital literacy but moderate platform use. This example showcases the importance of continued investment in the research on the

effectiveness of digital literacy training programs on a myriad of outcomes to ensure our most vulnerable groups do not get left behind.

In assessing the resources needed to deploy and sustain the use of myStrength with underserved isolated older adults, we learned a lot about both the time and types of activities that supporters engage in. These findings can guide future implementations that seek to integrate various models of human support. While a growing body of research suggests that pairing TESs with human support increases uptake and enhances effectiveness (Fortuna et al., 2019; Werntz et al., 2023; World Health Organization, 2018), given the infancy of this approach, relatively little is known about the most optimal implementation strategies. Admittedly, previous research has shown a wide range of training requirements, expectations, and standards that human supporters must meet to assist in implementing and delivering TESs (Bernstein et al., 2022). In developing and piloting human-support procedures and expectations within the context of our pilot implementation, we leveraged several implementation strategies, including conducting educational meetings with pilot staff, developing educational materials for staff, and building a coalition of promotores and nurse interns. These strategies enabled us to anticipate possible challenges our target population might encounter and proactively prepare strategies and materials to circumvent such challenges. For instance, early on, we knew that most of our target population, although interested in technology, lacked proficiency in digital tools. In response, our team developed a priori digital literacy training course. Yet, even with the existence of this course platform users still needed substantial human support to generalize the skills they acquired throughout the course. The unforeseen challenges that necessitated additional human-support also points to the fact that this approach might not be sustainable long-term both within Marin County and other county mental health service settings. In our pilot implementation of

myStrength, pilot staff provided human support on almost every aspect of the project. Specifically, they assisted with recruitment, preparatory activities and service delivery and operations. The fact that these supporters were nurses, promotores, and county staff shows that individuals with various backgrounds and training can fill this role. Thus, TESs may facilitate task-shifting paradigms, whereby interventions are provided by non-specialists (Naslund et al., 2019). As previously mentioned, we mainly attribute the high level of involvement from supporter to our extensive collaboration with community partners. This may be particularly relevant for the long-term sustainment of myStrength within publicly funded service settings. Other publicly funded mental health service settings might not have the budget or community relationships to hire, train, and maintain supporters involved in every aspect of the project. Fortunately, this limitation is currently being addressed at a systemic level. Specifically, the shift to remote services that was propelled by the physical distancing guidelines of COVID-19 has resulted in several policy changes that could lead to the long-term sustainability of TESs, including increased reimbursement and increased investment in TESs from venture capitalists, health systems, and cities and counties.

Limitations

There are several limitations of this pragmatic evaluation. This pilot implementation followed a naturalistic paradigm, meaning that we lacked random assignment and control groups. Consequently, although platform users showed improvement in loneliness from the start to the end of the pilot, we cannot solely attribute this improvement to the myStrength platform. Similarly, our findings are based on data collected in a single-site with a small sample. As such, our results might not be generalizable to other settings. In addition, the small sample size increases the potential inaccuracy of our statistics, particularly the reliability of our measures.

Indisputably, most scholars suggest that a minimum of 30 observations are required for each reliability analysis. The data we used for each of our measures was less than that given that we had had some participants who did not complete all the assessments. Lastly, in an effort to minimize participant burden we collected only data necessary to answer evaluation questions. While this approach allowed us to collect valuable information, we may lack relevant data that would help us tease out results or explore potential nuances.

Conclusions

In conclusion, the pilot implementation of myStrength within Marin County's Help@Hand project provides valuable insights into the potential of TESs to address mental health needs, particularly amongst isolated underserved older adults with limited digital literacy. First, significant reduction in loneliness reported by users supports the feasibility that myStrength paired with human support might impact this target outcome in real-world settings. The success of reaching the target population and gaining adoption of myStrength by platform users highlights the importance of community partnerships to not only recruit but facilitate a better user-experience. At the same time, our findings indicate that when integrating TESs into existing service settings, such as publicly funded mental health care, their potential to address treatment access gaps may be dependent on the presence of ongoing human support. Thus, it is important that future work in this area assess support needs of the target population from the start and build wrap-around services around those needs, to ensure that human support in TESs is both resource-rich and sustainable.

Figure 1

Overview of Pilot Timeline

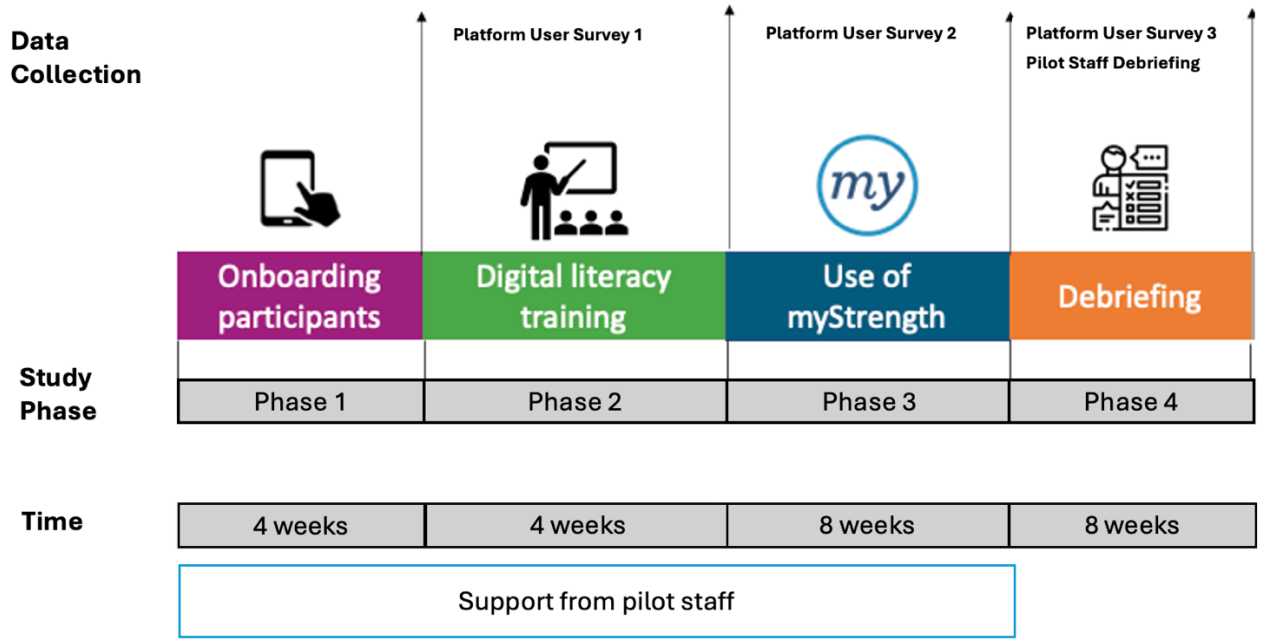


Figure 2

Comparison of Median Digital Literacy by Training Course Timepoint

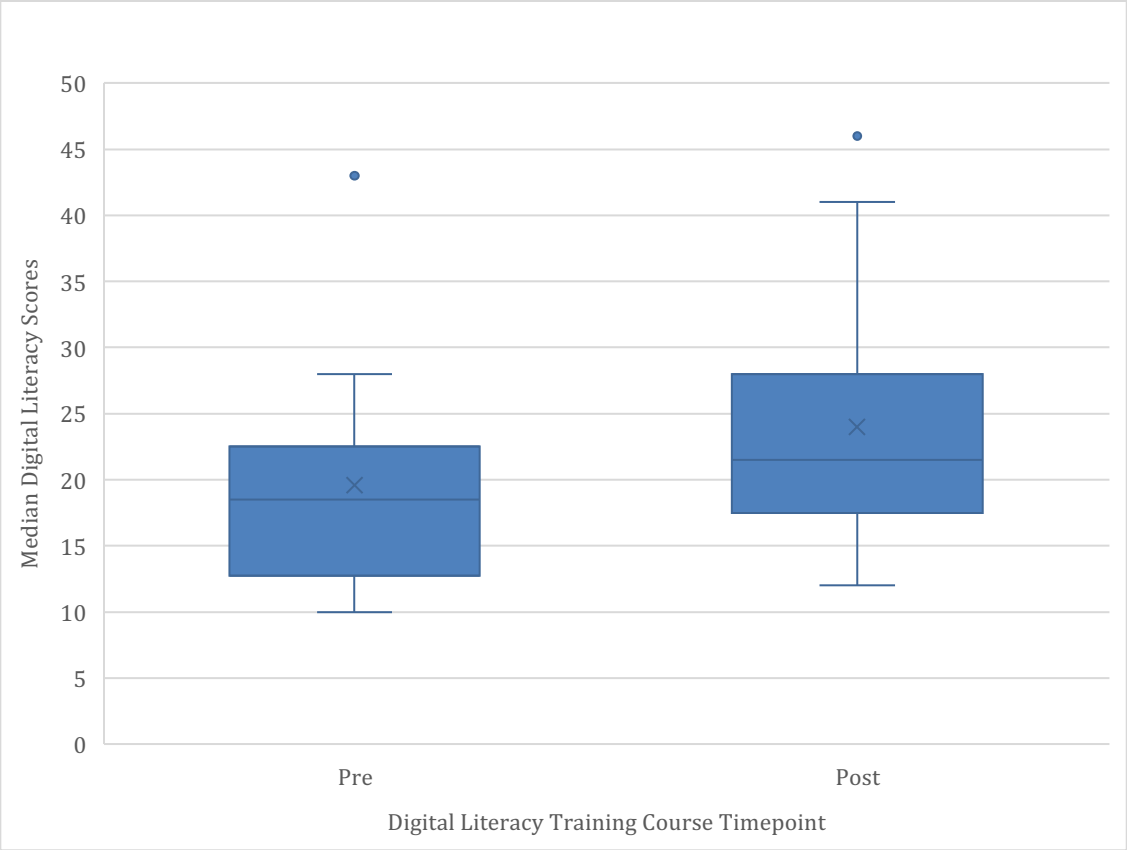


Figure 3

Comparison of Median Loneliness by Data Collection Period

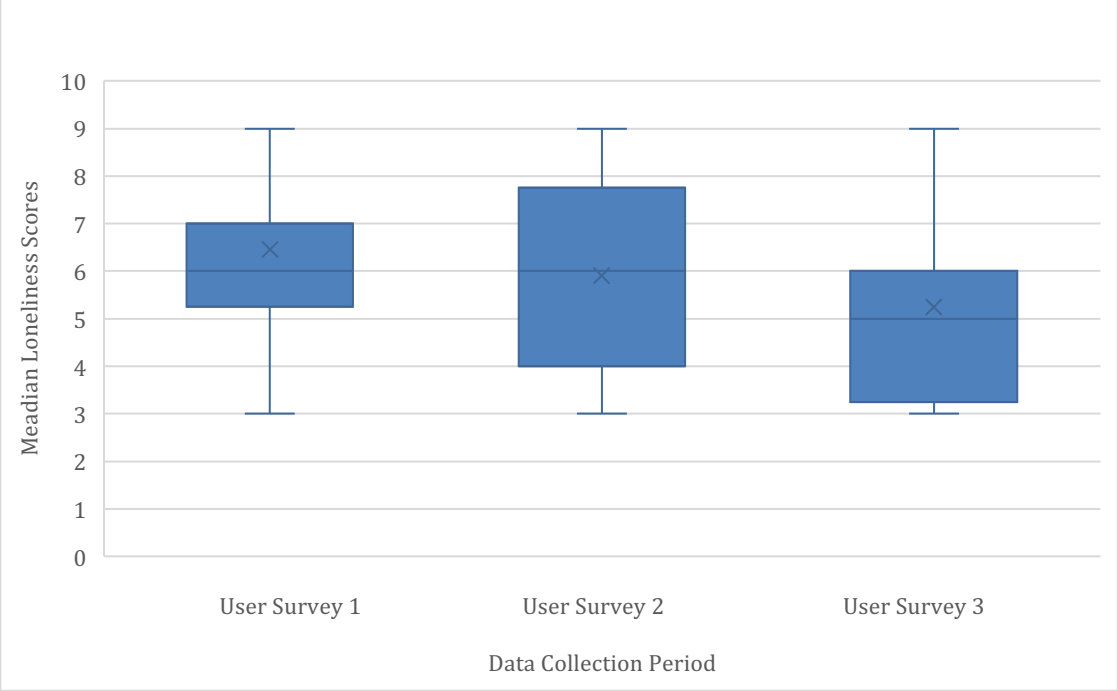
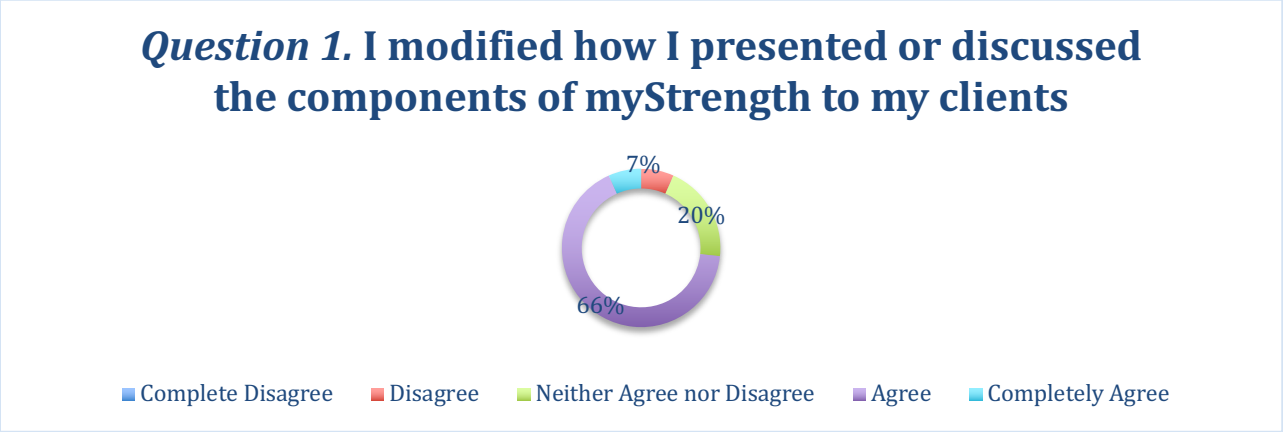
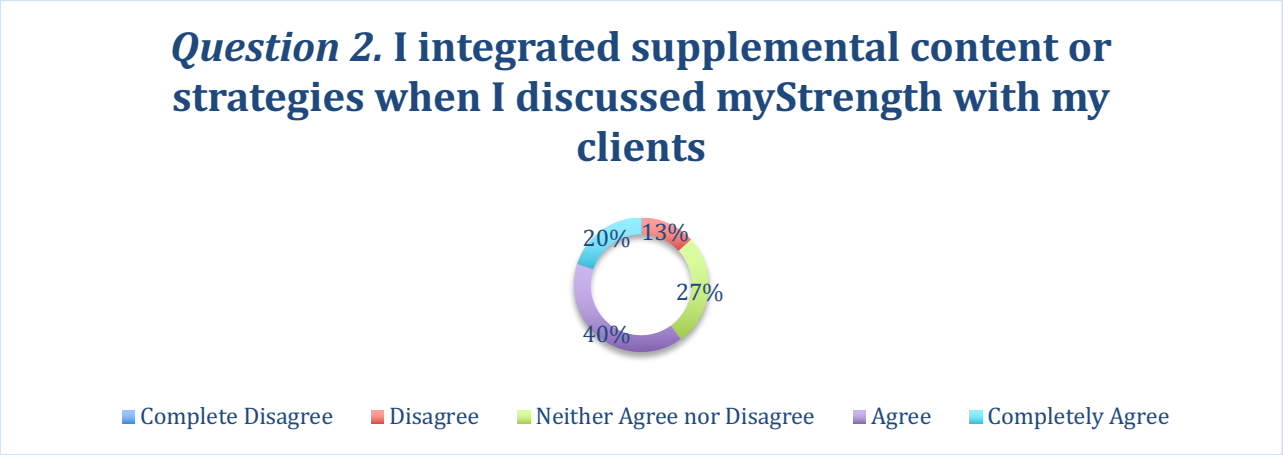


Figure 4

Breakdown of Average Adaptations to Presentation, Discussion, and Service Delivery of myStrength





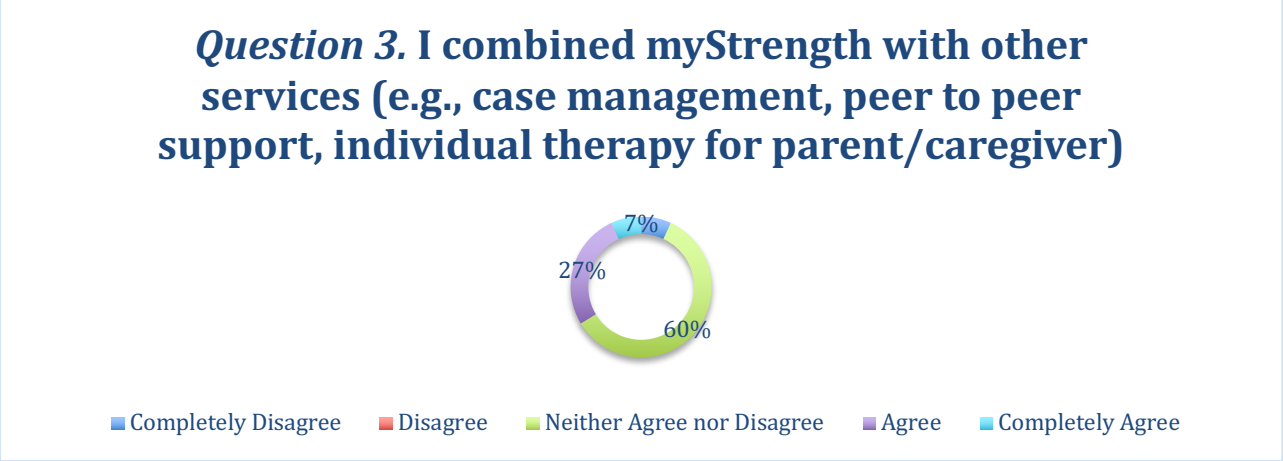
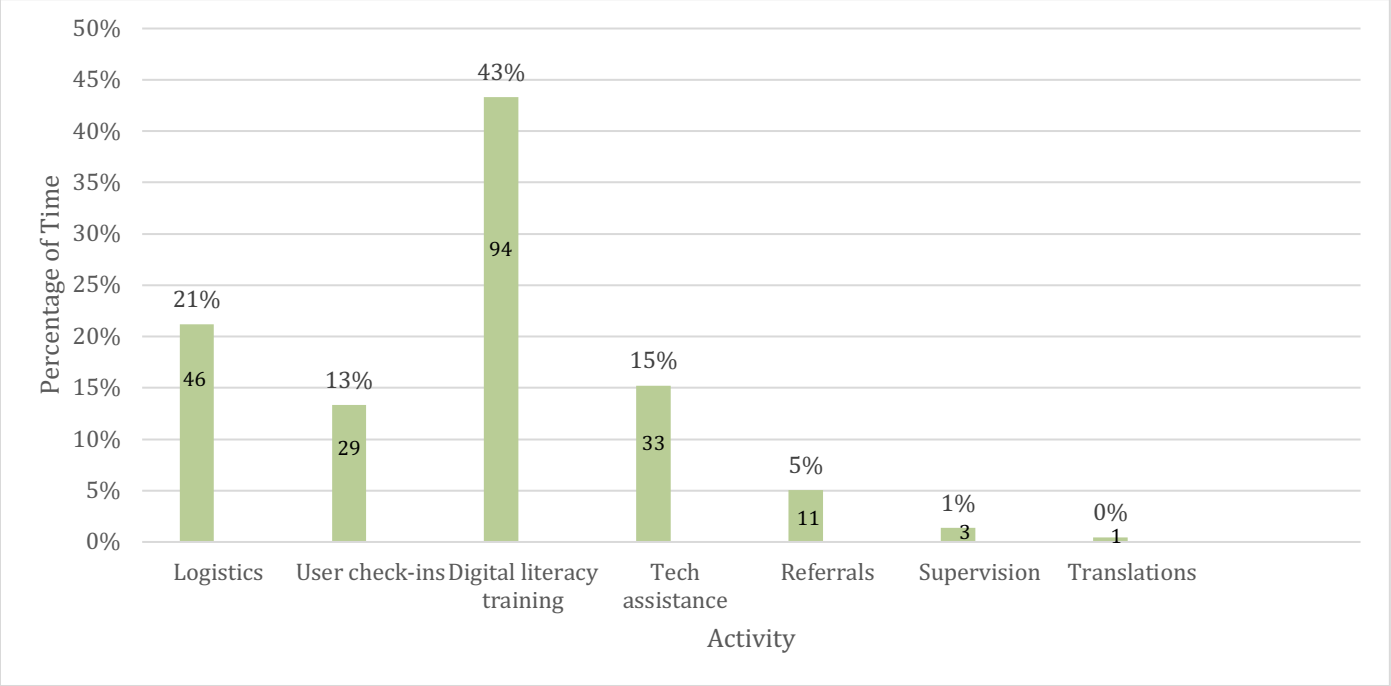


Figure 5

Frequency and Percentage of Time Pilot Staff Spent Providing Human Support by Activity



Note. Time spent in hours is located inside the bar graphs.

Table 1

Sociodemographic Characteristics of Platform Users

Characteristics	Full Sample	
	n	%
Sex		
Female	27	93.1
Preferred language		
English	14	48.3
Spanish	15	51.7
Ethnicity		
Black	1	3.5
Latine	16	55.1
White	11	37.9
Biracial	1	3.5
Highest educational level[a]		
High School or less	8	27.6
More than high school	18	62.1
Household income[b]		
Less than $19,000	12	41.4
$20,000 – $39,000	3	10.3
$40,000 - $59,000	2	6.9
$60,000 - $79,999	2	6.9
More than $80,000	4	13.8
Employment Status[c]		
Full-time	1	3.5
Part-time	1	3.5
Unemployed	5	17.2
Retired	11	37.9
Disabled	6	20.7
Marital Status[d]		
Unpartnered	19	65.5
Partnered	9	31.0
Living Situation[e]		
Lives alone	8	27.6
Lives with others	17	58.6
Mental Health Concerns[f]		
Experienced	11	37.9
Did not experience	12	41.4
Disability	14	48.3
Has health Insurance	25	86.2
Has Insurance that cover mental health	15	51.7
Technical Readiness		
Not confident using technology before pilot[g]	12	41.3
Needed Support getting access to Wi-Fi[h]	6	20.7

Note. $n = 29$. Sociodemographic data is missing for one platform user, who chose not to complete a demographic survey. Platform users were on average 72 years ($SD = 7.8$),

a. 3 platform users preferred not to answer this question.
b. 6 platform users preferred not to answer this question.
c. 5 platform users selected “other” for this question but did not provide specifics.
d. 1 platform user preferred not to answer this question.
e. 4 platform users selected “other” for this question but did not provide specifics.
f. 2 platform users selected “other” for this question but did not provide specifics; 4 platform users preferred not to answer this question.
g. 2 platform user preferred not to answer this question.
h. 1 platform user preferred not to answer this question.

Table 2

Descriptive Comparison of Pilot Sample and Population Sociodemographic Characteristics

Characteristics	*Our Sample*	*Marin County*
	%	
Age (over 65)	100%	16.8%
Sex		
Female	93.1%	50.5%
Preferred language,		
English	48.3%	86.4%
Other than English	51.7%	13.6%
Race		
White	37.9%	75.8%
Black	3.5%	13.6%
Hispanic or Latine	55.1%	18.9%
Highest educational level,		
High School or less	27.6%	66.3%
College Degree or more (AA, BA, MA, PhD)	62.1%	33.7%
Living Situation, %		
Lives alone	27.6%	23.7%
Lives with others	58.6%	76.3%
Household income, (*Md*)	$35,000	$131,008

Table 3

Sociodemographic Characteristics of Pilot Staff at Debriefing

Characteristics	*Full Sample*	
	n	%
Role		
Nurse Interns	13	65.0.
Promotores	4	20.0
In-house County Staff	3	15.0
Sex		
Female	16	84.2
Ethnicity		
White	1	5.3
American Indian/Alaskan Indian	8	42.2
Multiracial	3	15.8
Hispanic or Latino	7	36.8
Highest educational level		
High School or less	10	52.6
College Degree or less (Trade, AA, BA)	8	42.2
Master's or Doctoral Degree	1	5.3
Onboarded users to myStrength	17	89.5
Attended at least one of the four-class technology training	15	78.9

Note: n = 19. Sociodemographic data (besides data pertaining to role) is missing for one pilot staff, who chose not to complete a demographic survey. Pilot staff were on average 33 years old (*SD* = 12.4).

Table 4

Definition of Activities Classified by Area

Area	Type of Activity	Definition
Preparatory	Logistics	Getting users onboarded, starting Wi-Fi services, hand-offs, coordinating support from nurse interns and promotores, coordinating with 3rd-parties, etc.
Preparatory	Digital literacy training	Anything that is related to learning how to use a device. The ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills. (e.g., how to us Zoom, signing up for myStrength, exploring app features, etc.)
Preparatory	Translations	Further translating the myStrength content into a form of Spanish that the users could understand.
Service Delivery and Operations	User feedback	Gathering feedback from users or checking in with users.
Service Delivery and Operations	Technical assistance	Anything that is related to having issues with technology. Aiding with technology such as televisions, computers, and software, typically aiming to help the user with a specific problem. (e.g., Wi-Fi issues, issues with logging into accounts, etc.)
Service Delivery and Operations	Referrals	Connecting users to resources and mental health support.
Service Delivery and Operations	Supervision	Supporting and providing feedback to nurse interns and promotores.

REFERENCES

Adu-Brimpong, J., Pugh, J., Darko, D. A., & Shieh, L. (2023). Examining Diversity in Digital Therapeutics Clinical Trials: Descriptive Analysis. *J Med Internet Res*, *25*, e37447. https://doi.org/10.2196/37447

Avila-Garcia, P., Hernandez-Ramos, R., Nouri, S. S., Cemballi, A., Sarkar, U., Lyles, C. R., & Aguilera, A. (2019). Engaging users in the design of an mHealth, text message-based intervention to increase physical activity at a safety-net health care system. *JAMIA Open*, *2*(4), 489–497. https://doi.org/10.1093/jamiaopen/ooz049

Barnett, M. L., Gonzalez, A., Miranda, J., Chavira, D. A., & Lau, A. S. (2018). Mobilizing Community Health Workers to Address Mental Health Disparities for Underserved Populations: A Systematic Review. *Administration and policy in mental health*, *45*(2), 195–211. https://doi.org/10.1007/s10488-017-0815-0

Baumel, A. (2022). Therapeutic Activities as a Link between Program Usage and Clinical Outcomes in Digital Mental Health Interventions: A Proposed Research Framework. *Journal of Technology in Behavioral Science*, *7*(2), 234–239. https://doi.org/10.1007/s41347-022-00245-7

Baumel, A., Edan, S., & Kane, J. M. (2019). Is there a trial bias impacting user engagement with unguided e-mental health interventions? A systematic comparison of published reports and real-world usage of the same programs. *Translational Behavioral Medicine, 9*(6), 1020-1033. https://doi.org/10.1093/tbm/ibz14

Bennion, M. R., Hardy, G., Moore, R. K., & Millings, A. (2017). E-therapies in England for stress, anxiety or depression: What is being used in the NHS? A survey of mental health services. *BMJ Open*, *7*(1), e014844. https://doi.org/10.1136/bmjopen-2016-014844

Bernal, G., & Domenech Rodríguez, M. M. (Eds.). (2012). Cultural adaptations: Tools for evidence-based practice with diverse populations. *Cultural Adaptations: Tools for Evidence-Based Practice with Diverse Populations.*, xix, 307–xix, 307. https://doi.org/10.1037/13752-000

Bernstein, E. E., Weingarden, H., Wolfe, E. C., Hall, M. D., Snorrason, I., & Wilhelm, S. (2022). Human Support in App-Based Cognitive Behavioral Therapies for Emotional Disorders: Scoping Review. *Journal of Medical Internet Research*, *24*(4), e33307. https://doi.org/10.2196/33307

Bevilacqua, R., Strano, S., Di Rosa, M., Giammarchi, C., Cerna, K. K., Mueller, C., & Maranesi, E. (2021). EHealth Literacy: From Theory to Clinical Application for Digital Health Improvement. Results from the ACCESS Training Experience. *International Journal of Environmental Research and Public Health*, *18*(22). https://doi.org/10.3390/ijerph182211800

Borghouts, J., Eikey, E. V., De Leon, C., Schueller, S. M., Schneider, M., Stadnick, N. A., Zheng, K., Wilson, L., Caro, D., Mukamel, D. B., & Sorkin, D. H. (2022). Understanding the Role of Support in Digital Mental Health Programs With Older Adults: Users' Perspective and Mixed Methods Study. *JMIR Form Res*, *6*(12), e43192. https://doi.org/10.2196/43192

California Department of Aging. (2020). *Marin County Older Adults Food Access*. California Department of Aging. https://aging.ca.gov/download.ashx?lE0rcNUV0zaHN9rgoWlGsA%3D%3D

Camacho, E., & Torous, J. (2023). Impact of Digital Literacy Training on Outcomes for People With Serious Mental Illness in Community and Inpatient Settings. *Psychiatric Services*, *74*(5), 534–538. https://doi.org/10.1176/appi.ps.20220205

Chapman, S., Bates, T., & Miller, J. (2022). *Understanding California's Community Health Worker/Promotor Workforce: A Survey of CHW/Ps*. Healthforce Center at UCSF. Retrieved from California Health Care Foundation https://www.chcf.org/publication/understanding-community-health-worker-promotor-workforce-survey-chwps/#related-links-and-downloads

Chou, T., Bry, L. J., & Comer, J. S. (2017). Overcoming traditional barriers only to encounter new ones: Doses of caution and direction as technology-enhanced treatments begin to "go live". *Clinical Psychology: Science and Practice*, *24*(3), 241–244. https://doi.org/10.1111/cpsp.12196

Clark, L. T., Watkins, L., Piña, I. L., Elmer, M., Akinboboye, O., Gorham, M., Jamerson, B., McCullough, C., Pierre, C., Polis, A. B., Puckrein, G., & Regnante, J. M. (2019). Increasing Diversity in Clinical Trials: Overcoming Critical Barriers. *Current Problems in Cardiology*, *44*(5), 148–172. https://doi.org/10.1016/j.cpcardiol.2018.11.002

Coffman, J., Bates, T., Geyn, I., & Spetz, J. (2018, February 12). *California's Current and Future Behavioral Health Workforce | Healthforce Center at UCSF*. Healthforce.Ucsf.Edu. https://healthforce.ucsf.edu/sites/healthforce.ucsf.edu/files/publication-pdf/California%E2%80%99s%20Current%20and%20Future%20Behavioral%20Health%20Workforce.pdf

Cook, B. L., Trinh, N.-H., Li, Z., Hou, S. S.-Y., & Progovac, A. M. (2017). Trends in Racial-Ethnic Disparities in Access to Mental Health Care, 2004–2012. *Psychiatric Services*, *68*(1), 9–16. https://doi.org/10.1176/appi.ps.201500453

Cudjoe, T. K. M., Roth, D. L., Szanton, S. L., Wolff, J. L., Boyd, C. M., & Thorpe, R. J. (2020). The Epidemiology of Social Isolation: National Health and Aging Trends Study. *The Journals of Gerontology: Series B*, *75*(1), 107–113. https://doi.org/10.1093/geronb/gby037

Diep, K., Frederiksen, B., Long, M., Ranji, U., & Salganicoff, A. (2022). *Access and Coverage for Mental Health Care: Findings from the 2022 KFF Women's Health Survey* [Survey]. Kaiser Family Foundation. https://www.kff.org/womens-health-policy/issue-brief/access-and-coverage-for-mental-health-care-findings-from-the-2022-kff-womens-health-survey/

Duffy, D., Enrique, A., Connell, S., Connolly, C., & Richards, D. (2020). Internet-Delivered Cognitive Behavior Therapy as a Prequel to Face-To-Face Therapy for Depression and Anxiety: A Naturalistic Observation. *Frontiers in Psychiatry*, *10*, 902. https://doi.org/10.3389/fpsyt.2019.00902

Dworschak, C., Heim, E., & Maercker, A. (2022). Efficacy of internet-based interventions for common mental disorder symptoms and psychosocial problems in older adults: A systematic review and meta-analysis. *Internet Interventions*, *27*, 100498. https://doi.org/10.1016/j.invent.2022.100498

Fleming, T., Bavin, L., Lucassen, M., Stasiak, K., Hopkins, S., & Merry, S. (2018). Beyond the Trial: Systematic Review of Real-World Uptake and Engagement With Digital Self-Help Interventions for Depression, Low Mood, or Anxiety. *J Med Internet Res*, *20*(6), e199. https://doi.org/10.2196/jmir.9275

Fonagy, P., & Luyten, P. (2021). Socioeconomic and sociocultural factors affecting access to psychotherapies: The way forward. *World Psychiatry*, *20*(3), 315–316. https://doi.org/10.1002/wps.20911

Fontil, V., McDermott, K., Tieu, L., Rios, C., Gibson, E., Sweet, C. C., Payne, M., & Lyles, C. R. (2016). Adaptation and Feasibility Study of a Digital Health Program to Prevent Diabetes among Low-Income Patients: Results from a Partnership between a Digital Health Company and an Academic Research Team. *Journal of Diabetes Research*, *2016*, 1–10. https://doi.org/10.1155/2016/8472391

Fortuna, K. L., Naslund, J. A., LaCroix, J. M., Bianco, C. L., Brooks, J. M., Zisman-Ilani, Y., Muralidharan, A., & Deegan, P. (2020). Digital Peer Support Mental Health Interventions for People With a Lived Experience of a Serious Mental Illness: Systematic Review. *JMIR mental health*, *7*(4), e16460. https://doi.org/10.2196/16460

Garg, R. K., Sidana, A., & Chavan, B. S. (2011). *Factors associated with treatment lag in mental health care*. https://api.semanticscholar.org/CorpusID:73885613

Gilbody, S., Littlewood, E., Hewitt, C., Brierley, G., Tharmanathan, P., Araya, R., Barkham, M., Bower, P., Cooper, C., Gask, L., Kessler, D., Lester, H., Lovell, K., Parry, G., Richards, D. A., Andersen, P., Brabyn, S., Knowles, S., Shepherd, C., … White, D. (2015). Computerised cognitive behaviour therapy (cCBT) as treatment for depression in primary care (REEACT trial): Large scale pragmatic randomised controlled trial. *BMJ*, *351*, h5627. https://doi.org/10.1136/bmj.h5627

Glasgow, R. E., & Estabrooks, P. E. (2018). Pragmatic Applications of RE-AIM for Health Care Initiatives in Community and Clinical Settings. *Preventing Chronic Disease*, *15*, 170271. https://doi.org/10.5888/pcd15.170271

Glasgow, R. E., Vogt, T. M., & Boles, S. M. (1999). Evaluating the public health impact of health promotion interventions: The RE-AIM framework. *American Journal of Public Health*, *89*(9), 1322–1327. https://doi.org/10.2105/AJPH.89.9.1322

Graham, A. K., Lattie, E. G., Powell, B. J., Lyon, A. R., Smith, J. D., Schueller, S. M., Stadnick, N. A., Brown, C. H., & Mohr, D. C. (2020). Implementation strategies for digital mental health interventions in health care settings. *American Psychologist*, *75*(8), 1080–1092. https://doi.org/10.1037/amp0000686

Haimi, M., (2023). Challenges and attitudes of the elderly population in using telemedicine services during the COVID-19 pandemic. *Evidence Based Nursing*, *26*(3), 115. https://doi.org/10.1136/ebnurs-2022-103660

Haldane, V., Chuah, F. L. H., Srivastava, A., Singh, S. R., Koh, G. C. H., Seng, C. K., & Legido-Quigley, H. (2019). Community participation in health services development, implementation, and evaluation: A systematic review of empowerment, health, community, and process outcomes. *PloS one*, *14*(5), e0216112. https://doi.org/10.1371/journal.pone.0216112

Hedman, E., Andersson, G., Ljótsson, B., Andersson, E., Rück, C., Mörtberg, E., & Lindefors, N. (2011). Internet-Based Cognitive Behavior Therapy vs. Cognitive Behavioral Group Therapy for Social Anxiety Disorder: A Randomized Controlled Non-inferiority Trial. *PLoS ONE*, *6*(3), e18001. https://doi.org/10.1371/journal.pone.0018001

Heponiemi, T., Kaihlanen, A.-M., Kouvonen, A., Leemann, L., Taipale, S., & Gluschkoff, K. (2022). The role of age and digital competence on the use of online health and social care services: A cross-sectional population-based survey. *DIGITAL HEALTH*, *8*, 20552076221074484. https://doi.org/10.1177/20552076221074485

Hermes, E. D., Lyon, A. R., Schueller, S. M., & Glass, J. E. (2019). Measuring the Implementation of Behavioral Intervention Technologies: Recharacterization of Established Outcomes. *J Med Internet Res*, *21*(1), e11752. https://doi.org/10.2196/11752

Hernandez-Ramos, R., Aguilera, A., Garcia, F., Miramontes-Gomez, J., Pathak, L. E., Figueroa, C. A., & Lyles, C. R. (2021). Conducting Internet-Based Visits for Onboarding Populations with Limited Digital Literacy to an mHealth Intervention: Development of a Patient-Centered Approach. *JMIR Form Res*, *5*(4), e25299. https://doi.org/10.2196/25299

Hickin, N., Käll, A., Shafran, R., Sutcliffe, S., Manzotti, G., & Langan, D. (2021). The effectiveness of psychological interventions for loneliness: A systematic review and meta-analysis. Clinical Psychology Review, 88, 102066. https://doi.org/10.1016/j.cpr.2021.102066

Hirsch, A., Luellen, J., Holder, J. M., Steinberg, G., Dubiel, T., Blazejowskyj, A., & Schladweiler, K. (2017). Managing Depressive Symptoms in the Workplace Using a Web-Based Self-Care Tool: A Pilot Randomized Controlled Trial. *JMIR Research Protocols*, *6*(4), e51. https://doi.org/10.2196/resprot.7203

Hirsch, A., myStrength, Albright, J., Methods Consultants, Link, A. (2011). DIGITAL TOOLS FOR CHRONIC PAIN MANAGEMENT: An innovative approach to building awareness of non-opioid based pain management techniques. myStrength. Retrieved from https://www.samhsa.gov/data/release/2020-national-survey-drug-use-and-health-nsduh-releases#annual-national-report

Holt-Lunstad, J. (2021). A pandemic of social isolation? *World Psychiatry*, *20*(1), 55–56. https://doi.org/10.1002/wps.20839

Hughes, M. E., Waite, L. J., Hawkley, L. C., & Cacioppo, J. T. (2004). A Short Scale for Measuring Loneliness in Large Surveys: Results From Two Population-Based Studies. *Research on Aging*, *26*(6), 655–672. https://doi.org/10.1177/0164027504268574

Inan, O. T., Tenaerts, P., Prindiville, S. A., Reynolds, H. R., Dizon, D. S., Cooper-Arnold, K., Turakhia, M., Pletcher, M. J., Preston, K. L., Krumholz, H. M., Marlin, B. M., Mandl, K. D., Klasnja, P., Spring, B., Iturriaga, E., Campo, R., Desvigne-Nickens, P., Rosenberg, Y., Steinhubl, S. R., & Califf, R. M. (2020). Digitizing clinical trials. *Npj Digital Medicine*, *3*(1), 101. https://doi.org/10.1038/s41746-020-0302-y

James, C. V., Moonesinghe, R., Wilson-Frederick, S. M., Hall, J. E., Penman-Aguilar, A., & Bouye, K. (2017). Racial/Ethnic Health Disparities Among Rural Adults—United States, 2012–2015. *MMWR. Surveillance Summaries*, *66*(23), 1–9.

Kaihlanen, A.-M., Virtanen, L., Buchert, U., Safarov, N., Valkonen, P., Hietapakka, L., Hörhammer, I., Kujala, S., Kouvonen, A., & Heponiemi, T. (2022). Towards digital health equity—A qualitative study of the challenges experienced by vulnerable groups in using digital health services in the COVID-19 era. *BMC Health Services Research*, *22*(1), 188. https://doi.org/10.1186/s12913-022-07584-4

Karyotaki, E., Efthimiou, O., Miguel, C., Bermpohl, F. M. genannt, Furukawa, T. A., Cuijpers, P., Individual Patient Data Meta-Analyses for Depression (IPDMA-DE) Collaboration, Riper, H., Patel, V., Mira, A., Gemmil, A. W., Yeung, A. S., Lange, A., Williams, A. D., Mackinnon, A., Geraedts, A., van Straten, A., Meyer, B., Björkelund, C., … Forsell, Y. (2021). Internet-Based Cognitive Behavioral Therapy for Depression: A Systematic Review and Individual Patient Data Network Meta-analysis. *JAMA Psychiatry*, *78*(4), 361. https://doi.org/10.1001/jamapsychiatry.2020.4364

Kazdin, A. E., & Blase, S. L. (2011). Rebooting Psychotherapy Research and Practice to Reduce the Burden of Mental Illness. *Perspectives on Psychological Science: A Journal of the Association for Psychological Science*, *6*(1), 21–37. https://doi.org/10.1177/1745691610393527

King, D. K., Glasgow, R. E., & Leeman-Castillo, B. (2010). Reaiming RE-AIM: Using the Model to Plan, Implement, and Evaluate the Effects of Environmental Change Approaches to Enhancing Population Health. *American Journal of Public Health*, *100*(11), 2076–2084. https://doi.org/10.2105/AJPH.2009.190959

Ku, B. S., Li, J., Lally, C., Compton, M. T., & Druss, B. G. (2021). Associations between mental health shortage areas and county-level suicide rates among adults aged 25 and older in the USA, 2010 to 2018. *General Hospital Psychiatry*, *70*, 44–50. https://doi.org/10.1016/j.genhosppsych.2021.02.001

Kumar, V., Sattar, Y., Bseiso, A., Khan, S., & Rutkofsky, I. H. (2017). The Effectiveness of Internet-Based Cognitive Behavioral Therapy in Treatment of Psychiatric Disorders. *Cureus*. https://doi.org/10.7759/cureus.1626

Kumpfer, K. L., Scheier, L. M., & Brown, J. (2020). Strategies to Avoid Replication Failure With Evidence-Based Prevention Interventions: Case Examples From the Strengthening Families Program. *Evaluation & the Health Professions*, *43*(2), 75–89. https://doi.org/10.1177/0163278718772886

Kwan, B. M., McGinnes, H. L., Ory, M. G., Estabrooks, P. A., Waxmonsky, J. A., & Glasgow, R. E. (2019). RE-AIM in the Real World: Use of the RE-AIM Framework for Program Planning and Evaluation in Clinical and Community Settings. *Frontiers in Public Health*, *7*. https://www.frontiersin.org/articles/10.3389/fpubh.2019.00345

Lattie, E. G., Nicholas, J., Knapp, A. A., Skerl, J. J., Kaiser, S. M., & Mohr, D. C. (2020). Opportunities for and Tensions Surrounding the Use of Technology-Enabled Mental Health Services in Community Mental Health Care. *Administration and Policy in Mental Health and Mental Health Services Research*, *47*(1), 138–149. https://doi.org/10.1007/s10488-019-00979-2

Law, N., Woo, N., Torre, J. de la, & Wong, G. (2018). *A global framework of reference on digital literacy skills for indicator 4.4.2*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000265403

Lieberz, J., Shamay-Tsoory, S. G., Saporta, N., Esser, T., Kuskova, E., Stoffel-Wagner, B., Hurlemann, R., & Scheele, D. (2021). Loneliness and the Social Brain: How Perceived Social Isolation Impairs Human Interactions. *Advanced Science*, *8*(21), 2102076. https://doi.org/10.1002/advs.202102076

Linardon, J., Cuijpers, P., Carlbring, P., Messer, M., & Fuller-Tyszkiewicz, M. (2019). The efficacy of app-supported smartphone interventions for mental health problems: A meta-analysis of randomized controlled trials. *World Psychiatry*, *18*(3), 325–336. https://doi.org/10.1002/wps.20673

Lyles, C. R., Tieu, L., Sarkar, U., Kiyoi, S., Sadasivaiah, S., Hoskote, M., Ratanawongsa, N., & Schillinger, D. (2019). A Randomized Trial to Train Vulnerable Primary Care Patients to Use a Patient Portal. *Journal of the American Board of Family Medicine : JABFM*, *32*(2), 248–258. https://doi.org/10.3122/jabfm.2019.02.180263

Masi, C. M., Chen, H.-Y., Hawkley, L. C., & Cacioppo, J. T. (2011). A Meta-Analysis of Interventions to Reduce Loneliness. *Personality and Social Psychology Review*, *15*(3), 219–266. https://doi.org/10.1177/1088868310377394

Mohr, D. C., Azocar, F., Bertagnolli, A., Choudhury, T., Chrisp, P., Frank, R., Harbin, H., Histon, T., Kaysen, D., Nebeker, C., Richards, D., Schueller, S. M., Titov, N., Torous, J., & Areán, P. A. (2021). Banbury Forum consensus statement on the path forward for digital mental health treatment. *Psychiatric Services*, *72*(6), 677–683. https://doi.org/10.1176/appi.ps.202000561

Montgomery, R. M., Brandysky, L., Neary, M., Eikey, E., Mark, G., Schneider, M., Stadnick, N. A., Zheng, K., Mukamel, D. B., Sorkin, D. H., & Schueller, S. M. (2021). Curating the Digital Mental Health Landscape With a Guide to Behavioral Health Apps: A County-Driven Resource. *Psychiatric Services (Washington, D.C.)*, *72*(10), 1229–1232. https://doi.org/10.1176/appi.ps.202000803

Mordecai, Histon Trina, Neuwirth Estee, Heisler W. Scott, Kraft Aubrey, Bang Young, Franchino Karen, Taillac Cosette, & Nixon J. Peter. (2021). How Kaiser Permanente Created a Mental Health and Wellness Digital Ecosystem. *NEJM Catalyst*, *2*(1). https://doi.org/10.1056/CAT.20.0295

myStrength. 2024. URL: https://mystrength.com/ [accessed 2024-5-22]

Naslund, J. A., Shidhaye, R., & Patel, V. (2019). Digital Technology for Building Capacity of Nonspecialist Health Workers for Task Sharing and Scaling Up Mental Health Care Globally. *Harvard review of psychiatry*, *27*(3), 181–192. https://doi.org/10.1097/HRP.0000000000000217

National Academies of Sciences, Engineering, and Medicine. (2020). *Social Isolation and Loneliness in Older Adults: Opportunities for the Health Care System* (p. 25663). National Academies Press. https://doi.org/10.17226/25663

Nebeker, C., Murray, K., Holub, C., Haughton, J., & Arredondo, E. M. (2017). Acceptance of Mobile Health in Communities Underrepresented in Biomedical Research: Barriers and Ethical Considerations for Scientists. *JMIR MHealth and UHealth*, *5*(6), e87. https://doi.org/10.2196/mhealth.6494

Pereira, D. G., Afonso, A., & Medeiros, F. M. (2015). Overview of Friedman's Test and Post-hoc Analysis. *Communications in Statistics - Simulation and Computation*, *44*(10), 2636–2653. https://doi.org/10.1080/03610918.2014.931971

Ramos, G., Hernandez-Ramos, R., Taylor, M., & Schueller, S. M. (2024). State of the Science: Using Digital Mental Health Interventions to Extend the Impact of Psychological Services. *Behavior Therapy*. https://doi.org/10.1016/j.beth.2024.04.004

Raue, P. J., Fridling, N., Song, J., Hull, T. D., Alexopoulos, G. S., & Arean, P. A. (2022). Message-based psychotherapy for older adults: A cohort comparison study. *Frontiers in Psychiatry*, *13*, 951354. https://doi.org/10.3389/fpsyt.2022.951354

SAMHSA. (2020). *Key Substance Use and Mental Health Indicators in the United States: Results from the 2020 National Survey on Drug Use and Health*. Substance Abuse and Mental Health Services Administration. https://www.samhsa.gov/data/sites/default/files/reports/rpt35325/NSDUHFFRPDFWHTMLFiles2020/2020NSDUHFFR1PDFW102121.pdf

Santini, Z. I., Jose, P. E., York Cornwell, E., Koyanagi, A., Nielsen, L., Hinrichsen, C., Meilstrup, C., Madsen, K. R., & Koushede, V. (2020). Social disconnectedness, perceived isolation, and symptoms of depression and anxiety among older Americans (NSHAP): A longitudinal mediation analysis. *The Lancet Public Health*, *5*(1), e62–e70. https://doi.org/10.1016/S2468-2667(19)30230-0

Scheff, S. W. (2016). Chapter 8—Nonparametric Statistics. In S. W. Scheff (Ed.), *Fundamental Statistical Principles for the Neurobiologist* (pp. 157–182). Academic Press. https://doi.org/10.1016/B978-0-12-804753-8.00008-7

Schladweiler, K., Hirsch, A., Jones, E., & Snow, L. B. (2017). Real-World Outcomes Associated with a Digital Self-Care Behavioral Health Platform. *Annals of Clinical Research and Trails*. https://scientonline.org/open-access/real-world-outcomes-associated-with-a-digital-self-care-behavioral-health-platform.pdf

Schueller, S. M., & Torous, J. (2020). Scaling evidence-based treatments through digital mental health. *American Psychologist*, *75*(8), 1093–1104. https://doi.org/10.1037/amp0000654

Schueller, S. M., Muñoz, R. F., & Mohr, D. C. (2013). Realizing the Potential of Behavioral Intervention Technologies. *Current Directions in Psychological Science*, *22*(6), 478–483. https://doi.org/10.1177/0963721413495872

Schueller, S. M., Tomasino, K. N., & Mohr, D. C. (2017). Integrating Human Support Into Behavioral Intervention Technologies: The Efficiency Model of Support. *Clinical Psychology: Science and Practice*, *24*(1), 27–45. https://doi.org/10.1111/cpsp.12173

Sepúlveda-Loyola, W., Rodríguez-Sánchez, I., Pérez-Rodríguez, P., Ganz, F., Torralba, R., Oliveira, D. V., & Rodríguez-Mañas, L. (2020). Impact of Social Isolation Due to COVID-19 on Health in Older People: Mental and Physical Effects and Recommendations. *The Journal of Nutrition, Health & Aging*, *24*(9), 938–947. https://doi.org/10.1007/s12603-020-1500-7

Smith, K. J., Gavey, S., RIddell, N. E., Kontari, P., & Victor, C. (2020). The association between loneliness, social isolation and inflammation: A systematic review and meta-analysis.

Neuroscience & Biobehavioral Reviews, *112*, 519–541. https://doi.org/10.1016/j.neubiorev.2020.02.002

Stirman, S. W., Baumann, A. A., & Miller, C. J. (2019). The FRAME: An expanded framework for reporting adaptations and modifications to evidence-based interventions. *Implementation Science*, *14*(1), 58. https://doi.org/10.1186/s13012-019-0898-y

Tabak, R. G., Khoong, E. C., Chambers, D. A., & Brownson, R. C. (2012). Bridging Research and Practice. *American Journal of Preventive Medicine*, *43*(3), 337–350. https://doi.org/10.1016/j.amepre.2012.05.024

Titov, N., Dear, B. F., Nielssen, O., Wootton, B., Kayrouz, R., Karin, E., Genest, B., Bennett-Levy, J., Purtell, C., Bezuidenhout, G., Tan, R., Minissale, C., Thadhani, P., Webb, N., Willcock, S., Andersson, G., Hadjistavropoulos, H. D., Mohr, D. C., Kavanagh, D. J., … Staples, L. G. (2020). User characteristics and outcomes from a national digital mental health service: An observational study of registrants of the Australian MindSpot Clinic. The Lancet Digital Health, 2(11), e582–e593. https://doi.org/10.1016/S2589-7500(20)30224-7

Trucharte, A., Calderón, L., Cerezo, E., Contreras, A., Peinado, V., & Valiente, C. (2021). Three-item loneliness scale: Psychometric properties and normative data of the Spanish version. *Current Psychology*, *42*(9), 7466–7474. https://doi.org/10.1007/s12144-021-02110-x

United States Census Bureau. (2022). *Quick Facts United States*. U.S. Census Bureau. https://www.census.gov/quickfacts/fact/table/US/PST040222

United States Department of Health and Human Services. (2023). Our Epidemic of Loneliness and Isolation: The U.S. Surgeon General's Advisory on the Healing Effects of Social

Connection and Community. United States Department of Health and Human Services. https://www.hhs.gov/sites/default/files/surgeon-general-social-connection-advisory.pdf

van Deursen, A. J. A. M., Helsper, E., & Eynon, R. (2014). *Measuring digital skills: From digital skills to tangible outcomes*. https://eprints.lse.ac.uk/59996/

Werntz, A., Amado, S., Jasman, M., Ervin, A., & Rhodes, J. E. (2023). Providing Human Support for the Use of Digital Mental Health Interventions: Systematic Meta-review. *J Med Internet Res*, *25*, e42864. https://doi.org/10.2196/42864

World Health Organization. (2018). *Classification of digital health interventions v1.0: A shared language to describe the uses of digital technology for health*. World Health Organization. https://apps.who.int/iris/handle/10665/260480

Yardley, L., Choudhury, T., Patrick, K., & Michie, S. (2016). Current Issues and Future Directions for Research Into Digital Behavior Change Interventions. *American Journal of Preventive Medicine*, *51*(5), 814–815. https://doi.org/10.1016/j.amepre.2016.07.019