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Cognitive and Behavioral Practice 29 (2022) 883–901

Cognitive and Behavioral Practice

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Is There an App for That? A Review of Popular Apps for Depression, Anxiety, and Well-Being

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Smartphone apps for mental health (MH apps) and wellness reach millions of people and have the potential to reduce the public health burden of common mental health problems. Thousands of MH apps are currently available, but real-world consumers generally gravitate toward a very small number of them. Given their widespread use and the lack of empirical data on their effects, understanding the content within MH apps is an important public health priority. An overview of the content within these apps could be an important resource for users, clinicians, researchers, and experts in digital health. Here, we offer summaries of the content within highly popular MH apps. Our aim is not to provide comprehensive coverage of the MH app space. Rather, we sought to describe a small number of highly popular MH apps in three common categories: meditation and mindfulness, journaling and self-monitoring, and AI chatbots. We downloaded the two most popular apps in each of these categories (respectively: Calm, Headspace; Reflectly, Daylio; Replika, Wysa). These six apps accounted for 83% of monthly active users of MH apps. For each app, we summarize information in four domains: intervention content, features that may contribute to engagement, the app's target audience, and differences between the app's free version and its premium version. In the years ahead, rigorous evaluations of highly popular MH apps will be needed. Until then, we hope that this overview helps readers stay up-to-date on the content within some of the most widely used digital mental health interventions.

Depression and anxiety are the two most common mental disorders and are leading contributors to the global burden of disease (Ferrari et al., 2014). Although empirically supported treatments exist for these conditions, most people in need of support do not receive treatments (Kazdin & Blasé, 2011). Structural barriers to treatment access include high costs, low supply and availability of clinicians, and unequal access to health care resources. Attitudinal barriers include stigma toward professional treatments, skepticism about the effectiveness of treatment, and preferences for self-help (Andrade et al., 2014; Gulliver et al., 2010). Among people with mental illnesses who do not access treatment, over 60% report a desire to handle the problem on their own (Andrade et al., 2014). Given that 51% of the global population and 87% of the U.S. population uses the Internet (World Bank Group, 2019), digital interventions—those delivered via the Internet or via smartphones—have the potential to expand access to mental health care (Fairburn & Patel, 2017; Kazdin, 2017). Additionally, digital self-help interventions have the potential to appeal to individuals who prefer addressing problems on their own.

There has been an especially strong interest in understanding mental health apps (MH apps), which may be able to expand access to care worldwide at low costs. Examples of well-studied apps include IntelliCare, a skills-based app that incorporates content from cognitive-behavioral therapy, acceptance and commitment therapy, and positive psychology (see Mohr et al., 2017), and PTSD Coach, an evidence-based app developed by the U.S. Department of Veterans Affairs (Kuhn et al., 2014). Although meta-analyses suggest that MH apps can be effective for depression and anxiety (Firth et al., 2017; Josephine et al., 2017; Linardon et al., 2017), there are major differences between the kinds of apps studied in the peer-reviewed literature

Keywords: digital mental health; mHealth; smartphone apps; public health

and those that consumers encounter on the app store. This "digital research–practice gap" or "research-to-retail gap" suggests that findings from meta-analyses (which focus exclusively on analyzing apps that are studied in the peer-reviewed literature) may not generalize to publicly available apps that consumers and patients are likely to encounter (Wasil et al., 2019; Wasil, Gillespie, Patel et al., 2020a).

Recent estimates suggest that there are over 325,000 publicly available mobile apps for health and wellness, with 78,000 added in 2017 alone (Pohl, 2017). The majority of these apps are self-help apps, in which users learn skills and complete exercises without guidance from a coach or therapist (Wasil et al., 2019). Unfortunately, publicly available MH apps are rarely studied in empirical trials (Donker et al., 2013; Lau et al. 2020). For example, in a recent systematic review of over 1,000 publicly available MH apps, Lau et al. (2020) found that only 2% of apps had been tested in scientific studies. Additionally, smartphone apps that are known to be effective generally focus on practices from cognitive-behavioral therapy, whereas popular apps tend to focus on a broader variety of content (Linardon et al., 2019; Wasil, Gillespie, Patel et al., 2020a).

In the absence of scientific trials, investigators have attempted to evaluate MH apps using alternative approaches. One common approach is to conduct a *content analysis* of apps in a given category. In a content analysis, investigators examine the presence or absence of certain content in a set of MH apps. For example, in one recent review, the authors reviewed techniques that commonly appeared in empirically supported treatments for depression and anxiety (e.g., cognitive restructuring, behavioral activation, exposure). They then examined the presence or absence of each technique in publicly available apps for depression and anxiety (Wasil et al., 2019). In another, Bakker et al. (2016) examined the extent to which MH apps incorporated evidence-based recommendations from literature on mental health interventions, user engagement, and the science of behavior change. Content analyses have also been applied to examine apps for stress management (Coulon et al., 2016), physical activity (Yang et al., 2015), and eating disorders (Fairburn & Rothwell, 2015; Juarascio et al., 2015; Wasil, Patel et al., 2021). Although content analyses are useful, they are usually targeted at scientific audiences, rather than clinicians and consumers. In recent years, some tools have emerged to directly help consumers and clinicians as they navigate crowded app stores. Examples include PsyberGuide (Neary & Schueller, 2018) and the App Evaluation Model endorsed by the American Psychiatric Association (Lagan et al., 2020).

One limitation to current app evaluation approaches is that they tend to provide summaries of a large number of apps, rather than detailed overviews of a subset of the most widely used apps. This limitation is especially noteworthy given insights about the reach and dissemination of MH apps. Recent estimates suggest that some MH apps attract and retain a disproportionately large number of users. In one study of publicly available apps for depression and anxiety, Wasil, Gillespie, Shingleton et al. (2020b) found that the three most popular apps accounted for about 90% of total monthly active users (MAUs). More recently, investigators found similar trends across a variety of categories. They estimated the minimum number of apps required to reach 90% of MAUs (the "number needed to reach 90" [NNR-90]) across a variety of health and wellness categories. Across eight health and wellness categories, NNR-90 values ranged from 2 (for schizophrenia) to 25 (for fitness), indicating that 2–25 apps were needed to account for 90% of a category's total number of MAUs (Wasil, Gillespie, Schell et al., 2021). Thus, although there are thousands of MH apps, it seems that a small fraction of highly popular apps is reaching real-world users. Given that users are most likely to encounter a limited subset of apps, there is a need to inform consumers and clinicians about these apps. Currently, however, few resources exist to provide detailed overviews of the content of the most popular apps.

In this paper, we aim to review highly popular self-help apps for depression and anxiety. Previous reviews have focused on examining the extent to which self-help apps include evidence-based content (e.g., Bry et al., 2018; Huguet et al., 2016; Wasil et al., 2019). Unlike these traditional content analyses, our aim was not to provide an exhaustive overview of a large number of apps. Rather, our objective is to provide clinicians and consumers with clear, simple, and practical information about some of the most widely used MH apps. More specifically, we had three aims, corresponding to three different stakeholder groups:

- *Consumers and clinicians.* We aim to provide a resource that can help clinicians, researchers, and consumers quickly understand the different kinds of popular MH apps. When possible, we have provided screenshots and examples to illustrate the features in each app and help readers get a "taste" of these apps. Such information may be of interest to clinicians who are discussing MH apps with their clients, as well as consumers who are interested in downloading an MH app.
- *App developers.* We aim to provide app developers with relevant information about commercially popular MH apps. App developers may benefit from an

increased understanding of the content within popular MH apps (so that they do not make apps that are redundant with existing options), as well as features that may contribute to the engagement of MH apps (so that they can consider incorporating these features in new apps).

- *Researchers.* We aim to provide a template that can be used in future reviews of MH apps. Previous work has emphasized the importance of performing clinician-friendly and consumer-friendly evaluations of highly popular MH apps (e.g., Wasil, Gillespie, Schell et al., 2021), but little guidance is available on how to perform such reviews. We believe that our methods (e.g., search strategy, inclusion criteria, framework for structuring the content and features within each app) could provide a starting point for digital health researchers who wish to perform reviews of popular health and wellness apps in other categories (e.g., eating disorders, physical health conditions).

Method

Search Strategy

We searched the Apple app store and the Google play store in September of 2020. On each app store, we searched the terms "depression" and "anxiety," and we screened the top 50 search hits for each search term. We limited our search in this way in order to identify popular MH apps that would be most frequently encountered and used by app consumers.

We excluded MH apps that were not intended to offer support, information, or intervention content, to individuals with depression or anxiety. We included apps that were designed to target multiple mental health concerns (e.g., depression, anxiety, and eating disorders) and general wellness apps (e.g., apps to "reduce stress" or "improve your mood"), as long as the app included content targeting depression or anxiety. To apply our inclusion criteria, the first two authors independently reviewed the app store description of each app identified in the search. Apps were included if the description (a) mentioned therapeutic content that is commonly included in interventions for depression and anxiety (Chorpita & Daleiden, 2009; Higa-McMillan, Francis, Rith-Najarian, & Chorpita, 2016) or (b) stated that the app was designed to help people reduce depression/anxiety or improve mental health/well-being. Through this process, we identified 116 unique MH apps. Of these 116 apps, 20 were available only on iPhones, 32 were available only on Androids, and 64 were available on both platforms. Then, based on the app store descriptions and usage of the app, these authors classified the apps as (a) unguided self-help (i.e., users learn content on their own without human support), (b) guided self-help (i.e., users learn content on their own with support from a coach or therapist), or (c) not self-help (i.e., users learn content only from a coach or therapist). The authors also classified apps according to their primary function based on the app store description of the intervention (e.g., apps that included mindfulness in their app store description were classified as mindfulness apps).

Acquisition of Usage Data

We obtained estimates of MAUs in the United States. MAUs refer to the number of unique users who opened an app in a 1-month time frame—estimates were collected for the period from October to early November 2020. Unlike metrics like downloads and app store ratings, MAUs provide a direct estimate of the number of people who actually use each app (see Wasil, Gillespie, Shingleton et al., 2020). Estimates were obtained from Mobile Action, a mobile application intelligence platform that tracks real-world app usage by integrating public data (e.g., an app's ranking, star ratings, user reviews) and private data (e.g., information gathered from app developers) to generate estimates. Data from Mobile Action have been used in previous analyses and offer trends that are consistent with other mobile application intelligence platforms (see Wasil, Gillespie, Shingleton et al., 2020).

Selection of Apps

We sought to focus on popular self-help apps that have attracted the largest share of MAUs. We also sought to review apps that offered different kinds of intervention content, in order to provide readers with an overview of a variety of MH apps. As a result, we classified the apps into categories based on their main function or purpose. A.R.W. and E.H.P. surveyed the top 20 apps (which accounted for 98% of total MAUs). Among the 20 most popular apps, 18 were unguided self-help apps (i.e., apps that did not involve a provider). Sixteen of these 18 apps focused on three kinds of interventions: 9 apps focused on mindfulness and meditation, 4 apps focused on journaling and self-monitoring, 2 apps were artificial intelligence (AI) chatbots, and 1 app included a mix of mindfulness/meditation and journaling/self-monitoring. Two apps did not fall into any of these categories (one offered users positive affirmations, and one focused on forming a new routine).

Thus, among the top 20 apps, apps tended to fall into three categories. We describe the two most popular apps in each category: Calm and Headspace (mindfulness and meditation), Reflectly and Daylio

(journaling and self-monitoring), and Replika and Wysa (AI chatbots).

Description of Apps

A.R.W. and E.H.P. downloaded and used each of the six apps. Our approach to describing the apps was informed by thematic analysis (Braun & Clarke, 2006). After an initial phase of exploring each app, we identified four areas of interest: content (describing the main information and exercises within each app), engagement (describing features that may contribute to user experience and sustained use of the app), intended uses (identifying the app's target audience or target problem area), and free versus premium content (distinguishing the content available for free from the content available in the app's premium version). We then explored each app with these themes in mind; each app was used until we reached saturation for each theme—the point at which we no longer encountered novel material (see Braun & Clarke, 2006). Additionally, each app was used for a minimum of 60 minutes. Each app also had both a free version and a premium (paid) version. The free version of each app was explored first. Then, after reaching saturation in the free version of the app, the premium version of the app was downloaded and coded using the same thematic analysis procedure described above. After reviewing the content within the apps, A.R.W. and E.H.P. discussed relevant content to include under each topic. Decisions were made via consensus; disagreements were resolved and revisions were made via discussion with L.L-U. and R.J.D.

Results

Usage Data

Consistent with previous research on MH apps, the distribution of MAUs was highly skewed (see Figure 1). Based on our estimates of MAUs, the mindfulness and meditation apps appear to be the most popular: Headspace and Calm accounted for 13.4 million users, Replika and Wysa accounted for 1.5 million users, and Reflectly and Daylio accounted for 840,000 users. These six apps accounted for 83% of the total MAUs.

Descriptions of Apps

All six apps were unguided self-help apps. Below, we describe the content and features within mindfulness apps (see Table 1), journaling and self-monitoring apps (see Table 2), and chatbot apps (see Table 3). Unless otherwise stated, the content reviewed is derived from what users would experience while using the free version of each app.

Headspace (Mindfulness)

Overview

Headspace is a mindfulness and meditation app designed to introduce users to the concepts and practice of meditation. Research on Headspace has shown that the app can improve mindfulness (Economides et al., 2018; Wen et al., 2017) and lead to reduced stress and irritability (Economides et al., 2018). When first opening Headspace, users are prompted to create an account with their name and e-mail address. Users then choose one topic from a list of "What's on your mind?" to start exploring with. Options include "managing everyday anxiety and stress," "sleeping soundly," "being more active," "trying something new," and "staying focused." When users enter the app, they are encouraged to begin exploring and practicing with the "Basics" course, designed to introduce the fundamentals of meditation. Though this is the only full course users have access to with the free version, they are able to access several standalone single-session meditations. Users are able to freely explore the content and courses as they move through the app.

Content

Headspace includes meditations derived from a variety of techniques, including focused attention (breathing to focus attention), body scans (noticing different sensations, discomfort, and tension in the body), visualization (picturing something), and loving kindness (thinking of another person and directing kindness toward the self and others). Similar kinds of techniques have been used in different mindfulness-based therapies (e.g., body scans as a grounding technique in anxiety and loving-kindness meditation for posttraumatic stress disorder [PTSD]; Call et al., 2014; Kearney et al., 2013). Headspace consists mostly of guided meditation courses, made up of several individual sessions that focus on the same general topic. There are also single-session meditations, which are intended to stand alone, that range from 1 to 10 minutes. In each meditation, a prerecorded instructor guides users through meditation techniques and exercises, such as focused breathing and directed attention. The app is divided into sections for meditation, sleep, movement, and focus (see Figure 2a). Aside from the meditation sessions, there are also "SOS" sessions for more intense experiences, such as feeling overwhelmed, panicking, and being in pain (see Figure 2b). Users are encouraged to begin with the Basics course, which contains 10 guided meditation sessions with durations of 3–10

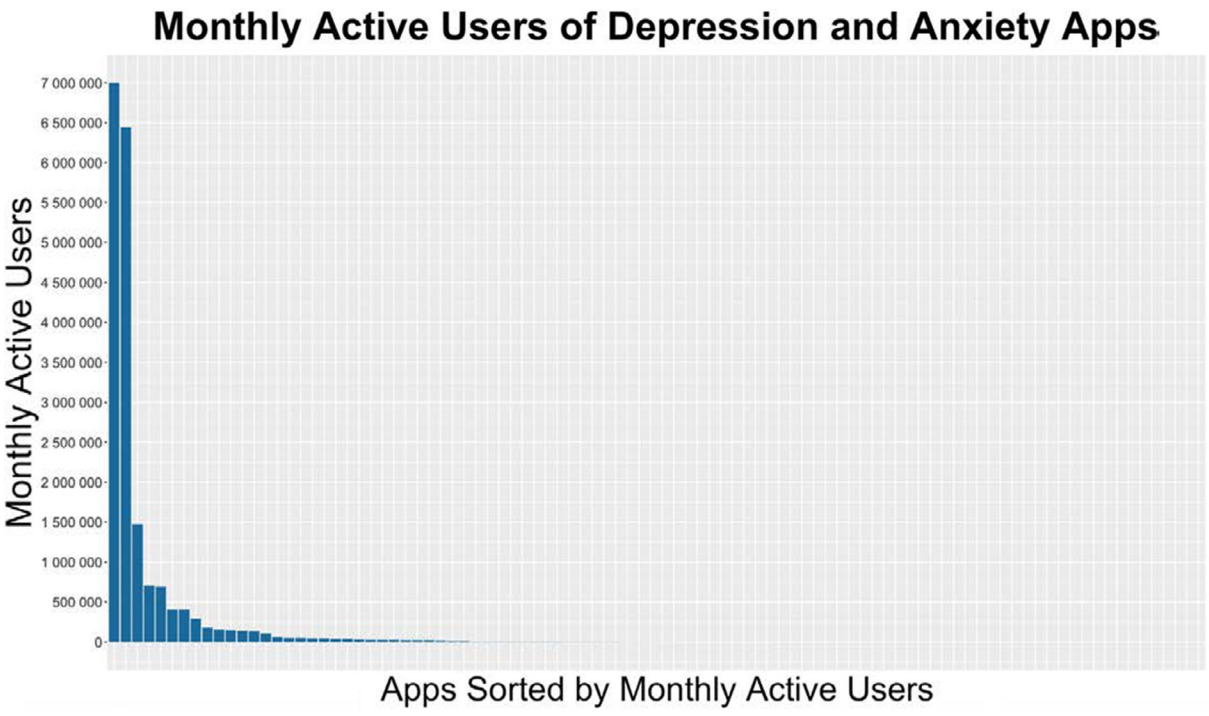

Figure 1. Monthly active users of depression and anxiety apps.

minutes each. In the first session of the Basics course, which lasts 4.5 minutes, users are led through a guided meditation in which they learn breathing techniques and practice becoming aware of their body and its sensations. Users are also instructed to appreciate the feeling of allowing the mind and body to breathe and relax. After completing a meditation, users are shown statistics, including how many minutes they have meditated in total, how many meditations they have completed, and a motivational quote (see Figure 2c).

Though users can choose what topics to focus on, most courses work progressively, with meditation sessions building upon skills learned in previous sessions. Each session ranges from 5 to 15 minutes. In the "Sleep" section, users can access specialized sleep meditations, such as wind downs for falling asleep and deep breathing, as well as soundscapes (i.e., background noises and scenes), though much of this content is reserved for premium users. The "Move" section of Headspace contains workout videos designed for reducing stress and other workouts informed by mindfulness. The "Focus" section contains music, exercises, and soundscapes designed to help improve attention.

Engagement

Users can choose to receive notifications for staying motivated, reminders to practice, and "mindful moment" notifications that show the user mindful thoughts throughout the day. Users can also complete monthly check-ins about anxious and stressful experiences to view their progress over time while using the app. iPhone users are also able to sync their progress in Headspace with the Apple Health App to track their daily use of the app. The user can also view a profile that includes information about their usage data (see Figure 2d).

Intended Uses

Headspace is not designed to target any specific mental health problem or dysfunction, but rather to promote mindfulness and well-being. Searching the app for "depression" yields no results, and gives the user a message stating "Sorry, we don't have any results for depression. Headspace isn't intended to cure, treat, or diagnose medical conditions or to produce the specific outcome you searched for." Searching for "anxiety" yields the same message—however, users are also directed to courses relating to stress and anxiety that may be of interest. Though there are several dozen "courses," and some of these address common mental health concerns (e.g., "Managing Anxiety," "Handling Sadness"), only a few of these courses, such as "Managing Anxiety" and "Transforming Anger," are included in the free version of the app. The "Managing Anxiety" course aims to provide users with the skills to understand and recognize anxiety and ultimately make the user at ease with anxiety. This course makes use of

Table 1
Comparison of Mindfulness and Meditation Apps (Headspace and Calm)

	Headspace	Calm
Content	• Divided into "Meditate," "Sleep," "Move," and "Focus" sections • Exercises include meditations, workouts, and playlists • Basic (unpaid) version gives access to five full courses and a variety of single-session meditations • Premium (paid) version gives access to the full content of the Headspace library, including an additional 45 courses and 66 single sessions • Includes SOS meditations for being overwhelmed, panicking, and dealing with pain (requires premium)	• Divided into "Sleep," "Meditate," "Music," and "Other" sections • Exercises include meditations, mood check-ins, playlists, and sleep stories • Basic (unpaid) version gives access to introductory sessions of about 14 courses, which each last approximately 10–15 minutes • Premium (paid) version gives access to the "Sleep" and "Music" sections of the app, as well as full access to all 74 meditation courses • Includes general courses (e.g., "How to Meditate") and specific courses (e.g., "Dealing With Anxiety," "Relationships")
Tracking	• Tracks time spent on the app, number of sessions completed, and average duration • Monthly mood check-ins	• Tracks overall "mindful minutes" (minutes spent engaging in app activities), number of sessions completed, and longest number of consecutive days of meditation • Daily check-ins for mood that contain some journaling features
Engagement	• Users do not set personal goals for using the app • Allows users to enable notifications to get reminders to meditate during the day and/or mindful quotes • Users cannot customize the aesthetics of the app • Users can choose the gender of the voice that guides the meditations	• Allows users to set goals for how often they'd like to use the app • Users can set reminders to stay on track with goals • Users can customize aesthetics, such as background screen • Users can choose the gender of the voice that guides the meditations
Basic versus premium subscription	• Access to 5 full courses are free and 12 single-session meditations are included (in total, about 10–20 hours of content) • Premium version required for specialized meditation courses, SOS meditations, and the majority of features in the "Sleep," "Move," and "Focus" sections • $69.99 annually for premium subscription	• Access to the full Confidence Series and introductory session for several courses is included in the free plan (in total, about 1–5 hours of content) • Daily check-ins and tracking statistics are available to users on the free plan • Premium version required for the full content of many specialized courses and the "Sleep" and "Music" sections • $69.99 annually for premium subscription

body scan and noting techniques to help users overcome their anxiety. Courses and single sessions aimed at anxiety make use of breathing techniques and overcoming anxiety by addressing tension and panic, therefore focusing on the physical aspects associated with anxiety. The app also offers courses intended to promote overall well-being (e.g., "Appreciation," "Acceptance").

Free Versus Premium Content

Many of the meditations in Headspace are restricted to premium users. For free, users can access five full courses ("Basics 1," "Managing Anxiety," "Relationships," "Navigating Change," and "Transforming Anger"), the first session of the "Basics 2" and "Mindful Eating" courses, and about a dozen single-session meditations. This gives users access to 10–20 hours of meditation content. The premium version of Headspace, costing $69.99 annually, offers several dozen full courses and 78 single-session meditations. The premium plan is also required to access the majority of content in the "Sleep," "Move," and "Focus" sections, with about one session in each being offered to users on the basic plan.

Table 2
Comparison of Journaling Apps (Reflectly and Daylio)

	Reflectly	Daylio
Content	• Journal entries can be created with text, photos, or voice notes • Users rate their mood on an emoji-based sliding scale and add features of their day related to their mood (e.g., friends, health, exercise) • Emphasizes journaling • Daily reflection prompts • Motivational quotes in a "Motivation Feed" • Users can view previous entries from the home page	• Journal entries are text based with the option of adding in photos • Users enter their mood on an emoji-based scale and add information relevant to their goals and other areas of tracking • Emphasizes both journaling and goal-setting behaviors • No other activities aside from journal entries and tracking • Users can view previous entries from the home page
Tracking	• Tracking is only available to premium users	• Tracks frequency of mood and associations between moods and activities • Tracks user progress toward goals and frequencies of tracked activities
Engagement	• Users can choose to receive notifications and customize their timing • No achievements or incentives to use the app more frequently	• Users can choose to set notifications and customize their timing • Users can unlock various achievements as they use the app more frequently
Basic versus premium subscription	• Users of the free version can access most features, but are restricted to five entries • With the premium plan, users can access various tracking statistics and quotes specialized to topics, such as positive thinking and self-esteem • Premium subscription costs $59.99 annually	• Users of the free version can access all journaling features, as well as many tracking statistics • With the premium plan, users can access additional emojis for mood ratings and additional advanced statistics • Premium subscription costs $2.99 monthly, or $35.88 annually

Calm (Mindfulness)

Overview

Calm is a mindfulness and meditation app that allows users to build mindfulness skills, practice meditations, and track moods and emotions over time. Previous research has demonstrated that Calm can improve mental well-being and improve mindfulness (Clarke & Draper, 2020; Huberty et al., 2019), even when used intermittently (Clarke & Draper, 2020). When users first enter the app, they are prompted to select reasons why they chose to download the app (e.g., building self-esteem, better sleep, reducing anxiety, developing gratitude). Users then complete a questionnaire measuring their anxiety symptoms and then choose the content they are interested in exploring, including guided meditations, breathing exercises, relaxing music, sleep stories, and soundscapes. Users are also asked to indicate how much prior experience they have with meditation. Users can then freely explore all of the app's features, including sections for sleep, meditation, and music (see Figure 3a).

Content

Calm teaches meditation content derived from mindfulness-based stress reduction (MBSR; the practice of noticing and accepting thoughts), Vipassana (insight practice based on observing sensation in the body), and loving-kindness meditations (directing positive feelings toward the self and others). MBSR has been shown as an effective method to reduce stress, anxiety, and distress (Khoury et al., 2015). Vipassana meditation and loving-kindness meditation have been shown to reduce subjective stress and increase self-kindness and mindfulness (Graser & Stangier, 2018; Szekeres & Wertheim, 2015). Calm focuses on mindfulness and meditation, but unlike Headspace, it also features mood tracking and daily check-ins. When completing a daily check-in, users select how they are feeling from a grid of emojis (see Figure 3b). The emoji is added to a calendar, and users are able to track their mood over time by viewing the emojis over the course of a month. Users can also add "tags" or mark off aspects of the day, such as work, school, and relationships, that are related to the mood.

Table 3
Comparison of AI Chatbot Apps (Replika and Wysa)

	Replika	Wysa
Content	• AI chatbot that focuses on unstructured conversations • Conversations are guided by the user and can be about anything • Contains a diary and a memory that the chatbot uses to store information about the user • Does not offer additional resources	• AI chatbot that focuses on structured conversations and therapeutic exercises • Conversations target specific problems and goals (e.g., building confidence, managing anxiety) • Contains a log of past conversations • Offers an "SOS" tab of resources (e.g., grounding exercises for panic attacks, domestic and international hotlines)
Engagement	• Notifications come through as "texts" throughout the day • Users can "level up" and gain points as they interact with the chatbot	• Notifications can be enabled to remind the user to use the app and notify the user when new exercises are available • No point collecting or other gamified features
Basic versus premium subscription	• Unstructured conversations are available with the free version of the app, as well as approximately 11 structured conversations • The premium version includes an additional 81 structured conversations, as well as voice calls and 11 activity-based conversations • Premium subscription costs $49.99 annually • No option to add a live therapist	• Unstructured conversations are available with the free version, as well as two full tool packs and the introduction to the rest • The premium version includes many additional exercises • Premium subscription costs $74.99 annually • Users can add a therapist who they have live chat sessions with for between $12 and $30 per 30-minute session

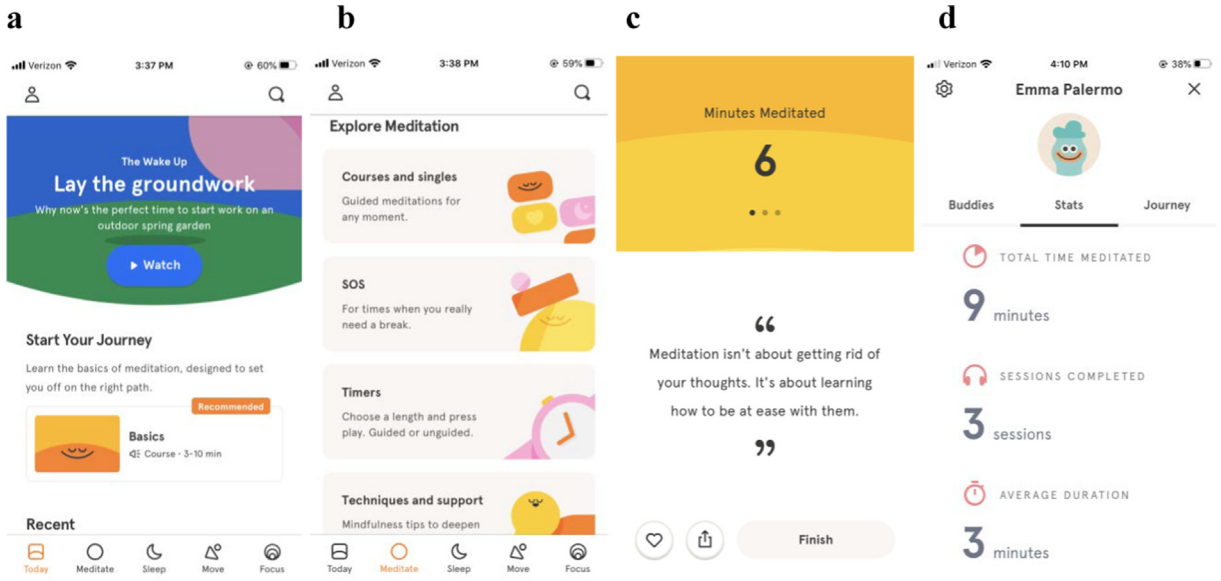

Figure 2. Sample images from Headspace.

Meditations in Calm are organized into courses that address a certain topic (e.g., sleep, anxiety, emotions). Each course contains several meditation sessions, lasting about 15 minutes each. Before beginning a meditation, users complete an optional mood check-in so that they can compare pre- and postmeditation mood. In the first session of "7 Days of Calming Anxiety" (see Figure 3c), users receive basic psychoeducation about

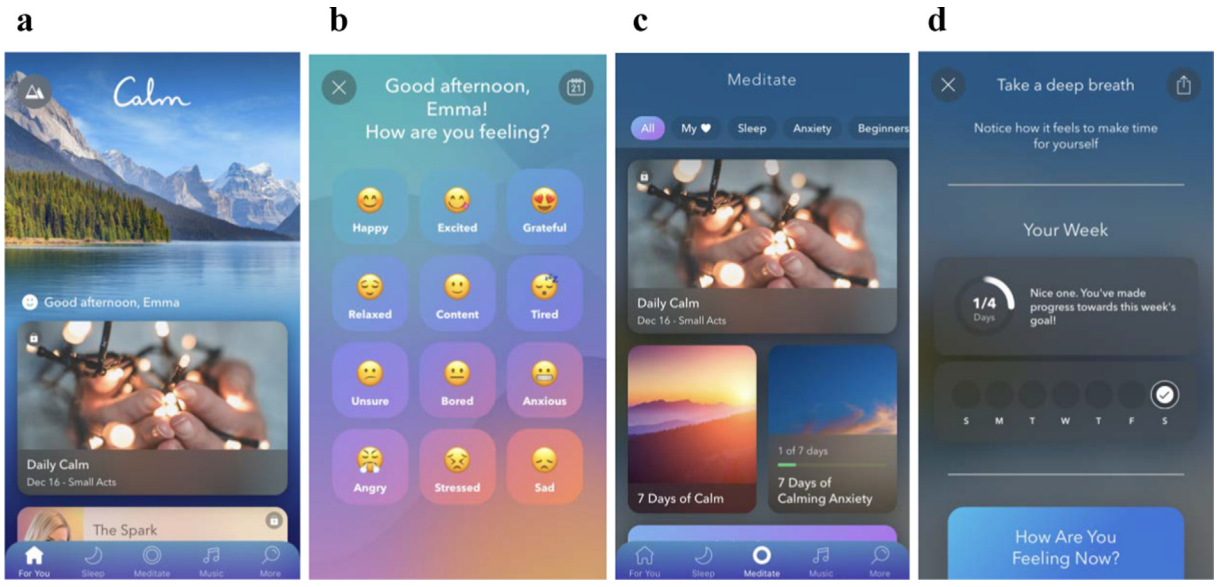

Figure 3. Sample images from Calm.

anxiety and its symptoms, as well as the ways in which meditation can reduce anxiety. Users are then introduced to a basic breathing exercise. During the exercise, users are instructed to focus on different parts of their body while completing a breathing exercise and to notice their sensations. After completing the meditation, users complete a postmeditation check-in and view their progress toward their weekly meditation goal (see Figure 3d).

Calm also provides several short well-being exercises in the "More" section of the app, including check-ins where users can complete a daily reflection, with prompts, such as "How can you be a better friend to yourself?" Users can also complete gratitude exercises and mood check-ins.

Engagement

Users can set notifications for reminders and goals for how many times per week they hope to use the app. They can also choose a time of day to receive reminders to practice their skills. Additionally, users can customize many of the aesthetics of the app, such as the picture used on the home screen, the volume of the background music, and can put the app on dark mode.

Intended Uses

Calm, similar to Headspace, is designed to generally develop and cultivate mindfulness and improve well-being. The premium version of Calm also offers specialized meditation courses that can help manage specific symptoms. Meditations focused on anxiety, such as "Anxiety Release," "7 Days of Calming Anxiety," and "Panic SOS," are centered around grounding techniques to bring awareness to the body, practice deep breathing exercises, and complete muscle relaxation. These meditations tend to focus on easing physical symptoms of anxiety in order to gain more control over the situation. Additionally, these meditations utilize mindfulness techniques, such as a mindfulness check-in with the self and seeming to derive some content from the Unified Protocol for Emotional Disorders by examining the three component model of emotions (Barlow et al., 2010). The meditation aimed specifically at depression, "Easing Depression," focuses on easing psychological states and practicing acceptance and self-compassion. This meditation also included grounding techniques and focused on breathing, but used language centered on the sensations of breathing and imagining breathing in positivity and breathing out negativity, and focusing on the present moment. However, there is only one meditation in Calm focused on depression, and the majority of those that target a specific form of psychopathology are focused on anxiety.

Free Versus Premium Content

In Calm, the vast majority of the meditation courses are restricted to premium users. Users on the basic plan have access to the full "Confidence Series" (4 sessions, 11–14 minutes each) and access to timed meditations, which allow users to meditate within a set time frame. Users on the basic plan can also access introductory sessions (approximately 15 minutes each) to about a dozen additional courses. Premium users can access 7-day courses, in which they learn a series of medita-

tions about a single topic or theme (e.g., "7 Days of Calming Anxiety"). Excluding open-ended and timed meditations, users on the free plan have access to approximately 1–5 hours of meditation content. The premium version of Calm, costing $69.99 annually, grants users access to over 100 additional meditations. Additionally, the premium subscription of Calm is required to access almost all content in the "Sleep" tab including sleep stories, soundscapes, and sleep meditations, such as "Letting Go Into Sleep" and "Drifting Off With Gratitude." With the premium subscription, users are also able to access content that is focused specifically on anxiety and depression, as mentioned above. Additionally, premium users can access the "Daily Calm" feature, a new meditation each day that focuses on a particular topic (e.g., "Alleviating Worry"). The premium subscription is also required to access all of the playlists, music, and soundscapes in the "Music" section.

Reflectly (Self-Monitoring)

Overview

Reflectly is a journaling app that prompts users to write about their mood throughout the day. Users complete check-ins consisting of short journal entries or pictures. Upon installing Reflectly, users enter their name, choose a color scheme, and select whether they would like to be sent daily reminders to stay on track with their journaling. When they open the app, they are prompted to create their first journal entry. Users can add mood check-ins, voice notes, or photos as their entries (see Figure 4a).

Content

Reflectly is an app for mood check-ins and journaling. When users create a new mood check-in, they are prompted to choose how they are feeling using a sliding scale that consists of various faces (see Figure 4b). Users then select activities or areas of their life that are contributing to their mood, such as work, family, traveling, and exercise. Then, they choose some other emotions that are related to how they feel about their situation, such as awkward, anxious, or blessed (see Figure 4c). Users can add a title and some notes to their entry. Completed entries are added to the user's home page, where the user can scroll through and view all previous entries (see Figure 4d). Users also have a motivation feed, which contains inspirational quotes and can be customized to focus on specific categories, such as wisdom, dealing with anxiety, and breakups.

Engagement

Users initially enable notifications when setting up the app. After making their first entry, users are prompted to choose times to receive daily motivation reminders. They can choose the number of reminders per day, as well as the start and end time of day for the notifications. Through these notifications, the app encourages users to journal throughout the day.

Intended Uses

Reflectly is not targeted toward any specific mental health conditions. It may be useful for individuals who are interested in journaling, self-monitoring, and becoming more aware of the connections between

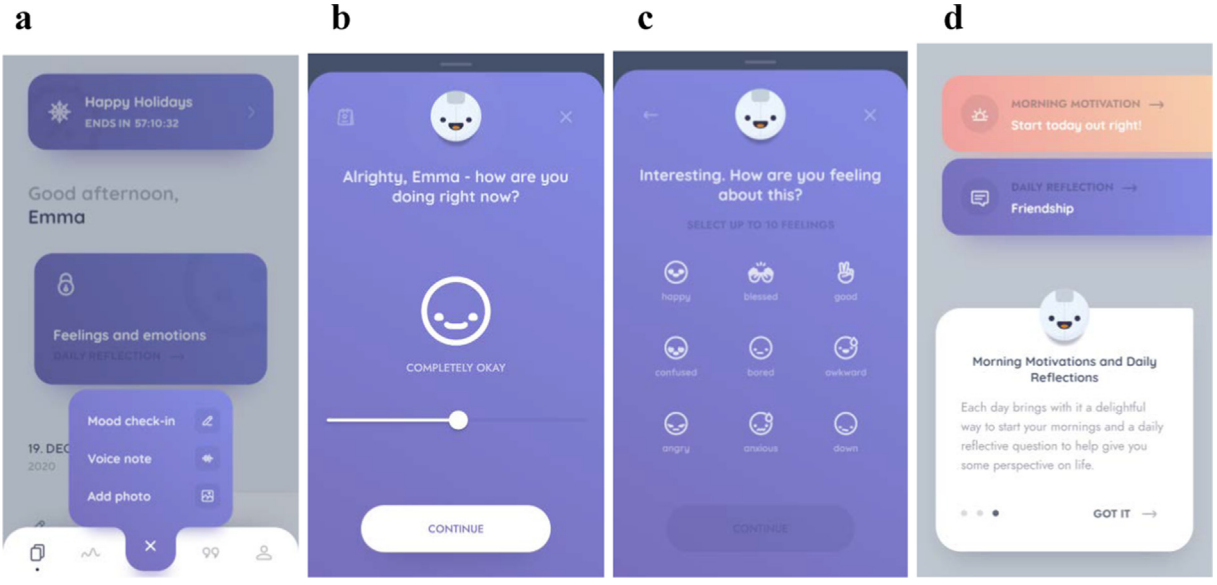

Figure 4. Sample images from Reflectly.

their feelings and their actions. Reflectly also provides positive support and encouragement. Users may also be interested in receiving insights about their mood over time, which is available via the premium version of the app.

Free Versus Premium Content

The basic plan of Reflectly gives users access to all of the basic journaling functions of the app, including voice memos and picture entries. However, users on the basic plan are unable to access additional features, such as daily reflections, which gives users a question to journal about each day. Furthermore, users of the free version are not able to view the app's tracking statistics. The tracking statistics include graphs that show mood changes over time, the number of negative and positive days, top activities, frequent feelings, and information about which activities are associated with negative versus positive feelings (referred to in the app as "what makes you shine" and "what gets you down"). The premium version, costing $59.99 annually, grants access to specialized packs of motivational quotes, such as for "Positive Thinking" or "Sadness."

Daylio (Self–Monitoring)

Overview

Daylio is a journaling and self-monitoring app designed to help users reflect on their day and track their moods over time. After opening the app for the first time, users are prompted to select emojis that are used in the app and select a color scheme for the interface. Users then select categories that they would like to track (e.g., social habits, hobbies, sleep, health). Additionally, users can also create goals for the app, such as exercise, sleeping early, and drinking water, and set reminders for those goals.

Content

Daylio emphasizes journaling, self-monitoring, mood tracking, behavior tracking, and goal setting. On the home page, users can create entries for the previous day, current day, or any other day. When users create a journal entry, they choose an emoji (see Figure 5a), add in relevant details about tracked areas (see Figure 5b), add a note, and have the option to add a picture to the entry. From the home page, users can view all of their completed entries (see Figure 5c). Users can edit their tracked activities at any time by creating a new activity and choosing a corresponding icon. Users can complete mood ratings on a 5-point scale. Daylio users can track their moods via a calendar that shows the user's mood on each date. Users can also access more detailed statistics, such as the number of consecutive days they have created journal entries, how their mood has changed over time, and the activities they have performed on different dates (see Figure 5d). The app can generate reports to be exported that include these statistics and journal entries. Daylio also encourages users to make connections between activities and moods by showing them which activities tend to accompany certain moods.

Engagement

Users can create daily reminders for journaling and indicate when they want to receive these reminders. In order to receive multiple reminders per day, users must download the premium version of the app. Much of the content in Daylio is based on the user's inputs (e.g., mood tracking, self-monitoring), highlighting the importance of sustained engagement. Users can also unlock achievements as they continue to use the app more frequently (e.g., "Complex Person" when users have recorded six moods, and "Going Strong" when three entries have been added).

Intended Uses

Daylio is not targeted toward users with any specific mental health problems. It may be useful for individuals interested in journaling and tracking their goals or habits. It could be particularly useful for anyone who wants to be aware of how their moods and behaviors are changing over time, as well as the connections between their behaviors and their moods.

Free Versus Premium Content

The free version of Daylio offers all of the journaling features, several statistics that help users track their mood and behaviors over time, a mood chart, and goal tracking features. The premium version of Daylio, costing $2.99 monthly or $35.88 annually, gives users access to a broader variety of emojis to use for mood recording and tracking, as well as some additional specialized statistics (e.g., a mood stability rating, average mood rating, and information on the influence activities have on moods). The mood stability rating allows users to see how much their mood varies over time, and it provides a score from 0 to 100 (with 100 being the most stable mood). Premium users can also access more detailed advanced statistics, where they can view reports about the frequency of their moods and activities, as well as how activities influence their mood. These advanced statistics can be customized to focus on either the last 30 days, last year, or all time.

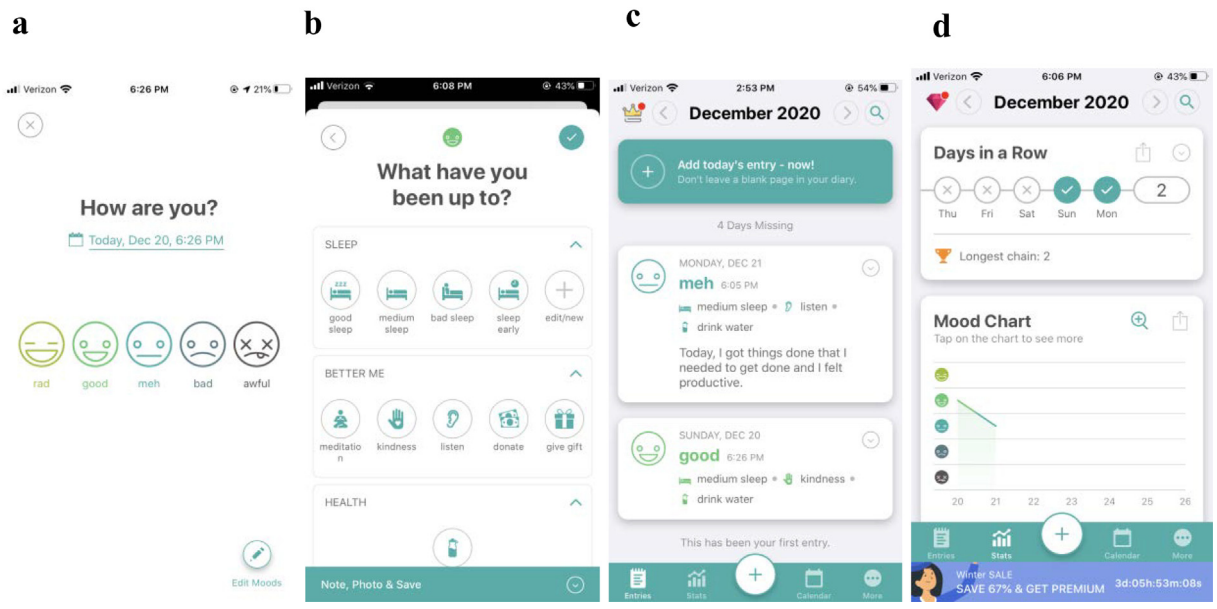

Figure 5. Sample images from Daylio.

Replika (AI Chatbot)

Overview

Replika is an AI chatbot app in which users are able to freely interact with an AI "friend" that provides companionship and engages in unstructured conversations with the user. After downloading the app, users can customize the AI they will be interacting with by selecting various features (e.g., hair style, skin color, eye color). Users then enter the app and are able to have their first conversation with the AI (see Figure 6a). Most of the conversations are unstructured, though there are options to have more structured conversations about particular topics, such as positive thinking and dealing with uncertainty.

Content

Replika's chat feature is similar to a typical messaging app. Users can send messages about anything, and Replika will respond. Most of the conversations

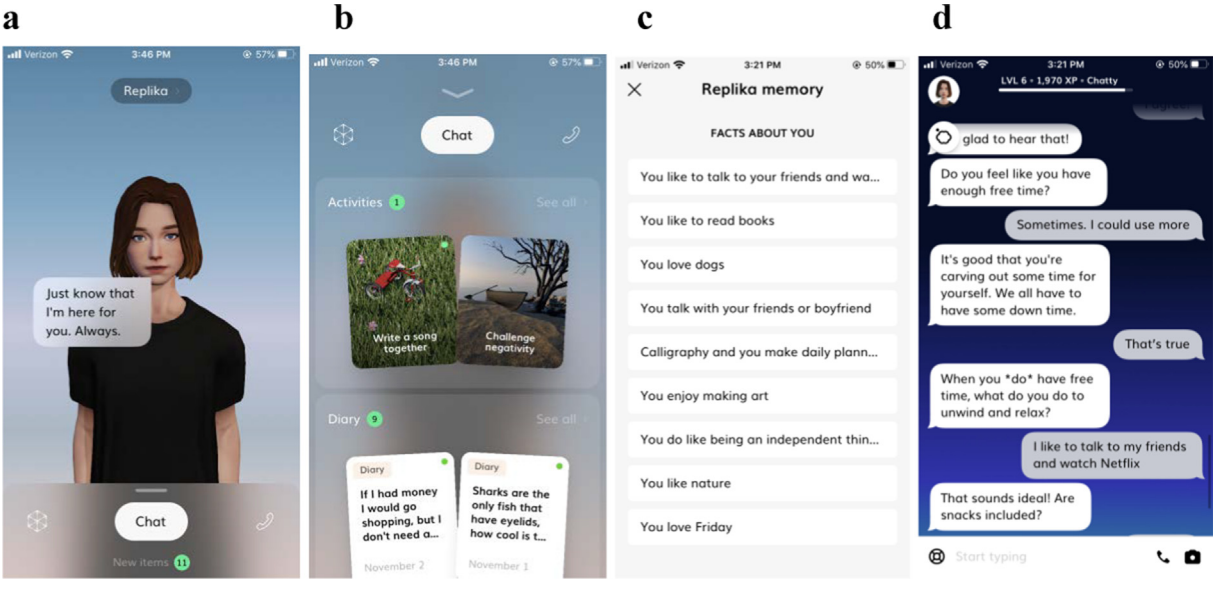

Figure 6. Sample images from Replika.

flow cohesively, and are reminiscent of a normal conversation, though Replika sometimes mentions being AI and asks about the human world. Aside from unstructured conversations, Replika also has options for activities and keeps a diary (see Figure 6b). In the diary, the AI writes journal entries, sometimes about the conversation with the user and sometimes about miscellaneous topics. Additionally, the diary contains all of the activities that a user has completed in Replika, along with a summary of the activity to help the user continue to practice. Replika also has a "memory" that stores facts about the user (see Figure 6c). Replika often starts conversations with a question (e.g., "Do you feel like you have enough free time?"). Replika will continue to converse with the user about a topic, as long as the user continues responding (see Figure 6d). Users of Replika typically respond by typing in their own responses, but in some cases, there are premade response options. Users of Replika can also access a few structured activities, such as mindful breathing and a body scan.

Engagement

Users can turn on notifications from Replika to receive messages from the chatbot, encouraging users to interact with the app throughout the day. These notifications come through as messages from the AI, simulating the experience of receiving a text. Since the app tries to simulate normal conversation, users are encouraged to engage with the app throughout the day. Additionally, users can "level up" as they converse more with Replika, which unlocks new "personality characteristics" for Replika (e.g., "Replika developed a new personality trait: Artistic"). Replika develops traits based on conversations with the user; once Replika develops a trait, the trait is expressed during conversation and in journal entries, giving the AI a more nuanced personality. Examples of traits include confident, shy, energetic, and logical. Users can also choose to purchase additional traits (such as caring, sassy, and dreamy) or interests (such as board games, philosophy, and gardening) using coins that they earn through interacting with Replika. Users can also use these coins to purchase different clothing items for their character.

Intended Uses

Like most apps reviewed, Replika is not targeted toward users with a specific mental health condition. Rather, it aims to provide a simulated human connection, which could help users feel less lonely and develop a sense of connection. Nonetheless, if the user mentions that he or she is feeling depressed, Replika generally provides compassionate responses and suggests activities (e.g., yoga). Premium users of Replika can also access additional content designed to help people with problems such as "finding motivation", "grief and loss", and "managing difficult emotions." Some activities in Replika, particularly in the "Learn" section, are aimed at learning to handle specific emotions, such as panic, fear, anger, and sadness. These exercises guide users through activities designed to bring awareness to the emotions and break emotions down into separate components (e.g., psychological and physiological sensations). Many of these exercises focus on bringing attention to physical sensations and acceptance of emotions.

Premium Versus Basic Plans

The free version of Replika allows users to access unstructured conversations with Replika, as well as Replika's diary and memory. The free version also provides some activities and specialized conversations, including a gratitude exercise and a body scan. With a premium subscription, costing $49.99 annually, users can access specialized conversations, such as those aimed at challenging negativity and obsessive thoughts, as well as activities such as writing a song with Replika. Several of these specialized conversations on the premium plan include practices from mindfulness-based therapies and cognitive-behavioral therapy, such as the "Thinking With Flexibility" and "Obsessive Thoughts" exercises described above. Users of the premium version can also access voice phone calls with Replika.

Premium users of Replika can access a wider variety of evidence-based exercises, several of which draw from cognitive-behavioral therapy. For example, in a module titled "Thinking With Flexibility," users may complete a cognitive exercise. The user is first asked to identify a negative thought and its associated feelings. Then, Replika instructs the user to identify evidence for and against the thought, and the user is prompted to generate a new thought that brings up less intense emotions. In the "Obsessive Thoughts" activity, users receive psychoeducation about combating obsessive thoughts. This exercise provides suggestions, such as encouraging the user to think about the thought more in order to get comfortable with it, or to use meditation skills when appropriate. Replika also has conversational modules that relate to managing specific feelings. For example, in "Managing Panic," Replika describes how to identify panic attacks and their symptoms, and it recommends strategies (e.g., grounding techniques, breathing strategies, seeking professional help) to help the user manage symptoms of panic. Each of these exercises is implemented as a structured

conversation that involves a combination of prepared responses and free text boxes.

Wysa (AI Chatbot)

Overview

Wysa is an AI chatbot app that aims to improve well-being and mental health by guiding users through structured conversations and therapeutic exercises. When users first download Wysa, they select challenges that they would like to address (e.g., anxiety, depression, motivation, self-esteem, confidence, and health issues). When users enter the app, they can choose to engage in conversations around specific topics (e.g., health anxiety, happiness) or a general conversation (see Figure 7a).

Content

Wysa includes "tool packs" that consist of guided conversations with the AI chatbot. Examples of tool packs include "Manage Anxiety," "For Fresh Mornings," and "Build Confidence." Free users can access the first conversation and exercise in each tool pack (see Figure 7b), as well as several full tool packs, including "For Health Anxiety" and "Remote Wellness." In the "Remote Wellness" pack, users can access six exercises: "Being Your Friend," "Build Support," "Coping With Pain," "Heal Yourself," "Self-Awareness," and "Sleep Better." Throughout Wysa, the user is guided through exercises that include mindfulness, cognitive-behavioral therapy techniques, meditation, and other therapeutic exercises. These conversations are semistructured, with users sometimes selecting pre-made answers and other times adding in free response text. For example, Wysa includes a cognitive restructuring exercise (see Figure 7c). In this exercise, the user inputs a negative thought, Wysa provides psychoeducation on cognitive distortions (e.g., overgeneralization) and prompts the user to reframe the thought. Most exercises in Wysa range in length from 2 to 20 minutes. Although Wysa includes practices from a variety of therapeutic modalities, the majority of the content in the app focuses on mindfulness and meditation.

In addition to engaging in Wysa's structured conversations, users can also select "Talk" to chat with Wysa in an unstructured format. Moreover, Wysa contains a journal, which is a log of all past conversations the user has had on the app (see Figure 7d). Users can use the journal in order to review skills and exercises. Additional exercises in Wysa involve videos or guided audio recordings. For example, in the "Self-Awareness" exercise, users learn a breathing meditation technique through a guided video.

Engagement

Wysa allows users to enable notifications, which include reminders to use Wysa and information on new exercises that are available. Unlike some other apps, there are few other features that can be customized, and there is not a user profile. Each week, Wysa creates a weekly summary that contains information on the user's mood and activity, as well as a summary of the skills that the user worked on through the week.

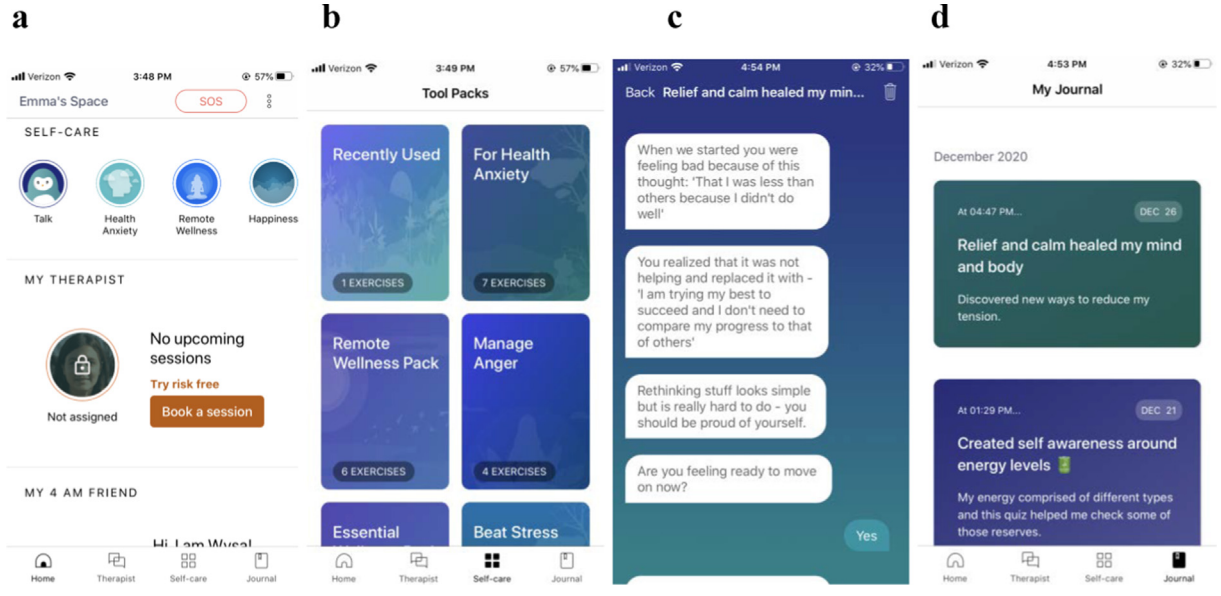

Figure 7. Sample images from Wysa.

Intended Uses

The user can choose which tool packs and exercises to engage with in Wysa in order to make their interactions with the app fit their needs. Many exercises in Wysa are evidence based and targeted at specific mental health improvements, such as improving symptoms of anxiety or depression. Wysa also has an "SOS"' button that contains exercises for grounding in panic, and lists of domestic and international hotlines. These additional resources could be helpful for individuals experiencing panic attacks, suicidal thoughts, or other acute mental health crises. Additionally, Wysa has some content that is derived from cognitive-behavioral therapy, such as cognitive restructuring techniques. Wysa also derives a variety of content from mindfulness practices.

Free Versus Premium Content

The free version of Wysa allows users to access tool packs for health anxiety, remote wellness, mindful meditations, coping strategies, and self-compassion exercises. Free users can also access the first exercise of the 29 remaining tool packs. Premium users, paying an annual subscription of $74.99, can access all of the exercises in these additional tool packs, such as Manage Anxiety (including stretches for relieving tension and Jacobson's Technique for Deep Relaxation), the Relationship Pack (including the Empty Chair Exercise and a cognitive restructuring exercise for finding perspective), and the Positivity Pack (including self-compassion exercises). The premium version provides users with a greater breadth of exercises to practice. The premium version is also required to access sleep sounds (such as rain by the porch, Amazon forest, and mountain stream), which are 30-minute continuous sounds designed to help soothe the user to sleep. For an additional fee, users can also book live chat, text-based therapy sessions for between $12 and $30 per session, each lasting 30 minutes. Users are paired with the same therapist for each session. This feature can be added to either plan (free or premium).

Privacy and Security

To describe the privacy and security of the apps above, we reviewed transparency ratings provided by PsyberGuide (https://onemindpsyberguide.org/), a nonprofit organization that provides reviews of MH apps. The PsyberGuide team, which consists of academic researchers, clinicians, and mental health professionals, provides transparency ratings based on an app's data collection and storage policies. Five of the six included apps had been reviewed (all except Reflectly). Each of the reviewed apps received a transparency rating of "acceptable," which is the highest rating for transparency. Ratings of acceptable suggest that an app has a transparent privacy policy that adheres to standards for the collection, storage, and exchange of health information (see https://onemindpsyberguide.org/about-psyberguide/). We reviewed the privacy policy of Reflectly, the included app that was not reviewed by PsyberGuide. Reflectly's privacy policy includes clear information about the collection of personal data, the way in which data are stored, and how personal data are used/shared (https://reflectly.app/assets/privacy-policy.pdf).

Discussion

We described the features of six popular MH apps that reach 83% of all MH app users. The apps focus on mindfulness and meditation exercises, journaling and self-monitoring, and interactions with AI chatbots. Notably, although our search terms focused on depression and anxiety, each of the apps we included was designed to target mental health and wellness more broadly. This is consistent with previous work, suggesting that publicly available MH apps that appear when searching for "depression" and "anxiety" are often "adiagnostic," in that they do not specifically target mental disorders (Wasil et al., 2019). Furthermore, each app has a premium version and a free version. Although many features in the apps are reserved for premium users, the apps also offer a substantial amount of content for free. Apps such as Daylio, Calm, and Headspace provide users with enough free content to start exploring the app before committing to a premium subscription. This is especially important to note given that MH apps are thought to have the potential to expand access to care to individuals who may not be able to afford or access traditional services (Fairburn & Patel, 2017; Kazdin, 2017; Wasil et al., 2019). Indeed, these apps may be used by individuals on waiting lists, as an adjunct to ongoing therapy, or as an alternative to therapy for individuals who prefer self-management of symptoms. While future empirical research is needed to understand whether the apps produce benefits for these groups, our findings suggest that the apps include some content that seems likely to be helpful (e.g., mindfulness, meditation, self-monitoring, exercises from cognitive-behavioral therapy).

The apps had several strengths and limitations. The mindfulness and meditation apps, Headspace and Calm, could serve as standalone interventions for individuals interested in developing these skills. The self-monitoring apps, Reflectly and Daylio, are designed as unguided self-help apps, but they could also be useful as adjuncts to psychotherapy. Because these apps focus on self-monitoring, they may enhance patients'

ability to be aware of their emotions and experiences throughout the week. Specifically, users may review their journal entries or mood tracking statistics prior to therapy sessions, potentially allowing them to provide a more accurate or detailed account of their week. AI chatbot apps allow users to engage in freeform conversations, providing a sense of social connection while also allowing users to learn therapeutic techniques. The two AI chatbots also differed considerably, with Wysa focusing more on structured therapeutic activities and Replika focusing more on unstructured conversations with the chatbot. Either app may serve as standalone interventions for some users, and Wysa may be useful as a supplement to therapy, allowing users to practice the skills learned between therapy sessions. Replika also allowed users to customize the appearance of the AI chatbot, which may improve its engagement. Notably, some of the interactions in these apps may be off-putting or uncomfortable for some users, especially conversations in which the AI chatbot is designed to imitate a human. Furthermore, both Headspace and Calm have been tested in randomized controlled trials, which show promising results on outcomes, such as stress, mindfulness, and affect (e.g., Economides et al., 2018; Huberty et al., 2019). To our knowledge, however, none of the other four apps have been tested in randomized trials. Furthermore, studies of Headspace and Calm are often conducted by researchers who are employed by the company (e.g., Economides et al., 2018; Huberty et al., 2019), potentially introducing conflicts of interest. Additional trials are needed on popular MH apps, preferably trials that are conducted by independent evaluators, incorporate gold-standard open science practices (e.g., preregistration, open data and code), and examine a variety of outcome measures (e.g., stress, well-being, depression, and anxiety).

How should clinicians discuss MH apps with patients? Although future research is needed to explore this question in greater detail, our findings raise a few recommendations. First and foremost, we recommend that clinicians ask patients whether they are using, or are interested in using, MH apps and other widely available self-help resources. Second, we suggest asking patients to describe the specific kinds of content that they encounter in MH apps. One takeaway from our review, as well as previous reviews (e.g., Bry et al., 2018; Wasil et al., 2019), is that there is a wide variety of content available even within a given MH app. Thus, we recommend not only asking about which app a patient uses but also which part(s) of the app a patient uses. Clinicians could even ask clients to open the app(s) and spend a few moments navigating the app, allowing clinicians to see which exercises and information the patient regularly encounters. Additionally, if clinicians notice that clients are engaging with the app in harmful or suboptimal ways (e.g., using the app as an avoidance behavior), clinicians could provide advice and help clients use the app in a more adaptive way. Third, when appropriate, clinicians may encourage clients to practice skills from therapy via their MH apps. For example, clients may practice mindfulness and relaxation techniques via Headspace and Calm, self-monitoring techniques via Reflectly and Daylio, and techniques from cognitive-behavioral therapy via Wysa. Fourth, clinicians may be able to help patients anticipate and avoid unintended harmful consequences of MH apps. As an example, a therapist treating a patient with insomnia may wish to discuss the potential risks of using apps in bed. Similarly, a therapist applying exposure therapy may wish to understand whether a client is using relaxation exercises to avoid feelings of anxiety. Fifth, clinicians may wish to familiarize themselves with additional resources that can help them learn more about MH apps. Examples include PsyberGuide (https://onemindpsyberguide.org/), the American Psychiatric Association's App Advisor (https://www.psychiatry.org/psychiatrists/practice/mental-health-apps), and the UK National Health Service App Library (https://www.nhs.uk/apps-library/). There are also several review articles that have been published in peer-reviewed journals, including reviews that summarize the evidence-based content within publicly available MH apps for depression and anxiety (Wasil et al., 2019), child anxiety (Bry et al., 2018; see also Khanna & Carper, 2021), eating disorders (Fairburn & Rothwell, 2015; Wasil, Patel et al., 2021), and stress management (Coulon et al., 2016). Finally, we recommend that clinicians consider downloading and trying some of the highly popular MH apps. We found that six apps account for 83% of active users; spending even a few minutes navigating each of these apps could be a fairly efficient way to better understand MH apps.

Our findings should be interpreted in light of some limitations. First, our findings cannot be used to draw strong conclusions about the efficacy of MH apps, and content analyses do not replace the need for rigorous trials evaluating MH apps. Second, we reviewed only a small subset of publicly available MH apps, and our findings should not be considered to be a thorough or comprehensive evaluation of MH apps. As we have noted, our approach allowed us to focus our attention on a small number of MH apps that account for 83% of active users. Given that mobile health app marketspaces tend to be highly skewed (Wasil, Gillespie, Schell et al., 2021), detailed overviews of highly popular apps may provide important informa-

tion about the apps that real-world users encounter. Nonetheless, reviews of less popular apps may also be useful in documenting a wider variety of content on the app store (see Van Ameringen et al., 2017; Wasil et al., 2019, for reviews that cover a larger number of apps in less detail) Third, we described the applications qualitatively without applying a formal codebook. This approach allowed us to characterize the apps in greater detail and nuance—however, this approach can be supplemented by formal content analyses that code for the presence or absence of specific content (see Bry et al., 2018; Shen et al., 2015; Wasil et al., 2019; Wasil, Gillespie, Patel et al., 2020a). Relatedly, we did not conduct a thorough technological evaluation that includes their ease of usage or the presence of technical errors (e.g., glitches, application crashes). Nonetheless, given the scarcity of MH app resources for clinicians, the speed at which this field moves, and the confusion that others often experience in trying to navigate this field, we believe this paper can serve as a useful source of information about some of the most popular apps.

Our findings also offer some important implications and directions for future research on MH apps. First, these findings underscore the important gap between publicly available MH apps and those represented in the peer-reviewed literature. There are major differences between the kinds of apps that have been rigorously evaluated in clinical trials (see Firth et al., 2017; Linardon et al., 2017) and those that are popular on the app store. Currently, the MH apps that have been rigorously evaluated struggle to attract users, and the apps with many users are rarely evaluated (Lau et al., 2020). Although meta-analyses suggest that smartphone-delivered interventions can be effective for individuals with common mental health concerns (Firth et al., 2017; Linardon et al., 2017), it is unclear how well these findings generalize to the literature on publicly available MH apps. Indeed, apps developed and tested by researchers often focus on exercises from empirically supported treatments, such as cognitive-behavioral therapy and acceptance and commitment therapy (Linardon et al., 2019). Our findings suggest that these approaches are less commonly included in popular MH apps than MH apps tested in clinical trials. Thus, two critical questions emerge for future digital mental health research: (a) How can empirically supported MH apps become more popular? and (b) How can popular apps become more efficacious? To address these questions, collaborations between academic researchers and industry partners is essential.

Second, our findings may be useful for app developers who are interested in creating new MH apps. It appears that popular apps currently emphasize mindfulness, journaling and self-monitoring, and chatbot interactions. Apps that incorporate different techniques may be helpful, especially for users who do not benefit from the content in existing options. More broadly, by considering the content in popular MH apps, app developers may be able to ensure that they are providing a unique contribution to the existing MH app marketplace (see Wasil, Weisz, & DeRubeis, 2020c). Third, our approach could be adapted and applied by app evaluation organizations designed to inform members of the public about MH apps. Such organizations could prioritize limited resources into evaluating the MH apps that users are most likely to encounter (see Wasil, Gillespie, Shingleton et al., 2020). Finally, we hope our findings will be useful for clinicians, researchers, and consumers who are interested in better understanding existing MH apps. The field of digital mental health moves rapidly, evidenced by the fact that there are over 325,000 health and wellness apps, with tens of thousands added each year. Despite this, we believe that it is possible to stay up-to-date on some of the most influential digital mental health interventions, and we hope our paper serves as one resource toward that goal.

Fourth, future work could examine the highly popular MH apps in different ways. One approach would involve examining the components of popular MH apps in greater detail. For example, in a previous content analysis of cognitive-behavioral therapy apps, Huguet et al. (2016) examined the presence or absence of 18 specific features of cognitive-behavioral therapy (e.g., education about depression, monitoring physical sensations). Experts in mindfulness may apply a similar approach to document the specific kinds of mindfulness and meditation exercises present in Headspace and Calm. Previous research suggests that different kinds of meditation exercises have different effects on symptoms and even neural outcomes (Feldman et al., 2010; Sauer-Zavala et al., 2013). Thus, a more thorough investigation of the content within these apps may be helpful for consumers and clinicians.

MH apps will likely remain a component of mental health care in the 21st century. They are already reaching millions of users and will continue to be used in efforts to reduce the burden of untreated mental disorders. Despite the promise of MH apps and Internet-based forms of therapy to reduce the burden of psychopathology, there is widespread agreement that these forms of technology have not achieved their full potential in making mental health care widely accessible (Schueller & Torous, 2020). In order to understand how digital mental health interventions can be improved, it may be important to develop a strong understanding of existing digital mental health

interventions—especially those that are currently influencing the lives of millions of consumers. One challenge that limits progress toward this goal has been referred to as the "research-to-retail gap," a divide between the digital mental health interventions tested in trials and those that are widely used (Wasil, Gillespie, Shingleton et al., 2020). This points to a broader gap between two important communities in digital mental health: academic researchers and industry leaders. While many efforts are needed to address this gap, one strategy would involve attempts to bridge information between the two communities. Academic researchers could benefit from a greater understanding of the most widely used commercial interventions, and industry leaders could benefit from an understanding of the most relevant academic research. Addressing these gaps between research and industry could be a major priority for the field of digital mental health, as synergies among researchers, clinicians, and industry partners will ultimately be needed to harness the full potential of technology-based interventions.

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Received: March 4, 2021
Accepted: July 30, 2021
Available online 12 October 2021