

Review

# Self-Guided Mental Health Apps Targeting Racial and Ethnic Minority Groups: Scoping Review

Fiby Saad<sup>1</sup>, MSc; Mia Eisenstadt<sup>1,2</sup>, PhD; Shaun Liverpool<sup>1,2,3</sup>, PhD; Courtney Carlsson<sup>4</sup>, MBA; Isabella Vainieri<sup>1,2,5</sup>, PhD

<sup>1</sup>Clinical, Educational and Health Psychology, Division of Psychology and Language Sciences, University College London, Faculty of Brain Sciences, London, United Kingdom

<sup>2</sup>Evidence Based Practice Unit, Anna Freud National Centre for Children and Families, London, United Kingdom

<sup>3</sup>Department of Social Work & Wellbeing, Edge Hill University, Faculty of Health, Social Care and Medicine, Ormskirk, United Kingdom

<sup>4</sup>Paradym, London, United Kingdom

<sup>5</sup>Department of Psychology, Royal Holloway, University of London, Egham, Surrey, United Kingdom

**Corresponding Author:**

Isabella Vainieri, PhD

Clinical, Educational and Health Psychology, Division of Psychology and Language Sciences

University College London

Faculty of Brain Sciences

Gower Street

London, WC1E 6BT

United Kingdom

Phone: 44 2039872684 ext 2684

Email: [ucjuiva@ucl.ac.uk](mailto:ucjuiva@ucl.ac.uk)

## Abstract

**Background:** The use of mental health apps (MHAs) is increasing rapidly. However, little is known about the use of MHAs by racial and ethnic minority groups.

**Objective:** In this review, we aimed to examine the acceptability and effectiveness of MHAs among racial and ethnic minority groups, describe the purposes of using MHAs, identify the barriers to MHA use in racial and ethnic minority groups, and identify the gaps in the literature.

**Methods:** A systematic search was conducted on August 25, 2023, using Web of Science, Embase, PsycINFO, PsycArticles, PsycExtra, and MEDLINE. Articles were quality appraised using the Mixed Methods Appraisal Tool, and data were extracted and summarized to form a narrative synthesis.

**Results:** A total of 15 studies met the inclusion criteria. Studies were primarily conducted in the United States, and the MHAs designed for racial and ethnic minority groups included ¡Aptívate!, iBobbly, AIMhi- Y, BRAVE, Build Your Own Theme Song, Mindful You, Sanadak, and 12 more MHAs used in 1 study. The MHAs were predominantly informed by cognitive behavioral therapy and focused on reducing depressive symptoms. MHAs were considered acceptable for racial and ethnic minority groups; however, engagement rates dropped over time. Only 2 studies quantitatively reported the effectiveness of MHAs among racial and ethnic minority groups. Barriers to use included the repetitiveness of the MHAs, stigma, lack of personalization, and technical issues.

**Conclusions:** Considering the growing interest in MHAs, the available evidence for MHAs for racial and ethnic minority groups appears limited. Although the acceptability seems consistent, more research is needed to support the effectiveness of MHAs. Future research should also prioritize studies to explore the specific needs of racial and ethnic minority groups if MHAs are to be successfully adopted.

(*JMIR Ment Health* 2023;10:e48991) doi: [10.2196/48991](https://doi.org/10.2196/48991)

**KEYWORDS**

mental health apps; racial and ethnic minority groups; self-guided; mental health; culturally appropriate technology

## Introduction

### Background

Mental health apps (MHAs) are frequently used as self-guided tools to help people with various mental health conditions, including anxiety [1] and depression [2]. More than 10,000 MHAs are currently available for smartphone users [3], and this number is increasing daily [4] due to a high interest in MHAs among the public [5], which peaked during the COVID-19 pandemic [6]. For instance, the number of MHA downloads increased by 2 million during the COVID-19 pandemic compared with prepandemic levels [6].

Despite the overall increase in downloads over the years, MHAs appear to appeal to certain populations more than others. For instance, people who have had a previous diagnosis of mental illness [7] or those who are more symptomatic [8] may be more likely to download MHAs. Interest in MHAs is especially high among younger generations, with studies reporting that younger participants (aged 18-22 years) were more interested in MHAs than older participants ( $\geq 23$  years) [7,9]. This increased interest in MHAs among younger generations could be attributed to the incorporation of smartphone technology in their daily lives [5], as well as the increase in mental health conditions among young people [10]. Another reason is self-monitoring and tracking of progress over time, as it can influence an individual's motivation to continue psychological treatment and enhance feelings of control, which is especially important in young people [11].

The COVID-19 pandemic has significantly impacted the mental health of young people. For example, the Opinions and Lifestyle Survey conducted by the Office for National Statistics revealed that the prevalence of anxiety and depression increased by almost 11% between June 2019 and March 2020 in people aged 16 to 39 years compared with prepandemic levels. However, studies have shown that 50% to 80% of young adults who struggle with mental health issues do not seek treatment [12,13]. Some experts argue that stigma around mental illness is a key barrier when accessing face-to-face (FTF) therapy, leaving some young people to express a preference for MHAs [14,15]. Overall, younger age and high self-stigma are associated with a low mental health help-seeking attitude and a negative attitude toward FTF therapy [16].

Despite their popularity, MHAs present some challenges for app users. First, there seems to be a high turnover rate of MHAs. Larsen et al [17] found that apps targeted for depression were unavailable to access approximately every 3 days, leading to difficulties for users to commit to one app and see any long-term benefits. Another major issue with MHAs is the level of user engagement because people rarely use MHAs as a long-term solution [18,19]. For instance, studies have shown that the median duration of app use was only 3 hours over an 8-week treatment period [19] and the median retention rate was 5.5 days (across 8 studies) [20].

However, the most important issue with MHAs is the lack of evidence of their effectiveness. A recent review showed that only 2 out of the 73 apps targeting common mental health symptoms provided direct evidence to support the use and

effectiveness of their app [17]; this highlights that app developers might use scientific jargons to lure users into using the app despite no evidence supporting their claims. Even apps that are approved by public authorities report little evidence of their effectiveness. Another review found that only 15% of the MHAs in the UK National Health Service library provided evidence of effectiveness [21], highlighting the need for regulations to ensure that MHAs meet specific standards of care [22].

Despite these challenges, there are a range of benefits that have contributed to the rapid growth and popularity of MHAs. First, MHAs can be accessed anywhere and at any given time. By contrast, traditional therapy occurs at set hours or in specific settings. Furthermore, services may have increased waiting times [23], which raises major risks for individuals, such as self-harm or suicide [24]. Second, unlike FTF therapy, MHAs can be used by any number of people. Third, unlike publicly funded therapy, in which an individual requires a diagnosis or a basis for referral, MHAs generally have no requirements or criteria for use. Overall, MHAs can be used outside clinical settings or as adjunct support to help people manage everyday stress [25].

The ability to access mental health aid outside clinical settings can be especially helpful for people from racial and ethnic minority backgrounds. For this review, *racial and ethnic minority group* refers to any racial and ethnic group with national or cultural traditions different from those of the main majority. Evidence shows that people from racial and ethnic minority backgrounds experience higher levels of stressors than the majority population; these stressors such as low socioeconomic status, discrimination, and racism can negatively affect mental health outcomes [26-28]. People from racial and ethnic minority backgrounds also experience increased barriers when engaging with mental health services [29-31] and are less likely to self-report and receive treatment [31]. This is possibly due to personal and environmental barriers such as the inability to recognize and accept mental health problems, embarrassment, confidentiality concerns, preference for self-reliance, social stigma against mental health, and financial factors [32-36]. Other factors are related to health care providers, such as language barriers, cultural naivety, insensitivity, and discrimination toward the needs of racial and ethnic minority service users [36]. Overall, individuals from racial and ethnic minority backgrounds are exposed to increased risk factors for poor mental health and experience inequalities in accessing mental health care.

MHAs can offer opportunities to access mental health support and overcome some of the abovementioned barriers encountered by racial and ethnic minority populations. For instance, MHAs provide a sense of safety to some users, increasing their ability to disclose and share their feelings [37], as they enable access to services from their homes, and more importantly, they avoid the stigma associated with disclosing a mental health problem [38,39]. This is particularly important for racial and ethnic minority populations, as evidence suggests that mental health stigma is higher in people from racial and ethnic minority backgrounds than in the majority population [33]. Furthermore, the consequences of mental health stigma are higher among

racial and ethnic minority populations, as they often experience other social adversities that negatively affect mental health, leading to untreated mental health problems as well as poorer mental health outcomes [33]. Kern et al [7] conducted a survey of college students in the United States to explore their openness, use, and attitudes toward MHAs. Out of 565 respondents, 179 were of racial and ethnic minority background, and they found that participants from this background preferred downloading an MHA instead of going to therapy. Similarly, Lungu and Sun [40] found that Asian American youth endorsed seeking help on the web rather than going to professionals in an FTF setting. Although this is promising, interest does not always correlate with actual use [41]. Furthermore, a recent systematic review of MHAs found that there was an absence of diverse samples, with many studies using majority White populations, whereas the effectiveness, acceptability, and use of MHAs in racial and ethnic minority groups remain poorly understood [42].

## Objectives

We conducted a scoping review of the literature to (1) describe the purposes of using MHAs in racial and ethnic minority groups, (2) examine the acceptability of MHAs among those groups, (3) examine the effectiveness of MHAs with these groups, (4) identify the barriers to MHA use within these groups, and (5) identify the gaps in the literature. We will only focus on self-guided MHAs that users can use without additional help (eg, video chat and text messaging), as they offer a more sheltered environment for the user, further removing the issue of stigma [43]. Due to the recent interest in MHAs among young people and the need for a comprehensive overview of the literature focusing on racial and ethnic minority groups, this study covered a wide age range of 14 to 36 years. This age range also captures 3 main age groups that have been found to have high smartphone use: 14 to 18 [15,44,45], 18 to 21 [7,43], and 25 to 36 years [46].

## Methods

This scoping review was conducted in accordance with the Joanna Briggs Institute methodology for scoping reviews [47] and the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews) guidelines [48]. Refer to [Multimedia Appendix 1](#) [49] for the PRISMA-ScR checklist.

## Search Strategy

A systematic search was conducted in the following databases: Embase; PsycINFO; PsycArticles; PsycExtra; MEDLINE ALL, via OVID; and Web of Science. See [Multimedia Appendix 2](#) for a complete list of search terms. The search algorithm was defined including concepts related to *mobile phone apps*, *mental health*, and *racial and ethnic minority groups*. The search was conducted on August 25, 2023, with no limit placed on the publication year.

## Eligibility Criteria

Studies were included if they fulfilled all the following criteria: (1) most participants were from a racial and ethnic minority

background (ie, more than 50%); (2) the study explored “self-guided” MHAs, meaning that the participants used the apps alone without outside help; (3) participants’ age range was between 14 and 36 years; (4) the study focused on mental health issues; and (5) the study was written in English. Studies were excluded if they were solely used for adherence to medication or other lifestyle changes such as diet or exercise.

## Selection Process

The CADIMA software package (Julius Kühn-Institut) was used to facilitate the review processes, including screening and data extraction [50]. The titles and abstracts were independently screened by 2 reviewers (FS and IV), and those that met our inclusion criteria were used for full-text screening. All the full texts were screened in parallel by the same 2 reviewers. Any inconsistencies between the reviewers were discussed before reaching an agreement.

## Data Extraction and Quality Assessment

The extracted data included (1) study design (eg, qualitative, quantitative, or mixed methods); (2) participants’ demographic details (eg, age, ethnicity, and occupation); (3) geographic location; (4) the intervention used, including theoretical basis, purpose, and duration of use; (5) data regarding the acceptability of MHAs; (6) data related to the effectiveness of the intervention; and (7) any barriers to MHA use. Acceptability was defined as “a multi-faceted construct that reflects the extent to which people delivering or receiving a health care intervention consider it to be appropriate, based on anticipated or experienced cognitive and emotional responses to the intervention” [51].

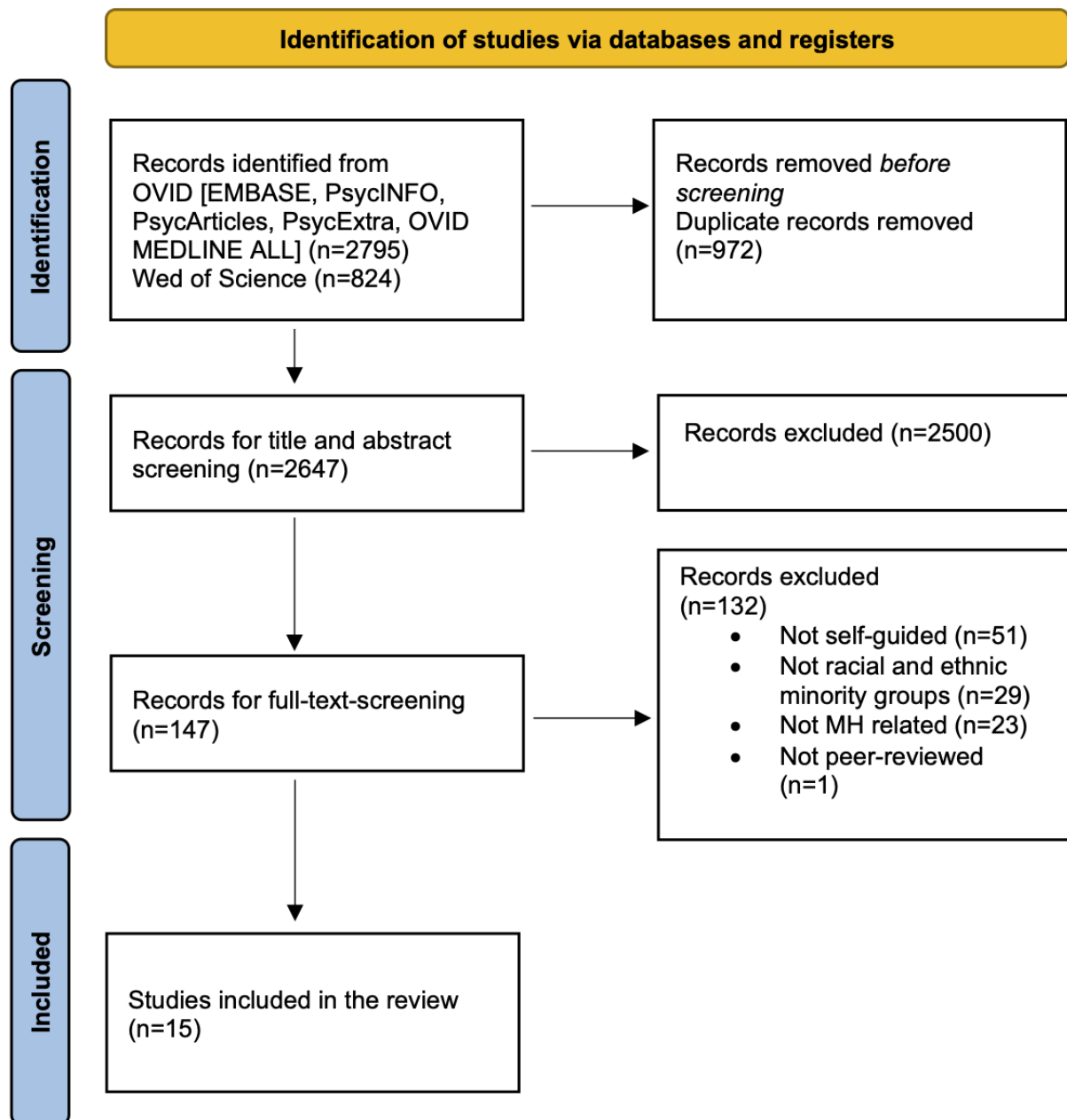
Critical appraisal was conducted following the Mixed Methods Appraisal Tool checklist [52]. The Mixed Methods Appraisal Tool consists of 2 general screening questions and 5 questions for each type of study design. Each question was answered by responding “yes,” “no,” or “can’t tell” and scored 1 for “yes” and 0 for “no,” resulting in the maximum score of 7 for each study. Quality assessment was conducted independently by 2 reviewers (FS and IV). Any discrepancies were discussed, and if necessary, a third team member was consulted to reach a final decision.

## Data Analysis and Data Synthesis

First, the study and its population characteristics were charted to provide an overall description of the body of evidence. Second, a narrative synthesis, supported by thematic and content analysis as outlined by Popay et al [53], was conducted to provide an overall narrative to address the aims of the review.

## Results

A total of 15 studies were eligible for inclusion in this scoping review. A PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram [49] is shown in [Figure 1](#) to illustrate the flow of information and the identified records at each phase of the scoping review.

**Figure 1.** Flowchart highlighting the key stages of the screening process. MH: mental health.

### Characteristics of Included Studies

Out of the 15 publications that met the inclusion criteria for this review [40,54-67], 10 (67%) studies were conducted in the United States [40,54,56,58-61,63,66,67], with publication dates ranging from 2016 to 2023. Overall, 13 (87%) of the 15 studies focused on specific MHAs [54-61,63-67], including 2 MHA prototypes [58,67]. Of the app-specific studies, 4 had a mixed methods design [55,58,60,63], 7 were quantitative

[54,56,57,59,61,65,67] and 2 were qualitative studies [64,66]. The last 2 studies did not focus on a specific MHA; instead, they assessed preference for web-based help versus FTF mental health help using surveys, both were quantitative [40,62]. Table 1 reports the characteristics of the reviewed studies, including study name, study design, sample size, mean age of participants, the racial and ethnic minority group, MHA name (if applicable), targeted mental health condition, duration of use, outcome measure, study location, and critical appraisal score.

**Table 1.** Summary of included studies.

Study (year)	MHA <sup>a</sup> name	Targeted mental health condition	Duration of use	Study design	Outcome measure	Ethnic minority group	Mean age (years)	Sample size	Geographic location	Critical appraisal score
Dahne et al [54], (2019)	• iAptivate!	• Depression	8 wk	Quantitative	• Spanish language Beck Depression Inventory—II • Semistructured interview	Hispanic	• 36.05	• 42	United States	6
Tighe et al [55], (2020)	• iBobbly	• Depression	6 wk	Mixed methods	• Semistructured interview and RCT <sup>b</sup> data	Aboriginal and Torres Strait Islander	• 24.15	• Interviews (n=18) • RCT (n=61)	Canada	6
Pratap et al [56], (2018)	• iPST <sup>c</sup>	• Depression	12 wk	Quantitative	• PHQ-9 <sup>d</sup> • Sheehan Disability Scale	Hispanic or Latino	• 34.90	• Hispanic (n=106) • Non-Hispanic (n=239)	United States	6
Lungu and Sun [40], (2016)	— <sup>e</sup>	—	—	Quantitative	• 18-item web-based survey • MHI-21 <sup>f</sup>	Asian American	• 18.7	• 572	United States	5
Tighe et al [57], (2017)	• iBobbly	• Suicidal ideation • depression • psychological distress • impulsivity	6 wk	Quantitative	• DSI-SS <sup>g</sup> • PHQ-9 • K10 <sup>h</sup> • BIS-11 <sup>i</sup>	Indigenous Australians	• 26.25	• 61	Australia	6
McCall et al [58], (2021)	—	• Anxiety and depression	—	Mixed methods	• QUIP <sup>j</sup> • Tobii (eye-tracking software)	African American	• 29	• 15	United States	6
Rushing et al [59], (2021)	• BRAVE	• Promote help-seeking behavior, mental health, and cultural resilience	8 wk	Quantitative	• None used	American Indian and Alaska Native	• 15-24	• 1030	United States	7
Stephens et al [60], (2020)	• BRAVE	• Promote help-seeking behavior, mental health, and cultural resilience	8 wk	Mixed methods	• None used	American Indian and Alaska Native	• 15-24	• 1030	United States	

Study (year)	MHA <sup>a</sup> name	Targeted mental health condition	Duration of use	Study design	Outcome measure	Ethnic minority group	Mean age (years)	Sample size	Geographic location	Critical appraisal score
Wrobel et al [61], (2022)	• BRAVE	• Promote help-seeking behavior, mental health, and cultural resilience	8 wk	Quantitative	• Mobile Commons tracks message engagement • Questionnaires and surveys	American Indian and Alaska Native	• 15-24	• 1030	United States	7
Maloney et al [62], (2020)	—	—	—	Quantitative	• Surveys	Jamaican	• 10-19	• 107	United Kingdom	6
Neal-Barnett et al [63], (2019)	• BYOTS <sup>k</sup>	• Anxiety and negative thinking	1 wk	Mixed methods	• Focus groups	Black and biracial	• 12-15	• 72	United States	7
Povey et al [64], (2016)	• iBobbly	• Depression	1 wk	Qualitative	• Focus groups	Aboriginal or Torres Strait Islander	—	—	Australia	5
Röhr et al [65], (2021)	• Sanadak	• PTSD <sup>l</sup>	4 wk	Quantitative	• PDS-5 <sup>m</sup> • PHQ-9 • GAD-7 <sup>n</sup> • PHQ-15 • GSE <sup>o</sup> • SSMIS-SF <sup>p</sup> • SSMIS-AW <sup>q</sup> • SSMIS-AG <sup>r</sup> • SSMIS-AP <sup>s</sup> • SSMIS-HS <sup>t</sup> • RS-13 <sup>u</sup> • LSNS-6 <sup>v</sup> • ESSI <sup>w</sup> • EQ-5D-5L • EQ-VAS <sup>x</sup> • PGI <sup>y</sup>	Syrian	• Control: 33.67 • Intervention: 32.98	• 133	Germany	6
Agapie et al [66], (2022)	• Mindshift • Sanvello • Woebot • Headspace • Insight Timer • Shine • Smiling Mind • Covid Coach • Daylio • Moodflow • Talk Life		1 wk for each category	Qualitative	• Follow-up survey and Mobile App Rating Scale	Hispanic and Black	• 18	• 5	United States	5

Study (year)	MHA <sup>a</sup> name	Targeted mental health condition	Duration of use	Study design	Outcome measure	Ethnic minority group	Mean age (years)	Sample size	Geographic location	Critical appraisal score
		<ul style="list-style-type: none"> <li>• CBT<sup>z</sup> (n=4)</li> <li>• Mindfulness (n=4)</li> <li>• Miscellaneous apps (n=4), which did not pertain to 1 category, including a coping app, journaling app, mood-tracking app, and peer support app</li> </ul>								
Watson-Singleton [67], (2023)	• Mindful You	• Mindfulness	2 wk	Quantitative	<ul style="list-style-type: none"> <li>• FFMQ<sup>aa</sup></li> <li>• MSES<sup>ab</sup></li> <li>• ATMS<sup>ac</sup></li> <li>• MBUS<sup>ad</sup></li> <li>• Mindfulness Knowledge Scale</li> <li>• PSS<sup>ae</sup></li> <li>• Difficulties in Emotion Regulation Scale</li> </ul>	African American	• 31.1	• 39	United States	4

<sup>a</sup>MHA: mental health app.

<sup>b</sup>RCT: randomized controlled trial.

<sup>c</sup>iPST: internet-based problem-solving therapy.

<sup>d</sup>PHQ: Patient Health Questionnaire.

<sup>e</sup>Not available.

<sup>f</sup>MHI-21: Mental Health Inventory.

<sup>g</sup>DSI-SS: Depressive Symptom Inventory–Suicidality Subscale.

<sup>h</sup>K10: The Kessler Psychological Distress Scale.

<sup>i</sup>BIS-11: Barratt Impulsivity Scale.

<sup>j</sup>QUIS: Questionnaire for User Interface Satisfaction.

<sup>k</sup>BYOTS: Build Your Own Theme Song.

<sup>l</sup>PTSD: posttraumatic stress disorder.

<sup>m</sup>PDS: Posttraumatic Diagnostic Scale for DSM-5.

<sup>n</sup>GAD-7: Generalized Anxiety Disorder, 7 items.

<sup>o</sup>GSE: General Self-efficacy.

<sup>p</sup>SSMIS-SF: Self-Stigma of Mental Illness Scale–Short Form.

<sup>q</sup>SSMIS-AW: Self-Stigma of Mental Illness Scale– Stereotype Awareness.

<sup>r</sup>SSMIS-AG: Self-Stigma of Mental Illness Scale–Stereotype Agreement.

<sup>s</sup>SSMIS-AP: Self-Stigma of Mental Illness Scale–Stereotype Application.

<sup>t</sup>SSMIS-HS: Self-Stigma of Mental Illness Scale–Harm to Self-esteem.

<sup>u</sup>RS-13: Resilience Scale.

<sup>v</sup>LSNS-6: Lubben Social Network Scale (social isolation).

<sup>w</sup>ESSI: ENRICHED Social Support Inventory.

<sup>x</sup>VAS: Visual Analog Scale.

<sup>y</sup>PGI: Posttraumatic Growth Inventory.

<sup>z</sup>CBT: cognitive behavioral therapy.

<sup>aa</sup>FFMQ: Five Facet Mindfulness Questionnaire.

<sup>ab</sup>MSES: Mindfulness Self-Efficacy Scale.

<sup>ac</sup>ATMS: Attitudes Toward Mindfulness Scale.

<sup>ad</sup>MBUS: Mindfulness Behavior Usage Scale.

<sup>ae</sup>PSS: Perceived Stress Scale.

## Purposes of Using MHAs in Racial and Ethnic Minority Groups

The most common purpose for using MHAs was depression (iAptivate!, iPST [internet-based problem-solving therapy], iBobbly, and a prototype app by McCall et al [58]) [54,56-58]. The iBobbly MHA also addressed impulsivity; however, this was not the main purpose of use.

Two studies focused on overall psychological well-being [59,66]. The BRAVE app was used to promote overall mental well-being by including help-seeking behaviors, general mental health, and cultural resilience as outcome measures. Agapie et al [66] included a mix of MHAs, with the aim of measuring their effect on psychological well-being using qualitative methods.

The other apps in this review had various purposes. The Build Your Own Theme Song (BYOTS) app was aimed at reducing anxiety and negative thoughts. The Sanadak app [65] aimed to reduce posttraumatic stress disorder (PTSD) symptoms, whereas Mindful You [67] aimed to reduce stress.

## Intervention Characteristics

A total of 20 apps were investigated in this review; 8 MHAs (including 2 prototypes) were included in 14 of the 15 studies [54,56-59,63-67], whereas 1 study [66] included 12 self-help MHAs that were qualitatively investigated.

Of the 20 apps, 8 (40%) were based on cognitive behavioral therapy (CBT) [65,66] or variations of the CBT approach, such as problem-solving therapy [56], acceptance-based therapy [57], and behavioral activation therapy [54]. Five (25%) apps were based on mindfulness [66,67], and the 7 (35%) apps could be described as miscellaneous: the prototype by McCall et al [58], which included the elements of CBT and psychotherapy [58]; the BYOTS app, which is based on musical cognitive restructuring [63]; and the BRAVE app, which is based on offering information and role model videos aimed at providing coping skills [59]. The remaining 4 miscellaneous apps were described as “wellness hacks” by Agapie et al [66]: Covid Coach, Daylio, Moodflow, and Talk Life. The full list of MHAs categorized by therapeutic approach is shown in [Textbox 1](#).



**Textbox 1.** Therapeutic approach of the 20 mental health apps included in this review.

#### Cognitive behavioral therapy–based apps

- Sanadak [65]
- Internet-based problem-solving therapy [56]
- ¡Aptivate! [54]
- iBobbly [57]
- Mindshift [66]
- Sanvello [66]
- Woebot [66]
- Wysa [66]

#### Mindfulness-based apps

- Headspace [66]
- Insight Timer [66]
- Shine [66]
- Smiling Mind [66]
- Mindful You [67]

#### Miscellaneous apps

- Prototype by McCall et al [58]
- Build Your Own Theme Song [63]
- BRAVE [59]
- Covid Coach [66]
- Daylio [66]
- Moodflow [66]
- Talk Life [66]

### Consideration of Racial and Ethnic Minority Groups While Developing MHAs

Of all the MHAs mentioned, 7 apps targeted racial and ethnic minority groups specifically: ¡Aptivate!, iBobbly, BRAVE, BYOTS, the prototype app by McCall et al [58], Sanadak, and Mindful You. The inclusion of racial and ethnic minority groups was ensured by codeveloping the app with the target population, by using workshops [56], interviews [55,59], usability trials [58], or working with culturally informed organizations [63]. ¡Aptivate! [54] was developed in Spanish language to be acceptable to the Hispanic population. Both Sanadak and Mindful You were developed with the specific needs of racial and ethnic minority groups in mind and tailored to the type of material used in the apps.

### Examining the Acceptability of MHAs Among Racial and Ethnic Minority Groups

To measure the acceptability of MHAs among racial and ethnic minority groups, 8 studies referred to app use and interactive data [54,56,57,59-61,65,67] in 6 MHAs. Studies reported good adherence to the specified MHAs throughout the set duration period in Hispanic, Aboriginal, Torres Strait Islander, and American Indian and Alaska Native individuals. Adherence

data ranged from 81.8% to 91.2% of participants using and interacting with the app.

For the ¡Aptivate! app, participants were asked to use the app within the 8 weeks provided. The retention rate was 100% in the first week but decreased to 50% by the eighth week. This study suggests that the 50% drop in retention can be explained by the local versus remote recruitment of Latina participants. Those who attended baseline visits in person were more likely to use the app more frequently than those who did remotely. Dahne et al [54] also reported that 50% of Hispanic participants who continued using ¡Aptivate! 2 months after enrollment showed a high level of acceptability. Pratap et al [56] also recruited Hispanic and Latina participants and conducted a randomized controlled trial for 3 months to evaluate the iPST app. Engagement and retention rates were assessed based on the number of completed surveys. The study reported 34.4% dropouts in the Hispanic and Latino population. Of those who dropped out, more than half reported making ≤US \$20,000 annually. Of those who used the app, Hispanic and Latina participants showed a 50% decrease in engagement from week 1 to week 4. It is important to note that this is based on the completion of the assessment and, therefore, is not an accurate representation of app use.

The BRAVE app was also used in an 8-week trial [60], with an overall retention rate of 87%. Among the participants in the BRAVE arm, 41 American Indian and Alaska Native participants opted out during the intervention and 25 opted out at crossover. This suggests a dropout rate of only 13% [59].

The iBobbly app was used by Aboriginal and Torres Strait Islander participants in a 6-week trial. The app had the lowest dropout rate (3%) of all other MHAs in this review. The study argues that this was due to technical issues and speculated that some participants might have felt self-conscious about sharing their use data [57].

Sanadak was designed for Syrian participants, and they were asked to use the app regularly for 4 weeks. The retention rate was 87.2%, with a dropout rate of 12.8%, where most participants refused to continue. Upon further analysis, Röhr et al [65] claimed that there was no significant difference between participants who completed the study and those who did not. Finally, Watson-Singleton et al [67] explored the Mindful You app. African American participants were asked to use the app for 2 weeks. The study reported a dropout rate of 45%, which the study found difficult to explain because the app was designed specifically for African Americans. Participants who continued using the app felt positive about Mindful You, giving the app 4.38 stars out of 5.

Overall, dropout rates were significantly higher among Hispanic and Latino participants than among non-Hispanic participants, with the latter staying on average 18.5 days longer.

Qualitative studies measured the acceptability of MHAs using interviews [55], workshops and focus groups [63], surveys [40,62], and questionnaires [58].

Participants were interviewed about the iBobbly app in terms of acceptability, cultural appropriateness, and whether the app provided help with their feelings and created distractions. The Aboriginal and Torres Strait Islander participants reported that iBobbly was acceptable, especially in terms of accessibility. Moreover, the participants felt a sense of privacy that was valued more than talking with a therapist or a family member. Participants also spoke of the “shame” attached to young Aboriginal people when asking for help, and so the iBobbly app was seen as culturally appropriate. Povey et al [64] also explored the iBobbly app and compared it with a therapist-led app. Aboriginal and Torres Strait Islander participants showed enthusiasm when they helped design the AIMhi- Y app [43]. Barnett et al [63] conducted focus groups regarding the BYOTS app designed for Black and biracial girls, and they were prompted to use the app 3 times a day for 1 week. This study did not mention dropout rates. However, using focus groups, the study showed that Black and biracial girls found the BYOTS app acceptable and useful in daily situations.

Agapie et al [66] explored a variety of apps with Hispanic and Latina participants. They were asked to use 1 app from each category weekly for a 5-week period and then complete a focus group at the end of each week. Every week participants would use a different app and then the last week they chose their favorite. There were no official use data; participants were asked to report how often they used the app, and they were most likely

to report “a few days a week.” It seems that mindfulness apps were more acceptable, with 60% of participants reporting continued use. During the focus groups, participants noted that the apps were easy to use and accessible. However, the participants generally preferred to use the apps with more free content. Some participants reported concern about whether the app was validated by professionals and expressed the need to feel safe.

Both Lungu and Sun [40] and Maloney et al [62] used a questionnaire to assess the acceptability of MHAs in general. Of the 75.3% Asian American young adults who endorsed seeking mental health help on the web, only 22% were interested in MHAs [40]. Asian American participants were more likely to be in the “No therapy” and “Online only” groups compared with White participants. Similarly, 56% of the Jamaican participants were interested in using MHAs. However, shame, stigma, and embarrassment were reported to be the major barriers to seeking help. However, using a questionnaire, McCall et al [58] found that African American women reported that the prototype app was easy to use and provided culturally helpful information for anxiety and depression.

Overall, the apps were acceptable both quantitatively through use data and qualitatively, as participants described their engagement with and enthusiasm for the apps. However, dropout rates among some racial and ethnic minority groups remain high, and there is some discrepancy in the measurement of acceptability.

## **Examining the Effectiveness of MHAs With Racial and Ethnic Minority Groups**

### ***Outcome Measures and Study Design***

Nine of the 15 studies included in this review were quantitative [40,54,56,57,59,61,62,65,67], 4 used mixed methods [55,58,60,63], and 2 were qualitative [64,66].

In terms of quantitative studies, 3 studies [54,56,57] assessed depression levels in Hispanic and Indigenous Australian individuals. Two studies assessed mental health resilience in American Indian and Alaska Native populations [59,61]. One study assessed the levels of PTSD in Syrian refugees [65], and the other focused on mindfulness in Black African Americans [67]. The last 2 measured the receptiveness of web-based mental health support and MHAs with Jamaican [62] and Asian American [40] participants.

Four studies adopted mixed methods designs [55,58,60,63] and assessed Aboriginal and Torres Strait Islander, Black and biracial, and Indigenous Australian population. Three of these studies explored named MHAs: BRAVE [60], iBobbly [55], and BYOTS [63]. The remaining was an unnamed app, and the study explored its usability [58]. All studies, except for the one by Stephens et al [60], used surveys [55,58,62,63] and focus groups [63] or interviews [55,56] or cognitive walkthrough and think-aloud methods [58]. Stephens et al [60] did not use any measures, as they reported lessons learned from recruiting and engaging participants from the previous BRAVE study [59]. Outcome measures that were used by Tighe et al [55] and Povey et al [64] were appropriately translated to and validated in other

languages to suit the ethnicity of the sample. Surveys, workshops, and interviews were developed and approved by mental health professionals of the target ethnicity.

Finally, the 2 qualitative studies focused on measuring the acceptability of the respective MHAs and discussing barriers to continued use [64,66]. All the outcome measures are presented in Table 1.

### **Effectiveness**

Studies that explored a specific app assessed its effectiveness by using either weekly assessments [54,56,65] or pre- and postintervention changes in outcome measure scores [57,59,61,63,67]. Outcome measures were divided into clinical outcomes (eg, depression, anxiety, and suicidality) and other behavioral outcomes (eg, distress, resilience, and self-efficacy).

Quantitative studies on clinical outcomes that measured effectiveness using weekly assessments had inconclusive results. The ¡Aptivate! app [54] reported significantly lower depressive symptoms in Hispanic adults than in the no-treatment group; however, depressive symptoms did not differ on average across time between the 2 groups. Pratap et al [56] found improvement in depression scores among Hispanic and non-Hispanic participants, regardless of the treatment arm and ethnicity. However, they noted no evidence of any clinically meaningful changes between the iPST and the control group. The authors noted that only participants who reported severe depressive symptoms showed the greatest decline; however, this only lasted until week 4 of the study. Tighe et al [57] reported a decline in depressive symptoms among Aboriginal and Torres Strait Islander participants, but no significant reduction was observed in the primary outcome of suicidality in Indigenous Australian participants. In addition, no significant relationship between use time and any of the outcome measures was observed. The Sanadak app [65] also showed no significant differences in PTSD symptoms between the intervention and control groups after 4 weeks and 4 months of follow-up.

Other behavioral outcomes were also explored by quantitative studies. For instance, Pratap et al [56] explored functional impairment in addition to depressive symptoms and found no difference in disability outcomes across treatment arms and no difference between Hispanic and non-Hispanic participants. Tighe et al [57] explored psychological distress and impulsivity as secondary outcomes. The iBobby app was associated with a significant decrease in Kessler Psychological Distress Scale scores after 6 weeks; however, there was no significant change in impulsivity [57]. Rushing et al [59] included the following secondary outcomes: self-efficacy, self-esteem, resilience, coping strategies, substance use, and cultural identity. They found that American Indian and Alaska Native participants who reported better health on average at baseline were more likely to report stronger cultural identity, cultural resilience, and positive coping strategies. No significant differences emerged in any of the primary outcomes of the BRAVE app (help seeking, self-efficacy related to mental health, and negative coping) [59,61]. A surprising finding for the BRAVE app was that higher scores on help-seeking attitude at baseline were associated with a decrease in the number of clicks or engagement with the app. However, it is important to note that

Wrobel et al [61] reported that the engagement data were highly skewed, with some participants clicking an average of 3.4 times, but some users clicked 49 times. Finally, Röhr et al [65] included the secondary outcomes: self-efficacy, self-stigma, and resilience. They found that after using the Sanadak app, Syrian refugees showed no differences in any of the secondary outcomes, except for self-stigma. Syrian refugees reported lower levels of self-stigma following the use of the Sanadak app.

Quantitative evidence from mixed methods studies also showed inconclusive results on both clinical and behavioral outcomes. Neal-Barnett et al [63] concluded that Black and biracial girls who used the BYOTS app reported significantly lower negative and anxious thoughts on day 7 than on day 1. Although this study showed a positive result, the app was used for only 1 week, so there is still uncertainty regarding whether these improvements would last. Watson-Singleton et al [67] reported that Black African American participants who used Mindful You showed a significant decrease in stress levels after 2 weeks. They also showed increased capacity for emotional regulation and a significant increase in self-efficacy and mindfulness behaviors. However, there were no significant differences in the endorsements of mindfulness attributes, attitudes, or knowledge.

Finally, of the 2 qualitative studies, the one by Agapie et al [66] used a focus group to ask about the perceived effectiveness of the different apps that the participants used. Hispanic and Latina participants reported that all the apps used had small positive impacts on their mental health. Miscellaneous apps were ranked as the most effective in improving mental health well-being, followed by CBT apps and mindfulness apps. Povey et al [64] focused only on acceptability, whereas McCall et al [58] explored usability rather than the effectiveness of the app.

### **Barriers to MHA Use Within Racial and Ethnic Minority Groups**

Several barriers to MHAs were reported by the studies, ranging from cost to cultural appropriateness. Four studies did not explicitly report any barriers; however, they did highlight that not all clients may respond to self-guided treatment [54,58,63,65].

One of the most common barriers to using MHAs was the lack of personal touch. Aboriginal and Torres Strait Islanders, who used the iBobby app, reported the need for more cultural content that related to their community [64]. This barrier was also true for American Indian and Alaska Native participants who used the BRAVE app [59]. Rushing et al [59] reported that due to the lack of representation in the media, participants reacted positively to both study arms, as they both contained cultural content. Participants who used the iBobby app reported that such apps were not given enough community awareness and were therefore less likely to be used [64]. Rushing et al [59] also found that those with higher help-seeking tendencies were less likely to use the BRAVE app, which they hypothesized was because they were more likely to have support from people around them. The need for a personal touch was common even across the multiple apps explored by Agapie et al [66], with Hispanic and Latina participants reporting that the content was not specific enough for them.

The second most common barrier was stigma. Islander participants who used the iBobbly app reported that others may not engage with the app due to stigma surrounding mental health [55]. Pratap et al [56] also noted similar concerns among Hispanic participants when using the iPST app. Jamaican participants have gone as far as to describe using MHAs as embarrassing, relating to the stigma attached to receiving mental health support [62].

The third barrier was the cost. This was not so common but was mentioned by both Islander and Hispanic participants [64,66]. Agapie et al [66] found that Hispanic participants were more likely to use apps that were richer in free content compared with those that required a subscription. Other barriers included the repetitiveness of the MHA that was described by Rushing et al [59] as “message fatigue,” as lack of engagement was evident after the 10th text sent by the BRAVE app. Furthermore, literacy and language barriers were brought up by Islander participants who argued that some people in their community may not be comfortable using English [64]. Finally, technical issues were also identified as barriers to using MHAs. For instance, Tighe et al [55] failed to gather use data for 21 out of the 61 participants due to internet connectivity issues, a technical problem with their device, or an uncharged battery. Stephens et al [60] also noted that some participants lost access to their mobile phones and were thus unable to interact with the content of the BRAVE app.

## Discussion

### Principal Findings

This scoping review aimed to (1) describe the purposes of using MHAs in racial and ethnic minority groups, (2) examine the acceptability of MHAs among those groups, (3) examine the effectiveness of MHAs with the groups, (4) identify the barriers to MHA use within the groups, and (5) identify the gaps in the literature. Overall, our research pooled findings from 15 publications and highlighted important findings regarding the evidence related to MHA use among the racial and ethnic minority groups. Overall, MHAs were used for different purposes such as improving depression, decreasing psychological distress, increasing cultural resilience, and promoting help-seeking behavior. Fundamentally, most MHAs targeting racial and ethnic minority groups are underpinned by CBT and focus on depressive symptoms. In terms of acceptability, MHAs appear to be of interest among racial and ethnic minority groups; however, there is limited and mixed evidence of their effectiveness. Barriers to use include intervention-specific characteristics (eg, repetitiveness of the tasks), user-specific characteristics (eg, stigma), and technology-specific characteristics (eg, internet connectivity). Finally, several gaps in the literature, namely, the participant pool, MHAs design, study design, and study location, were identified. Taken together, these findings need to be considered to deepen our knowledge of MHA use and experiences among racial and ethnic minority groups.

Regarding evidence based on the intended purpose of using MHAs in racial and ethnic minority groups, most of the apps included in our review focused on depression and psychological

distress. Although depression is one of the most common mental health disorders with a high prevalence among young people [68], the fact that it is one of the main purposes of the use of MHAs in this population is relevant. For instance, people from racial and ethnic minority backgrounds experience increased challenges compared with the majority population including social inequities, discrimination, and disparities in living conditions and work environments that may increase the risk of developing depression and psychological distress [26-28]. Islander participants who used the iBobbly app noted the need of more cultural content that was specific for them to increase engagement with the MHA [64]. However, Watson-Singleton et al [67] reported a 45% dropout rate from Mindful You despite having created a culturally specific app for Black African American population. Thus, there seems to be uncertainty about what specific changes would keep racial and ethnic minority groups engaged in MHAs. Another common challenge experienced by racial and ethnic minority groups is the stigma against mental health, which can form a barrier to accessing mental health support [33-35]. Stigma was a common barrier to using MHAs across Islander, Hispanic, and Jamaican participants [56,62,64]. Only one app in this review addressed this issue and focused on improving help-seeking behaviors [59]. However, the app reported no significant improvement in help-seeking behavior. In contrast, Röhr et al [65] found that a secondary outcome of the Sanadak app was reduced self-stigma in Syrian refugees. Therefore, future studies should aim to improve help-seeking behaviors and reduce mental health stigma in people from racial and ethnic minority backgrounds.

This review noted two critical observations regarding acceptability: (1) the measurements used and (2) attitudes of racial and ethnic minority groups toward MHAs. We followed the definition by Sekhon et al [52] for measuring acceptability: the willingness to participate and the adherence to the MHA. In our review, 8 studies measured acceptability using use or interactive data [54,56,57,59-61,64,67], and 7 used qualitative methods such as interviews, workshops, and surveys [40,55,58,62-64,66]. How acceptability is measured in these studies is essential, as it can affect how an MHA is perceived. For instance, in our review, the iBobbly app was investigated using both use data [55] and qualitative methods [57]. The findings showed that iBobbly was not acceptable in terms of use data; however, qualitative evidence showed that Aboriginal and Torres Strait Islanders reported that the iBobbly app was acceptable and culturally appropriate, and it reduced stigma surrounding mental health issues. Our review further highlights the heterogeneity in the definition and measurement of acceptability, making it difficult to draw conclusions.

Second, there seems to be ambivalence around racial and ethnic minority groups in terms of the acceptability of MHAs. Hispanic and Latina participants showed a high willingness to use MHAs [54,56] but showed a lack of engagement and high dropout rates [54,56]. In contrast, Agapie et al [66] found that 60% of Hispanic participants used the mindfulness apps even after the trial. Similarly, this review shows how many among Black and African American participants find MHAs useful and acceptable [62,63,67]. However, in the study by Watson-Singleton et al [67], almost half of the Black American participants dropped

out for no given reason. In the study by Maloney et al [62] Jamaican participants explained stigma and embarrassment as major barriers to use. Similarly, the BRAVE app was found to be helpful for American Indian and Alaska Native participants; however, upon closer examination of the interactive data, Wrobel et al [61] found that engagement was lower than expected. The study that used the iBobbly app showed that Aboriginal and Torres Strait Islander participants were highly willing to use MHAs [55]; however, there was still a lack of interest in MHAs among them [55]. The other 2 racial and ethnic minority groups included in this study were Syrian refugees and Asian American individuals, who both showed high interest in MHAs and high dropout rates [66] or would rather use Facebook [40].

Overall, despite the high willingness of racial and ethnic minority groups to use MHAs, evidence reports an overall mixed view of engagement. More research adopting appropriate and standardized methods for measuring acceptability should be considered in the future.

Of note, 2 user-specific factors are related to the acceptability of MHAs. First is the level of psychological distress among racial and ethnic minority groups. In our review, we observed that Indigenous Australians with higher levels of distress were more likely to use MHAs and adhere to them [57]. However, in qualitative studies, Indigenous Australians and Aboriginal and Torres Strait Islanders reported that in extreme distress, they might not benefit from MHAs and FTF therapy would be more appropriate [55,64].

The second factor is help-seeking behavior as shown in the BRAVE study. Stephens et al [60] and Wrobel et al [61] found that surprisingly, those who scored high on help-seeking behavior showed less engagement with the BRAVE app. It was suggested that these participants might already have had their own ways to deal with distress and, therefore, were less likely to use other methods such as the BRAVE app. This corroborates the findings of Lungu and Sun [40], who suggest that some people from ethnic minority groups prefer to seek other forms of support (eg, Facebook). Facebook is not a MHA; however, some participants were more comfortable to reveal information on Facebook than attend FTF therapy. It would be helpful to understand the ways in which participants adapted to seek help, as it seems to influence engagement.

Regarding the effectiveness of the apps, the review found only 2 quantitatively effective apps: BYOTS and Mindful You [63,67], which corroborates the findings from previous reviews that reported limited or mixed evidence of the effectiveness of MHAs [17,21,69]. Previous reviews revealed that most MHAs claim effectiveness; however, there is no scientific evidence supporting their claims. This highlights the dire need for regulations on MHAs that are available on app stores. The BYOTS and Mindful You apps were also trialed for only 1 and 2 weeks, respectively; therefore, we cannot confidently assume that they will be effective for longer periods [63]. However, the fact that these MHAs were effective in reducing negative and anxious thoughts in Black and African Americans is in line with previous literature that showed that when given access to treatment, Black Americans benefit and engage more from

therapy than White Americans [70]. Qualitative data found that Aboriginal youth in the study by Tighe et al [55] reported enjoying the iBobbly app even if it did not improve their clinical symptoms. Similarly, the participants who used the BRAVE app showed a significant positive improvement, but it was not different from those who received science, technology, engineering, and mathematics (STEM) messages [59]. Moreover, Sanadak app, which was used by Röhr et al [65], did not significantly decrease PTSD symptoms; however, participants' self-stigma toward mental health was notably reduced. Overall, little is known about how users interact with MHAs in clinically meaningful ways.

In terms of app-specific factors that affect effectiveness, evidence shows that users prefer using mobile apps in short bursts of time [19] highlighting that long-term use might result in repetition for app users. A possible solution might be to have users regularly engage with the app to improve its benefits [22]. Stephens et al [60] suggested creating a "pause" in the BRAVE messages so that users continue to be engaged and avoid "text fatigue." Future studies should investigate the features that can encourage engagement among MHAs users. This review highlights the importance of co-design approaches and cultural adaptations. Ramos et al [71] noted that culturally inspired MHAs may be more appealing to racial and ethnic minority groups and can lead to increased intervention uptake. All the MHAs included in this study, except ¡Aptivate! [54] and iPST [56], were designed with the guidance of racial and ethnic minority groups. The inclusion of these groups in the process of creating the app prevents stereotyping and ensures the most culturally relevant factors to the user [71]. ¡Aptivate! [54] and iPST [56] only included accessible language as a culturally adaptive factor in apps. This is in line with the review by Ramos et al [71], who found that almost 58% of the MHAs included only 1 criterion, suggesting that the inclusion of culturally relevant criteria is far from the norm. Our review also showed that a common barrier was that there was not enough cultural content, even for apps specifically designed for racial and ethnic minority groups [64]. Future studies should consider the impact of cultural factors on the effectiveness of MHAs. Furthermore, future studies would benefit from exploring these factors from a qualitative perspective for more insights, as this review shows only 1 effective MHA despite including many culturally adaptive factors.

## Observations and Gaps in the Field With Suggestions for Future Research

Four important observations emerged around the potential gaps in the literature: participant pool, MHA design, study design, and location of the study.

### Participant Pool

The participants recruited in the studies that we reviewed were primarily Hispanic and Latina or Black and biracial. Therefore, there is a need to recruit participants in MHA research from a wider racial and ethnic minority background. Another important observation in the review is that only 2 studies [54,64] included a greater number of unemployed than employed participants. The remaining studies included either employed participants or those who attended colleges or schools. Future research should

also include low-income racial and ethnic minority populations to help find ways to effectively incorporate MHA technology as an accessible mental health support tool.

### **MHA Design**

Regarding the MHA design, the apps in this review were primarily CBT based [54,64] or inspired by it using acceptance-based therapy [55,57], problem-solving therapy [56], cognitive musical restructuring [63], or a mixture of psychotherapy and CBT [58,59,66]. Therefore, more research is needed to explore different theoretical underpinnings to identify what works for whom, in what context, and among different cultures.

### **Study Design**

Most of the included studies were quantitative, which arguably did not explain why the apps were ineffective. Strategies such as interviews or workshops might help better explore the barriers experienced by participants and help tailor targeted interventions. For instance, studies with mixed methods design offered valuable insights into the strengths and barriers of MHAs [55,58,60,63]. Although qualitative research takes time, future MHA research should consider qualitative research as the beneficial next step to progress in the field of MHAs for racial and ethnic minority populations.

### **Study Location**

A total of 10 studies were conducted in the United States [40,54,56,58-61,63,66,67], 2 in Australia [57,64], 1 in Canada [55], 1 in the United Kingdom [62], 1 in Germany [65]. Overall, more studies are needed globally to achieve generalizability of the findings and improve our understanding of MHA use among people of racial and ethnic minorities. More research is needed to explore whether MHA might be incorporated into existing

services as a source of additional support to help overcome some of the existing barriers to service receipt among racial and ethnic minority groups.

### **Limitations**

This review benefited from independent screening by 2 researchers, and this minimized selection bias. Similarly, 2 reviewers were involved in quality appraisal, thereby reducing any bias in the assessments. However, this study has some limitations. Although our search terms were guided by previous systematic reviews including racial and ethnic minority groups, this is not an extensive list of all terminology related to racial and ethnic minority groups; therefore, the review was limited to the search terms used. Moreover, as the researchers involved could only read English, several studies that may have been relevant to this review were excluded. However, despite not imposing limitations on the country of origin and an extensive list of racial and ethnic minority group-related search terms, we were only able to include 15 studies; this demonstrates a dearth of evidence of MHAs among racial and ethnic minority groups, which highlights the need for further investigation.

### **Conclusions**

In this review, we aimed to explore the use of MHAs among racial and ethnic minority groups. This review synthesized data from 15 publications and reviewed 7 interventions. Although acceptability seems fairly consistent, more research is needed to support MHA effectiveness and overcome existing barriers. Overall, the literature on MHAs among racial and ethnic minority groups is still scarce, and there is still much left to understand. Future app developers should consider including racial and ethnic minority groups' input in the development of MHAs as well as widening the scope of MHAs to focus on a range of disorders and use different theoretical approaches.

---

### **Conflicts of Interest**

None declared.

---

### **Multimedia Appendix 1**

PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) checklist for scoping reviews.  
[\[PDF File \(Adobe PDF File\), 516 KB-Multimedia Appendix 1\]](#)

---

### **Multimedia Appendix 2**

Scoping review search terms.  
[\[DOCX File , 28 KB-Multimedia Appendix 2\]](#)

---

### **References**

1. Sucala M, Cuijpers P, Muench F, Cardo R, Soflau R, Dobrea A, et al. Anxiety: There is an app for that. A systematic review of anxiety apps. *Depress Anxiety*. 2017 Jun;34(6):518-525 [doi: [10.1002/da.22654](#)] [Medline: [28504859](#)]
2. Gould CE, Kok BC, Ma VK, Zapata AM, Owen JE, Kuhn E. Veterans Affairs and the Department of Defense mental health apps: a systematic literature review. *Psychol Serv*. 2019 May;16(2):196-207 [doi: [10.1037/ser0000289](#)] [Medline: [30431306](#)]
3. Torous J, Roberts LW. Needed innovation in digital health and smartphone applications for mental health: transparency and trust. *JAMA Psychiatry*. 2017 May 01;74(5):437-438 [doi: [10.1001/jamapsychiatry.2017.0262](#)] [Medline: [28384700](#)]
4. Torous J, Wisniewski H, Liu G, Keshavan M. Mental health mobile phone app usage, concerns, and benefits among psychiatric outpatients: comparative survey study. *JMIR Ment Health*. 2018 Nov 16;5(4):e11715 [FREE Full text] [doi: [10.2196/11715](#)] [Medline: [30446484](#)]

5. Bauer M, Glenn T, Geddes J, Gitlin M, Grof P, Kessing LV, et al. Smartphones in mental health: a critical review of background issues, current status and future concerns. *Int J Bipolar Disord*. 2020 Jan 10;8(1):2 [FREE Full text] [doi: [10.1186/s40345-019-0164-x](https://doi.org/10.1186/s40345-019-0164-x)] [Medline: [31919635](https://pubmed.ncbi.nlm.nih.gov/31919635/)]
6. Perez S. Meditation and mindfulness apps continue their surge amid pandemic. *TechCrunch*. 2020 May 28. URL: <https://techcrunch.com/2020/05/28/meditation-and-mindfulness-apps-continue-their-surge-amid-pandemic/> [accessed 2023-11-28]
7. Kern A, Hong V, Song J, Lipson SK, Eisenberg D. Mental health apps in a college setting: openness, usage, and attitudes. *Mhealth*. 2018 Jun 30;4:20 [FREE Full text] [doi: [10.21037/mhealth.2018.06.01](https://doi.org/10.21037/mhealth.2018.06.01)] [Medline: [30050916](https://pubmed.ncbi.nlm.nih.gov/30050916/)]
8. Lipschitz JM, Connolly SL, Miller CJ, Hogan TP, Simon SR, Burdick KE. Patient interest in mental health mobile app interventions: demographic and symptom-level differences. *J Affect Disord*. 2020 Feb 15;263:216-220 [doi: [10.1016/j.jad.2019.11.083](https://doi.org/10.1016/j.jad.2019.11.083)] [Medline: [31818779](https://pubmed.ncbi.nlm.nih.gov/31818779/)]
9. Temkin AB, Schild J, Falk A, Bennett SM. Mobile apps for youth anxiety disorders: a review of the evidence and forecast of future innovations. *Prof Psychol Res Pract*. 2020 Aug;51(4):400-413 [doi: [10.1037/pro0000342](https://doi.org/10.1037/pro0000342)]
10. Oswalt SB, Lederer AM, Chestnut-Steich K, Day C, Halbritter A, Ortiz D. Trends in college students' mental health diagnoses and utilization of services, 2009-2015. *J Am Coll Health*. 2020 Jan;68(1):41-51 [doi: [10.1080/07448481.2018.1515748](https://doi.org/10.1080/07448481.2018.1515748)] [Medline: [30355071](https://pubmed.ncbi.nlm.nih.gov/30355071/)]
11. Newman MG, Szkodny LE, Llera SJ, Przeworski A. A review of technology-assisted self-help and minimal contact therapies for anxiety and depression: is human contact necessary for therapeutic efficacy? *Clin Psychol Rev*. 2011 Feb;31(1):89-103 [doi: [10.1016/j.cpr.2010.09.008](https://doi.org/10.1016/j.cpr.2010.09.008)] [Medline: [21130939](https://pubmed.ncbi.nlm.nih.gov/21130939/)]
12. Eisenberg D, Nicklett EJ, Roeder K, Kirz NE. Eating disorder symptoms among college students: prevalence, persistence, correlates, and treatment-seeking. *J Am Coll Health*. 2011 Nov;59(8):700-707 [FREE Full text] [doi: [10.1080/07448481.2010.546461](https://doi.org/10.1080/07448481.2010.546461)] [Medline: [21950250](https://pubmed.ncbi.nlm.nih.gov/21950250/)]
13. Gruttadaro D, Crudo D. College students speak: a survey report on mental health. National Alliance on Mental Illness. 2012. URL: <https://www.nami.org/Support-Education/Publications-Reports/Survey-Reports/College-Students-Speak-A-Survey-Report-on-Mental-H> [accessed 2023-11-28]
14. Kosyluk KA, Conner KO, Al-Khouja M, Bink A, Buchholz B, Ellefson S, et al. Factors predicting help seeking for mental illness among college students. *J Ment Health*. 2021 Jun;30(3):300-307 [FREE Full text] [doi: [10.1080/09638237.2020.1739245](https://doi.org/10.1080/09638237.2020.1739245)] [Medline: [32191145](https://pubmed.ncbi.nlm.nih.gov/32191145/)]
15. Ross SG, Bruggeman B, Maldonado M, Deiling M. Examining personal, perceived, treatment, and self-stigma in college students: the role of parent beliefs and mental health literacy. *J College Stud Psychother*. 2019 Mar 01;34(3):183-197 [doi: [10.1080/87568225.2019.1580657](https://doi.org/10.1080/87568225.2019.1580657)]
16. Ibrahim N, Amit N, Shahar S, Wee LH, Ismail R, Khairuddin R, et al. Do depression literacy, mental illness beliefs and stigma influence mental health help-seeking attitude? A cross-sectional study of secondary school and university students from B40 households in Malaysia. *BMC Public Health*. 2019 Jun 13;19(Suppl 4):544 [FREE Full text] [doi: [10.1186/s12889-019-6862-6](https://doi.org/10.1186/s12889-019-6862-6)] [Medline: [31196033](https://pubmed.ncbi.nlm.nih.gov/31196033/)]
17. Larsen ME, Huckvale K, Nicholas J, Torous J, Birrell L, Li E, et al. Using science to sell apps: evaluation of mental health app store quality claims. *NPJ Digit Med*. 2019 Mar 22;2(1):18 [FREE Full text] [doi: [10.1038/s41746-019-0093-1](https://doi.org/10.1038/s41746-019-0093-1)] [Medline: [31304366](https://pubmed.ncbi.nlm.nih.gov/31304366/)]
18. Baumel A, Muench F, Edan S, Kane JM. Objective user engagement with mental health apps: systematic search and panel-based usage analysis. *J Med Internet Res*. 2019 Sep 25;21(9):e14567 [FREE Full text] [doi: [10.2196/14567](https://doi.org/10.2196/14567)] [Medline: [31573916](https://pubmed.ncbi.nlm.nih.gov/31573916/)]
19. Zhang R, Nicholas J, Knapp AA, Graham AK, Gray E, Kwasny MJ, et al. Clinically meaningful use of mental health apps and its effects on depression: mixed methods study. *J Med Internet Res*. 2019 Dec 20;21(12):e15644 [FREE Full text] [doi: [10.2196/15644](https://doi.org/10.2196/15644)] [Medline: [31859682](https://pubmed.ncbi.nlm.nih.gov/31859682/)]
20. Pratap A, Neto EC, Snyder P, Stepnowsky C, Elhadad N, Grant D, et al. Indicators of retention in remote digital health studies: a cross-study evaluation of 100,000 participants. *NPJ Digit Med*. 2020 Feb 17;3(1):21 [FREE Full text] [doi: [10.1038/s41746-020-0224-8](https://doi.org/10.1038/s41746-020-0224-8)] [Medline: [32128451](https://pubmed.ncbi.nlm.nih.gov/32128451/)]
21. Leigh S, Flatt S. App-based psychological interventions: friend or foe? *Evid Based Ment Health*. 2015 Nov 12;18(4):97-99 [doi: [10.1136/eb-2015-102203](https://doi.org/10.1136/eb-2015-102203)] [Medline: [26459466](https://pubmed.ncbi.nlm.nih.gov/26459466/)]
22. Bakker D, Kazantzis N, Rickwood D, Rickard N. Mental health smartphone apps: review and evidence-based recommendations for future developments. *JMIR Ment Health*. 2016 Mar 01;3(1):e7 [FREE Full text] [doi: [10.2196/mental.4984](https://doi.org/10.2196/mental.4984)] [Medline: [26932350](https://pubmed.ncbi.nlm.nih.gov/26932350/)]
23. Beck A, Burdett M, Lewis H. The association between waiting for psychological therapy and therapy outcomes as measured by the CORE-OM. *Br J Clin Psychol*. 2015 Jun 26;54(2):233-248 [doi: [10.1111/bjc.12072](https://doi.org/10.1111/bjc.12072)] [Medline: [25425180](https://pubmed.ncbi.nlm.nih.gov/25425180/)]
24. Bruen AJ, Wall A, Haines-Delmont A, Perkins E. Exploring suicidal ideation using an innovative mobile app-strength within me: the usability and acceptability of setting up a trial involving mobile technology and mental health service users. *JMIR Ment Health*. 2020 Sep 28;7(9):e18407 [FREE Full text] [doi: [10.2196/18407](https://doi.org/10.2196/18407)] [Medline: [32985995](https://pubmed.ncbi.nlm.nih.gov/32985995/)]
25. Ly KH, Asplund K, Andersson G. Stress management for middle managers via an acceptance and commitment-based smartphone application: a randomized controlled trial. *Internet Interv*. 2014 Jul;1(3):95-101 [FREE Full text] [doi: [10.1016/j.invent.2014.06.003](https://doi.org/10.1016/j.invent.2014.06.003)]

26. Paradies Y, Ben J, Denson N, Elias A, Priest N, Pieterse A, et al. Racism as a determinant of health: a systematic review and meta-analysis. *PLoS One*. 2015 Sep 23;10(9):e0138511 [FREE Full text] [doi: [10.1371/journal.pone.0138511](https://doi.org/10.1371/journal.pone.0138511)] [Medline: [26398658](https://pubmed.ncbi.nlm.nih.gov/26398658/)]
27. Williams DR. Stress and the mental health of populations of color: advancing our understanding of race-related stressors. *J Health Soc Behav*. 2018 Dec 28;59(4):466-485 [FREE Full text] [doi: [10.1177/0022146518814251](https://doi.org/10.1177/0022146518814251)] [Medline: [30484715](https://pubmed.ncbi.nlm.nih.gov/30484715/)]
28. Mossakowski KN. Dissecting the influence of race, ethnicity, and socioeconomic status on mental health in young adulthood. *Res Aging*. 2008 Sep 10;30(6):649-671 [doi: [10.1177/0164027508322693](https://doi.org/10.1177/0164027508322693)]
29. Tribe R. Mental health of refugees and asylum-seekers. *Adv Psychiatr Treat*. 2018 Jan 02;8(4):240-247 [FREE Full text] [doi: [10.1192/apt.8.4.240](https://doi.org/10.1192/apt.8.4.240)]
30. Fazel M, Wheeler J, Danesh J. Prevalence of serious mental disorder in 7000 refugees resettled in western countries: a systematic review. *Lancet*. 2005;365(9467):1309-1314 [doi: [10.1016/S0140-6736\(05\)61027-6](https://doi.org/10.1016/S0140-6736(05)61027-6)] [Medline: [15823380](https://pubmed.ncbi.nlm.nih.gov/15823380/)]
31. Harwood H, Rhead R, Chui Z, Bakolis I, Connor L, Gazard B, et al. Variations by ethnicity in referral and treatment pathways for IAPT service users in South London. *Psychol Med*. 2023 Feb;53(3):1084-1095 [FREE Full text] [doi: [10.1017/S0033291721002518](https://doi.org/10.1017/S0033291721002518)] [Medline: [34334151](https://pubmed.ncbi.nlm.nih.gov/34334151/)]
32. Alvidrez J, Snowden LR, Kaiser DM. The experience of stigma among Black mental health consumers. *J Health Care Poor Underserved*. 2008 Aug;19(3):874-893 [doi: [10.1353/hpu.0.0058](https://doi.org/10.1353/hpu.0.0058)] [Medline: [18677076](https://pubmed.ncbi.nlm.nih.gov/18677076/)]
33. Eylem O, de Wit L, van Straten A, Steubl L, Melissourgaki Z, Danışman GT, et al. Stigma for common mental disorders in racial minorities and majorities a systematic review and meta-analysis. *BMC Public Health*. 2020 Jun 08;20(1):879 [FREE Full text] [doi: [10.1186/s12889-020-08964-3](https://doi.org/10.1186/s12889-020-08964-3)] [Medline: [32513215](https://pubmed.ncbi.nlm.nih.gov/32513215/)]
34. Brown A, Rice SM, Rickwood DJ, Parker AG. Systematic review of barriers and facilitators to accessing and engaging with mental health care among at-risk young people. *Asia Pac Psychiatry*. 2016 Mar;8(1):3-22 [doi: [10.1111/appy.12199](https://doi.org/10.1111/appy.12199)] [Medline: [26238088](https://pubmed.ncbi.nlm.nih.gov/26238088/)]
35. Cook BL, Trinh NH, Li Z, Hou SS, Progovac AM. Trends in racial-ethnic disparities in access to mental health care, 2004-2012. *Psychiatr Serv*. 2017 Jan 01;68(1):9-16 [FREE Full text] [doi: [10.1176/appi.ps.201500453](https://doi.org/10.1176/appi.ps.201500453)] [Medline: [27476805](https://pubmed.ncbi.nlm.nih.gov/27476805/)]
36. Memon A, Taylor K, Mohebbati LM, Sundin J, Cooper M, Scanlon T, et al. Perceived barriers to accessing mental health services among Black and minority ethnic (BME) communities: a qualitative study in Southeast England. *BMJ Open*. 2016 Nov 16;6(11):e012337 [FREE Full text] [doi: [10.1136/bmjopen-2016-012337](https://doi.org/10.1136/bmjopen-2016-012337)] [Medline: [27852712](https://pubmed.ncbi.nlm.nih.gov/27852712/)]
37. Ardi Z, Sukmawati IS, Ifdil I, Afdal A, Rangka IB, Suranata K. Exploring the acceptability of internet-based mental health mobile app services using network psychometrics analysis. *J Phys Conf Ser*. 2018 Dec 07;1114:012106 [FREE Full text] [doi: [10.1088/1742-6596/1114/1/012106](https://doi.org/10.1088/1742-6596/1114/1/012106)]
38. Fraser HS, Blaya J. Implementing medical information systems in developing countries, what works and what doesn't. *AMIA Annu Symp Proc*. 2010 Nov 13;2010:232-236 [FREE Full text] [Medline: [21346975](https://pubmed.ncbi.nlm.nih.gov/21346975/)]
39. Pagalday-Olivares P, Sjöqvist BA, Adjordor-van de Beek J, Abudey S, Silberberg AR, Buendia R. Exploring the feasibility of eHealth solutions to decrease delays in maternal healthcare in remote communities of Ghana. *BMC Med Inform Decis Mak*. 2017 Dec 02;17(1):156 [FREE Full text] [doi: [10.1186/s12911-017-0552-z](https://doi.org/10.1186/s12911-017-0552-z)] [Medline: [29197391](https://pubmed.ncbi.nlm.nih.gov/29197391/)]
40. Lungu A, Sun M. Time for a change: college students' preference for technology-mediated versus face-to-face help for emotional distress. *Telemed J E Health*. 2016 Dec;22(12):991-1000 [doi: [10.1089/tmj.2015.0214](https://doi.org/10.1089/tmj.2015.0214)] [Medline: [27223266](https://pubmed.ncbi.nlm.nih.gov/27223266/)]
41. Torous J, Vaidyam A. Multiple uses of app instead of using multiple apps – a case for rethinking the digital health technology toolbox. *Epidemiol Psychiatr Sci*. 2020 Jan 31;29:E100 [FREE Full text] [doi: [10.1017/s2045796020000013](https://doi.org/10.1017/s2045796020000013)]
42. Eisenstadt M, Liverpool S, Infanti E, Ciuvat RM, Carlsson C. Mobile apps that promote emotion regulation, positive mental health, and well-being in the general population: systematic review and meta-analysis. *JMIR Ment Health*. 2021 Nov 08;8(11):e31170 [FREE Full text] [doi: [10.2196/31170](https://doi.org/10.2196/31170)] [Medline: [34747713](https://pubmed.ncbi.nlm.nih.gov/34747713/)]
43. Levin ME, Krafft J, Levin C. Does self-help increase rates of help seeking for student mental health problems by minimizing stigma as a barrier? *J Am Coll Health*. 2018;66(4):302-309 [doi: [10.1080/07448481.2018.1440580](https://doi.org/10.1080/07448481.2018.1440580)] [Medline: [29447600](https://pubmed.ncbi.nlm.nih.gov/29447600/)]
44. Haug S, Castro RP, Kwon M, Filler A, Kowatsch T, Schaub MP. Smartphone use and smartphone addiction among young people in Switzerland. *J Behav Addict*. 2015 Dec;4(4):299-307 [FREE Full text] [doi: [10.1556/2006.4.2015.037](https://doi.org/10.1556/2006.4.2015.037)] [Medline: [26690625](https://pubmed.ncbi.nlm.nih.gov/26690625/)]
45. Mascheroni G, Ólafsson K. Net children go mobile: risks and opportunities. Second edition. Educatt. 2014. URL: [https://netchildrengomobile.eu/ncgm/wp-content/uploads/2013/07/DEF\\_NCGM\\_SecondEdition\\_Report.pdf](https://netchildrengomobile.eu/ncgm/wp-content/uploads/2013/07/DEF_NCGM_SecondEdition_Report.pdf) [accessed 2023-11-28]
46. Rashid A, Zeb MA, Rashid A, Anwar S, Joaquim F, Halim Z. Conceptualization of smartphone usage and feature preferences among various demographics. *Cluster Comput*. 2020 Feb 05;23(3):1855-1873 [doi: [10.1007/s10586-020-03061-x](https://doi.org/10.1007/s10586-020-03061-x)]
47. Peters M, Mcinerney P, Soares CB, Parker D, Godfrey CM, Khalil H. Methodology for JBI scoping reviews. In: Joanna Briggs Institute Reviewers' Manual: 2015 Edition. Adelaide, Australia. The Joanna Briggs Institute; 2015.
48. Page MJ, Moher D. Evaluations of the uptake and impact of the preferred reporting items for systematic reviews and meta-analyses (PRISMA) statement and extensions: a scoping review. *Syst Rev*. 2017 Dec 19;6(1):263 [FREE Full text] [doi: [10.1186/s13643-017-0663-8](https://doi.org/10.1186/s13643-017-0663-8)] [Medline: [29258593](https://pubmed.ncbi.nlm.nih.gov/29258593/)]
49. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med*. 2018 Oct 02;169(7):467-473 [FREE Full text] [doi: [10.7326/M18-0850](https://doi.org/10.7326/M18-0850)] [Medline: [30178033](https://pubmed.ncbi.nlm.nih.gov/30178033/)]



50. Kohl C, McIntosh EJ, Unger S, Haddaway NR, Kecke S, Schiemann J, et al. Online tools supporting the conduct and reporting of systematic reviews and systematic maps: a case study on CADIMA and review of existing tools. *Environ Evid*. 2018 Feb 1;7(1):8 [FREE Full text] [doi: [10.1186/s13750-018-0115-5](https://doi.org/10.1186/s13750-018-0115-5)]
51. Sekhon M, Cartwright M, Francis JJ. Acceptability of healthcare interventions: an overview of reviews and development of a theoretical framework. *BMC Health Serv Res*. 2017 Jan 26;17(1):88 [FREE Full text] [doi: [10.1186/s12913-017-2031-8](https://doi.org/10.1186/s12913-017-2031-8)] [Medline: [28126032](https://pubmed.ncbi.nlm.nih.gov/28126032/)]
52. Hong QN, Fàbregues S, Bartlett G, Boardman F, Cargo MP, Dagenais P, et al. The Mixed Methods Appraisal Tool (MMAT) version 2018 for information professionals and researchers. *Educ Inf*. 2018 Dec 18;34(4):285-291 [doi: [10.3233/efi-180221](https://doi.org/10.3233/efi-180221)]
53. Popay J, Roberts H, Sowden A, Petticrew M, Arai L, Rodgers M, et al. Guidance on the conduct of narrative synthesis in systematic reviews: a product from the ESRC methods programme. Lancaster University. 2006 Apr. URL: <https://www.lancaster.ac.uk/media/lancaster-university/content-assets/documents/fhm/dhr/chir/NSsynthesisguidanceVersion1-April2006.pdf> [accessed 2023-11-28]
54. Dahne J, Collado A, Lejuez CW, Risco CM, Diaz VA, Coles L, et al. Pilot randomized controlled trial of a Spanish-language behavioral activation mobile app (¡Aptíivate!) for the treatment of depressive symptoms among United States Latinx adults with limited English proficiency. *J Affect Disord*. 2019 May 01;250:210-217 [FREE Full text] [doi: [10.1016/j.jad.2019.03.009](https://doi.org/10.1016/j.jad.2019.03.009)] [Medline: [30870770](https://pubmed.ncbi.nlm.nih.gov/30870770/)]
55. Tighe J, Shand F, McKay K, Mcalister TJ, Mackinnon A, Christensen H. Usage and acceptability of the iBobbly app: pilot trial for suicide prevention in aboriginal and Torres Strait islander youth. *JMIR Ment Health*. 2020 Dec 01;7(12):e14296 [FREE Full text] [doi: [10.2196/14296](https://doi.org/10.2196/14296)] [Medline: [33258782](https://pubmed.ncbi.nlm.nih.gov/33258782/)]
56. Pratap A, Renn BN, Volponi J, Mooney SD, Gazzaley A, Arean PA, et al. Using mobile apps to assess and treat depression in Hispanic and Latino populations: fully remote randomized clinical trial. *J Med Internet Res*. 2018 Aug 09;20(8):e10130 [FREE Full text] [doi: [10.2196/10130](https://doi.org/10.2196/10130)] [Medline: [30093372](https://pubmed.ncbi.nlm.nih.gov/30093372/)]
57. Tighe J, Shand F, Ridani R, Mackinnon A, De La Mata N, Christensen H. iBobbly mobile health intervention for suicide prevention in Australian Indigenous youth: a pilot randomised controlled trial. *BMJ Open*. 2017 Jan 27;7(1):e013518 [FREE Full text] [doi: [10.1136/bmjopen-2016-013518](https://doi.org/10.1136/bmjopen-2016-013518)] [Medline: [28132007](https://pubmed.ncbi.nlm.nih.gov/28132007/)]
58. McCall T, Ali MO, Yu F, Fontelo P, Khairat S. Development of a mobile app to support self-management of anxiety and depression in African American women: usability study. *JMIR Form Res*. 2021 Aug 17;5(8):e24393 [FREE Full text] [doi: [10.2196/24393](https://doi.org/10.2196/24393)] [Medline: [34133313](https://pubmed.ncbi.nlm.nih.gov/34133313/)]
59. Craig Rushing S, Kelley A, Bull S, Stephens D, Wrobel J, Silvasstar J, et al. Efficacy of an mHealth intervention (BRAVE) to promote mental wellness for American Indian and Alaska native teenagers and young adults: randomized controlled trial. *JMIR Ment Health*. 2021 Sep 15;8(9):e26158 [doi: [10.2196/26158](https://doi.org/10.2196/26158)] [Medline: [34524092](https://pubmed.ncbi.nlm.nih.gov/34524092/)]
60. Stephens D, Peterson R, Singer M, Johnson J, Rushing SC, Kelley A. Recruiting and engaging American Indian and Alaska native teens and young adults in a SMS help-seeking intervention: lessons learned from the brave study. *Int J Environ Res Public Health*. 2020 Dec 16;17(24):9437 [FREE Full text] [doi: [10.3390/ijerph17249437](https://doi.org/10.3390/ijerph17249437)] [Medline: [33339260](https://pubmed.ncbi.nlm.nih.gov/33339260/)]
61. Wrobel J, Silvasstar J, Peterson R, Sumbundu K, Kelley A, Stephens D, et al. Text messaging intervention for mental wellness in American Indian and Alaska native teens and young adults (BRAVE study): analysis of user engagement patterns. *JMIR Form Res*. 2022 Feb 25;6(2):e32138 [FREE Full text] [doi: [10.2196/32138](https://doi.org/10.2196/32138)] [Medline: [35212633](https://pubmed.ncbi.nlm.nih.gov/35212633/)]
62. Maloney CA, Abel WD, McLeod HJ. Jamaican adolescents' receptiveness to digital mental health services: a cross-sectional survey from rural and urban communities. *Internet Interv*. 2020 Sep;21:100325 [FREE Full text] [doi: [10.1016/j.invent.2020.100325](https://doi.org/10.1016/j.invent.2020.100325)] [Medline: [32455121](https://pubmed.ncbi.nlm.nih.gov/32455121/)]
63. Neal-Barnett A, Stadulis R, Ellzey D, Jean E, Rowell T, Somerville K, et al. Evaluation of the effectiveness of a musical cognitive restructuring app for Black inner-city girls: survey, usage, and focus group evaluation. *JMIR Mhealth Uhealth*. 2019 Jun 27;7(6):e11310 [FREE Full text] [doi: [10.2196/11310](https://doi.org/10.2196/11310)] [Medline: [31188130](https://pubmed.ncbi.nlm.nih.gov/31188130/)]
64. Povey J, Mills PP, Dingwall KM, Lowell A, Singer J, Rotumah D, et al. Acceptability of mental health apps for Aboriginal and Torres Strait Islander Australians: a qualitative study. *J Med Internet Res*. 2016 Mar 11;18(3):e65 [FREE Full text] [doi: [10.2196/jmir.5314](https://doi.org/10.2196/jmir.5314)] [Medline: [26969043](https://pubmed.ncbi.nlm.nih.gov/26969043/)]
65. Röhr S, Jung FU, Pabst A, Grochtdreis T, Dams J, Nagl M, et al. A self-help app for Syrian refugees with posttraumatic stress (Sanadak): randomized controlled trial. *JMIR Mhealth Uhealth*. 2021 Jan 13;9(1):e24807 [FREE Full text] [doi: [10.2196/24807](https://doi.org/10.2196/24807)] [Medline: [33439140](https://pubmed.ncbi.nlm.nih.gov/33439140/)]
66. Agapie E, Chang K, Patrachari S, Neary M, Schueller SM. Understanding mental health apps for youth: focus group study with Latinx youth. *JMIR Form Res*. 2022 Oct 18;6(10):e40726 [FREE Full text] [doi: [10.2196/40726](https://doi.org/10.2196/40726)] [Medline: [36256835](https://pubmed.ncbi.nlm.nih.gov/36256835/)]
67. Watson-Singleton NN, Pennefather J, Trusty T. Can a culturally-responsive mobile health (mHealth) application reduce African Americans' stress?: a pilot feasibility study. *Curr Psychol*. 2021 Mar 02;42(2):1434-1443 [doi: [10.1007/s12144-021-01534-9](https://doi.org/10.1007/s12144-021-01534-9)]
68. Thapar A, Eyre O, Patel V, Brent D. Depression in young people. *Lancet*. 2022 Aug 20;400(10352):617-631 [doi: [10.1016/S0140-6736\(22\)01012-1](https://doi.org/10.1016/S0140-6736(22)01012-1)] [Medline: [35940184](https://pubmed.ncbi.nlm.nih.gov/35940184/)]
69. Wang K, Varma DS, Prospero M. A systematic review of the effectiveness of mobile apps for monitoring and management of mental health symptoms or disorders. *J Psychiatr Res*. 2018 Dec;107:73-78 [doi: [10.1016/j.jpsychires.2018.10.006](https://doi.org/10.1016/j.jpsychires.2018.10.006)] [Medline: [30347316](https://pubmed.ncbi.nlm.nih.gov/30347316/)]

70. Baum A, Revenson TA, Singer J. Race and health: racial disparities in hypertension and links between racism and health. In: Handbook of Health Psychology Second Edition. New York, NY. Psychology Press; 2011.
71. Ramos G, Ponting C, Labao JP, Sobowale K. Considerations of diversity, equity, and inclusion in mental health apps: a scoping review of evaluation frameworks. Behav Res Ther. 2021 Dec;147:103990 [FREE Full text] [doi: [10.1016/j.brat.2021.103990](https://doi.org/10.1016/j.brat.2021.103990)] [Medline: [34715396](https://pubmed.ncbi.nlm.nih.gov/34715396/)]

## Abbreviations

**BYOTS:** Build Your Own Theme Song

**CBT:** cognitive behavioral therapy

**FTF:** face-to-face

**iPST:** internet-based problem-solving therapy

**MHA:** mental health app

**PRISMA:** Preferred Reporting Items for Systematic Reviews and Meta-Analyses

**PRISMA-ScR:** Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews

**PTSD:** posttraumatic stress disorder

**STEM:** science, technology, engineering, and mathematics

*Edited by J Torous; submitted 15.05.23; peer-reviewed by E Brondolo, W Bramer; comments to author 24.08.23; revised version received 14.10.23; accepted 21.10.23; published 06.12.23*

*Please cite as:*

*Saad F, Eisenstadt M, Liverpool S, Carlsson C, Vainieri I*

*Self-Guided Mental Health Apps Targeting Racial and Ethnic Minority Groups: Scoping Review*

*JMIR Ment Health 2023;10:e48991*

*URL: <https://mental.jmir.org/2023/1/e48991>*

*doi: [10.2196/48991](https://doi.org/10.2196/48991)*

*PMID: [38055315](https://pubmed.ncbi.nlm.nih.gov/38055315/)*

©Fiby Saad, Mia Eisenstadt, Shaun Liverpool, Courtney Carlsson, Isabella Vainieri. Originally published in JMIR Mental Health (<https://mental.jmir.org>), 06.12.2023. This is an open-access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work, first published in JMIR Mental Health, is properly cited. The complete bibliographic information, a link to the original publication on <https://mental.jmir.org/>, as well as this copyright and license information must be included.