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Review

Self-Guided Mental Health Apps Targeting Racial and Ethnic Minor ity Groups: Scoping Review

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Abstr act

Backgr ound: 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.

Objecti ve: In this review, we aimed to examine the acceptability and effectiveness of MHAs among racial and ethnic minority

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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 narrati ve synthesis.

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and summarized to form a narrati ve 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 ¡Aptí vate!, iBobbly , AIMhi- Y, BRA VE, Build Your Own Theme Song,

Mindful You, Sanadak, and 12 more MHAs used in 1 study . The MHAs were predominantly informed by cogniti ve behavioral

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therap y and focused on reducing depressi ve symptoms. MHAs were considered acceptable for racial and ethnic minority groups;

however, engagement rates dropped over time. Only 2 studies quantitati vely reported the effectiveness of MHAs among racial

and ethnic minority groups. Barriers to use included the repetiti veness of the MHAs, stigma, lack of personalization, and technical

issues.

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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 specif ic needs of racial and ethnic minority groups if MHAs are to

be successfully adopted.

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KEYW ORDS

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KEYW ORDS

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

Backgr ound

Mental health apps (MHAs) are frequently used as self-guided

tools to help people with various mental health conditions,

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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 peak ed 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

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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 (≥23 years) [7,9]. This increased interest in MHAs among younger generations could be attrib uted to the

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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 signif icantly impacted the mental

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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

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barrier when accessing face-to-f ace (FTF) therap y, 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 therap y [16].

Despite their popularity , MHAs present some challenges for app users. First, there seems to be a high turno ver rate of MHAs. Larsen et al [17] found that apps targeted for depression were

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unavailable to access approximately every 3 days, leading to difficulties for users to commit to one app and see any long-term benef its. 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].

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(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 andeffectiveness of their app [17]; this highlights that app developers might use scientif ic jargons to lure users into using the app despite no evidence supporting their claims. Even apps

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that are appro ved 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 specif ic standards of care [22].

Despite these challenges, there are a range of benef its that have contrib uted to the rapid growth and popularity of MHAs. First,

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MHAs can be accessed anywhere and at any given time. By contrast, traditional therap y occurs at set hours or in specif ic settings. Furthermore, services may have increased waiting times [23], which raises major risks for individuals, such as self-harm or suicide [24]. Second, unlik e FTF therap y, MHAs can be used by any number of people. Third, unlik e publicly funded therap y, 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

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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 recei ve treatment [31]. This is possibly

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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, insensiti vity, 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

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 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 therap y. 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

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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].

Objecti ves

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 remo ving the issue of stigma [43]. Due to the recent interest in MHAs among young people and the need for a comprehensi ve overvie w of the literature focusing on racial and ethnic minority groups, this

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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)

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guidelines [48]. Refer to Multimedia Appendix 1[49] for the PRISMA-ScR checklist.

Sear ch 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

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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 minoritybackground (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 softw are 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

Chunk 31

inclusion criteria were used for full-te xt 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, qualitati ve, quantitati ve, or mixed methods); (2) participants’ demographic details (eg, age, ethnicity , and occupation); (3) geographic

Chunk 32

location; (4) the interv ention used, including theoretical basis, purpose, and duration of use; (5) data regarding the acceptability of MHAs; (6) data related to the effectiveness of the interv ention; and (7) any barriers to MHA use. Acceptability was defined as “a multi-f aceted construct that reflects the extent to which people delivering or receiving a health care interv ention consider it to be appropriate, based on anticipated or experienced

cogniti ve and emotional responses to the interv ention” [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

Chunk 34

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 narrati ve synthesis, supported by thematic and content analysis as outlined by Popay et al [53], was conducted to provide an overall narrati ve to address the aims of the review.

Results

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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 1to illustrate the flow of information and the identif ied records at each phase of the scoping review.

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RenderX Figur e 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 specif ic MHAs [54-61,63-67], including 2 MHA

Chunk 37

prototypes [58,67]. Of the app-specif ic studies, 4 had a mixed methods design [55,58,60,63], 7 were quantitati ve[54,56,57,59,61,65,67] and 2 were qualitati ve studies [64,66].

The last 2 studies did not focus on a specif ic MHA; instead, they assessed preference for web-based help versus FTF mental health help using surveys, both were quantitati ve [40,62]. Table 1reports the characteristics of the reviewed studies, including study name, study design, sample size, mean age of participants,

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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.

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aMHA: mental health app.

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aMHA: mental health app.

bRCT : randomized controlled trial.

ciPST : internet-based problem-solving therap y.

dPHQ: Patient Health Questionnaire.

eNot available.

fMHI-21: Mental Health Inventory .

gDSI-SS: Depressi ve Symptom Inventory–Suicidality Subscale.

hK10: The Kessler Psychological Distress Scale.

iBIS-11: Barratt Impulsi vity Scale.

jQUIS: Questionnaire for User Interf ace Satisf action.

kBYOTS: Build Your Own Theme Song.

lPTSD: posttraumatic stress disorder .

Chunk 49

lPTSD: posttraumatic stress disorder .

mPDS: Posttraumatic Diagnostic Scale for DSM-5.

nGAD-7: Generalized Anxiety Disorder , 7 items.

oGSE: General Self-ef ficacy.

pSSMIS-SF: Self-Stigma of Mental Illness Scale–Short Form.

qSSMIS-A W: Self-Stigma of Mental Illness Scale– Stereotype Awareness.

rSSMIS-A G: Self-Stigma of Mental Illness Scale–Stereotype Agreement.

sSSMIS-AP: Self-Stigma of Mental Illness Scale–Stereotype Application.

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tSSMIS-HS: Self-Stigma of Mental Illness Scale–Harm to Self-esteem.

 uRS-13: Resilience Scale.

vLSNS-6: Lubben Social Netw ork Scale (social isolation).

wESSI: ENRICHD Social Support Inventory .

xVAS: Visual Analog Scale.

yPGI: Posttraumatic Growth Inventory .

zCBT : cogniti ve behavioral therap y.

Chunk 51

zCBT : cogniti ve behavioral therap y.

aaFFMQ: Five Facet Mindfulness Questionnaire.

abMSES: Mindfulness Self-Ef ficacy Scale.

acATMS: Attitudes Toward Mindfulness Scale.

adMBUS: Mindfulness Beha vior Usage Scale.

aePSS: Percei ved Stress Scale.

Purposes of Using MHAs in Racial and Ethnic

Minority Groups

The most common purpose for using MHAs was depression

(¡Aptí vate!, iPST [internet-based problem-solving therap y],

iBobbly , and a prototype app by McCall et al [58]) [54,56-58].

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The iBobbly MHA also addressed impulsi vity; however, this was not the main purpose of use.

Two studies focused on overall psychological well-being [59,66]. The BRA VE 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 qualitati ve methods.

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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.Inter vention Characteristics

A total of 20 apps were investig ated in this review; 8 MHAs (including 2 prototypes) were included in 14 of the 15 studies

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[54,56-59,63-67], whereas 1 study [66] included 12 self-help MHAs that were qualitati vely investig ated.

Of the 20 apps, 8 (40%) were based on cogniti ve behavioral therap y (CBT) [65,66] or variations of the CBT approach, such as problem-solving therap y [56], acceptance-based therap y [57], and behavioral activation therap y [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],

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which included the elements of CBT and psychotherap y [58]; the BYOTS app, which is based on musical cogniti ve restructuring [63]; and the BRA VE 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, Moodflo w, and Talk Life. The full list of MHAs categorized by therapeutic approach is shown in Textbox 1.

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

Cogniti ve beha vioral therapy–based apps

• Sanadak [65]

• Internet-based problem-solving therap y [56]

• ¡Aptí vate! [54]

• iBobbly [57]

• Mindshift [66]

• Sanvello [66]

• Woebot [66]

• Wysa [66]

Mindfulness-based apps

• Headspace [66]

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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]

• BRA VE [59]

• Covid Coach [66]

• Daylio [66]

• Moodflo w [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 specif ically: ¡Aptí vate!, iBobbly , BRA VE,

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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], intervie ws [55,59], usability trials [58], or working with culturally informed organizations [63]. ¡Aptí vate! [54] was developed in Spanish language to be acceptable to the Hispanic population. Both Sanadak and Mindful You were developed with the specif ic 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 interacti ve data [54,56,57,59-61,65,67] in 6 MHAs. Studies reported good adherence to the specif ied MHAs throughout the set duration period in Hispanic, Aboriginal, Torres Strait Islander , and

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American Indian and Alaska Native individuals. Adherencedata ranged from 81.8% to 91.2% of participants using and
interacting with the app.

For the ¡Aptí vate! 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.

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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 ¡Aptí vate! 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

Chunk 62

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.

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representation of app use.

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

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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

Chunk 65

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 signif icant 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

Chunk 66

specif ically for African Americans. Participants who continued using the app felt positi ve about Mindful You, giving the app 4.38 stars out of 5.

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

Qualitati ve studies measured the acceptability of MHAs using intervie ws [55], workshops and focus groups [63], surveys [40,62], and questionnaires [58].

Chunk 67

[40,62], and questionnaires [58].

Participants were intervie wed 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 . Moreo ver, the participants felt a sense of privacy that was valued more than talking with a therapist or a family member .

Chunk 68

Participants also spok e 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

Chunk 70

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 likelyto 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

Chunk 71

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 Malone y 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 therap y” and “Online only” groups compared

Chunk 72

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 quantitati vely through

Chunk 73

use data and qualitati vely, 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 discrepanc y in the measurement of acceptability .

Examining the Effecti veness of MHAs With Racial and Ethnic Minority Groups

Outcome Measures and Study Design

Nine of the 15 studies included in this review were quantitati ve [40,54,56,57,59,61,62,65,67], 4 used mixed methods

Chunk 74

[55,58,60,63], and 2 were qualitati ve [64,66].

In terms of quantitati ve 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 recepti veness of web-based mental

Chunk 75

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: BRA VE [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

Chunk 76

by Stephens et al [60], used surveys [55,58,62,63] and focus groups [63] or intervie ws [55,56] or cogniti ve 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 BRA VE 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

Chunk 77

 languages to suit the ethnicity of the sample. Surveys, workshops, and intervie ws were developed and appro ved by mental health professionals of the target ethnicity .

Finally , the 2 qualitati ve studies focused on measuring the acceptability of the respecti ve MHAs and discussing barriers

Chunk 78

to continued use [64,66]. All the outcome measures are presented in Table 1.

Effectiveness

Studies that explored a specif ic app assessed its effectiveness by using either weekly assessments [54,56,65] or pre- and postinterv ention 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-ef ficacy).

Chunk 79

Quantitati ve studies on clinical outcomes that measured effectiveness using weekly assessments had inconclusi ve results. The ¡Aptí vate! app [54] reported signif icantly lower depressi ve symptoms in Hispanic adults than in the no-treatment group; however, depressi ve symptoms did not differ on average across time between the 2 groups. Pratap et al [56] found impro vement in depression scores among Hispanic and non-Hispanic participants, regardless of the treatment arm and ethnicity .

Chunk 80

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 depressi ve symptoms showed the greatest decline; however, this only lasted until week 4 of the study . Tighe et al [57] reported a decline in depressi ve symptoms among Aboriginal and Torres Strait Islander participants, but no signif icant reduction was observ ed in the primary outcome of suicidality in Indigenous Australian

participants. In addition, no signif icant relationship between use time and any of the outcome measures was observ ed. The Sanadak app [65] also showed no signif icant differences in PTSD symptoms between the interv ention and control groups after 4 weeks and 4 months of follow-up.

Other behavioral outcomes were also explored by quantitati ve studies. For instance, Pratap et al [56] explored functional impairment in addition to depressi ve symptoms and found no

Chunk 82

difference in disability outcomes across treatment arms and no difference between Hispanic and non-Hispanic participants. Tighe et al [57] explored psychological distress and impulsi vity as secondary outcomes. The iBobbly app was associated with a signif icant decrease in Kessler Psychological Distress Scale scores after 6 weeks; however, there was no signif icant change in impulsi vity [57]. Rushing et al [59] included the following secondary outcomes: self-ef ficacy, self-esteem, resilience,

Chunk 83

coping strate gies, 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 positi ve coping strate gies. No signif icant differences emer ged in any of the primary outcomes of the BRA VE app (help seeking, self-ef ficacy related to mental health, and negative coping) [59,61]. A surprising finding for the BRA VE app was

Chunk 84

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 thatWrobel et al [61] reported that
the engagement data were highly
skewed, with some participants clicking an average of 3.4 times,
but some users click ed 49 times. Finally , Röhr et al [65] included
the secondary outcomes: self-ef ficacy, 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. Quantitati ve evidence from mixed methods studies also showed inconclusi ve results on both clinical and behavioral outcomes. Neal-Barnett et al [63] concluded that Black and biracial girls who used the BYOTS app reported signif icantly lower negative and anxious thoughts on day 7 than on day 1. Although this

Chunk 86

study showed a positi ve result, the app was used for only 1 week, so there is still uncertainty regarding whether these impro vements would last. Watson-Singleton et al [67] reported that Black African American participants who used Mindful You showed a signif icant decrease in stress levels after 2 weeks. They also showed increased capacity for emotional regulation and a signif icant increase in self-ef ficacy and mindfulness behaviors. However, there were no signif icant differences in

the endorsements of mindfulness attrib utes, attitudes, or knowledge.

Finally , of the 2 qualitati ve studies, the one by Agapie et al [66] used a focus group to ask about the percei ved effectiveness of the different apps that the participants used. Hispanic and Latina participants reported that all the apps used had small positi ve impacts on their mental health. Miscellaneous apps were ranked as the most effective in impro ving mental health well-being,

Chunk 88

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].

Chunk 89

[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 iBobbly 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 BRA VE app [59]. Rushing et al [59] reported that due to the lack of representation in the media, participants reacted

positi vely to both study arms, as they both contained cultural content. Participants who used the iBobbly 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 BRA VE 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

Chunk 91

across the multiple apps explored by Agapie et al [66], with Hispanic and Latina participants reporting that the content was not specif ic enough for them.

 The second most common barrier was stigma. Islander participants who used the iBobbly app reported that others may

Chunk 92

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 recei ving 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].

Chunk 93

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 repetiti veness 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 BRA VE app. Furthermore, literac y 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 identif ied 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 connecti vity issues, a technical problem with their device, or an unchar ged 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

Chunk 95

of the BRA VE 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

Chunk 96

evidence related to MHA use among the racial and ethnic minority groups. Overall, MHAs were used for different purposes such as impro ving 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 depressi ve symptoms. In terms of acceptability , MHAs appear to be of interest among racial and

Chunk 97

ethnic minority groups; however, there is limited and mixed evidence of their effectiveness. Barriers to use include interv ention-specif ic characteristics (eg, repetiti veness of the tasks), user-specif ic characteristics (eg, stigma), and technology-specif ic characteristics (eg, internet connecti vity). Finally , several gaps in the literature, namely , the participant pool, MHAs design, study design, and study location, were

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identif ied. 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 psychologicaldistress. Although depression is one of the most common mental

health disorders with a high prevalence among young people

Chunk 99

[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 specif ic 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 specif ic app for Black African American population. Thus, there seems to be uncertainty about what specif ic 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 impro ving help-seeking behaviors [59]. However, the app reported no signif icant impro vement in help-seeking behavior. In contrast, Röhr et al [65] found that a secondary outcome of the Sanadak app was reduced self-stigma

Chunk 102

in Syrian refugees. Therefore, future studies should aim to impro ve help-seeking behaviors and reduce mental health stigma in people from racial and ethnic minority backgrounds.

This review noted two critical observ ations 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.

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In our review, 8 studies measured acceptability using use or interacti ve data [54,56,57,59-61,64,67], and 7 used qualitati ve methods such as intervie ws, 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 percei ved. For instance, in our review, the iBobbly app was investig ated using both use data [55] and qualitati ve methods [57]. The findings showed that iBobbly was not acceptable in terms of

Chunk 104

use data; however, qualitati ve 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 ambi valence 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

Chunk 106

 out for no given reason. In the study by Malone y et al [62] Jamaican participants explained stigma and embarrassment as major barriers to use. Similarly , the BRA VE app was found to be helpful for American Indian and Alaska Native participants; however, upon closer examination of the interacti ve data,

Chunk 107

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].

Chunk 108

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-specif ic 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 observ ed

Chunk 109

that Indigenous Australians with higher levels of distress were more likely to use MHAs and adhere to them [57]. However, in qualitati ve studies, Indigenous Australians and Aboriginal and Torres Strait Islanders reported that in extreme distress, they might not benef it from MHAs and FTF therap y would be more appropriate [55,64].

The second factor is help-seeking behavior as shown in the BRA VE study . Stephens et al [60] and Wrobel et al [61] found

Chunk 110

that surprisingly , those who scored high on help-seeking behavior showed less engagement with the BRA VE 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 BRA VE 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,

Chunk 111

some participants were more comfortable to reveal information on Facebook than attend FTF therap y. 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 quantitati vely 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

Chunk 112

MHAs [17,21,69]. Previous reviews revealed that most MHAs claim effectiveness; however, there is no scientif ic 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, respecti vely; 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

Chunk 113

anxious thoughts in Black and African Americans is in line with
previous literature that showed that when given access to
treatment, Black Americans benef it and engage more fromtherap y than White Americans [70].
Qualitati ve data found that
Aboriginal youth in the study by Tighe et al [55] reported
enjoying the iBobbly app even if it did not impro ve their clinical
symptoms. Similarly , the participants who used the BRA VE
app showed a signif icant positi ve impro vement, but it was not

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different from those who recei ved science, technology , engineering, and mathematics (STEM) messages [59].

Moreo ver, Sanadak app, which was used by Röhr et al [65], did not signif icantly 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-specif ic 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 impro ve its benef its [22]. Stephens et al [60] suggested creating a “pause” in the BRA VE messages so that users continue to be engaged and avoid “text fatigue. ” Future studies should investig ate the features that can

Chunk 116

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 interv ention uptak e. All the MHAs included in this study , except ¡Aptí vate! [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]. ¡Aptí vate! [54] and iPST [56] only included accessible language as a culturally adapti ve 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

Chunk 118

that a common barrier was that there was not enough cultural content, even for apps specif ically 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 benef it from exploring these factors from a qualitati ve perspecti ve for more insights, as this review shows only 1 effective MHA despite including many culturally adapti ve factors.

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adapti ve factors.

Obser vations and Gaps in the Field With Suggestions

for Futur e Resear ch

Four important observ ations emer ged 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

Chunk 120

wider racial and ethnic minority background. Another important observ ation in the review is that only 2 studies [54,64] included a greater number of unemplo yed than emplo yed participants. The remaining studies included either emplo yed participants or those who attended colle ges or schools. Future research should

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RenderX 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 therap y [55,57], problem-solving therap y [56], cogniti ve musical restructuring [63], or a mixture of psychotherap y and CBT [58,59,66]. Therefore, more research

Chunk 122

is needed to explore different theoretical underpinnings to identify what works for whom, in what conte xt, and among different cultures.

Study Design

Most of the included studies were quantitati ve, which arguably did not explain why the apps were ineffective. Strate gies such as intervie ws or workshops might help better explore the barriers experienced by participants and help tailor targeted interv entions. For instance, studies with mixed methods design

Chunk 123

offered valuable insights into the strengths and barriers of MHAs [55,58,60,63]. Although qualitati ve research takes time, future MHA research should consider qualitati ve research as the benef icial 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 German y [65]. Overall,

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more studies are needed globally to achie ve generalizability of

the findings and impro ve our understanding of MHA use among

people of racial and ethnic minorities. More research is needed

to explore whether MHA might be incorporated into existingservices 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 benef ited 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 extensi ve list of all terminology related to racial and ethnic minority groups; therefore, the review was limited

Chunk 126

to the search terms used. Moreo ver, 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 extensi ve 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 investig ation.

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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 interv entions. 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

Chunk 128

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 Inter est

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]

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[DOCX File , 28 KB-Multimedia Appendix 2]

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Abbreviations

BYOTS: Build Your Own Theme Song

CBT : cogniti ve behavioral therap y

FTF: face-to-f ace

iPST : internet-based problem-solving therap y

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

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