

MHEALTH FOR MENTAL HEALTH: CULTURALLY-TAILORED INTERVENTIONS FOR  
MANAGING ANXIETY AND DEPRESSION IN AFRICAN AMERICAN WOMEN

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## **ABSTRACT**

Terika McCall: mHealth for Mental Health: Culturally-tailored Interventions for Managing Anxiety and Depression in African American Women  
(Under the direction of Saif Khairat)

The rates of mental illness among African American women are comparable to the general population, however, they significantly underutilize mental health services compared to their white counterparts. Previous studies revealed that mHealth interventions increase access to mental health services and resources, and are effective in reducing anxiety and depression. Approximately 80% of African American women own smartphones. This presents a great opportunity to use mobile technology to help reduce the disparity in mental health service utilization and improve health outcomes.

The purpose of this dissertation study is to examine the attitudes and perceptions of African American women towards using mental health services, and the feasibility of using mobile technology to deliver mental health services and resources. Eligible participants were African American women ( $\geq 18$  years of age). Participants were recruited through convenience sampling methods (e.g., social media) to complete a web-based survey ( $n=395$ ), participate in a focus group (4 groups of 5 participants), or test and evaluate a mental health app developed to help African American women manage anxiety and depression ( $n=15$ ).

Results from the study revealed that African American women have favorable views toward seeking mental health services. However, respondents identified many barriers to seeking

treatment. Most of the barriers were related to cost, not knowing where to get services, lack of time, and concern of stigma. Findings from the study showed that respondents were more comfortable with using voice call or video call when compared with text messaging or use of a mobile app to communicate with mental health professionals for help in managing anxiety and depression.

User-centered recommendations focused on the type of content (e.g., information to find a Black female therapist) and features (e.g., group chat rooms) that should be included in an app culturally-tailored for African American women. Suggestions to increase app usage (e.g., ability to learn coping techniques) and establish trust (e.g., transparency on how user data is protected) were also discussed. The findings of this study demonstrated the need for additional research into the use of mobile technology to provide African American women with more accessible and convenient options for mental health care.

To my mother, you encourage me to strive for greatness and to never give up. Thank you for all the sacrifices you have made to help me achieve this dream. To my father, I wish you were still here, however God called you home during my first year. I miss you. Your baby girl is finally done with school.

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## LIST OF ABBREVIATIONS

App	Smartphone application
BBL	Biobehavioral Lab
CAI	Caregiver Appraisal Inventory
CASP	Critical Appraisal Skills Programme
CBT	cognitive behavioral therapy
CES-D	Center for Epidemiological Studies Survey-Depression scale
CG	caregiver
e-Health	electronic health
ePHI	electronic protected health information
GAD-7	Generalized Anxiety Disorder 7-item scale
HAM-D	Hamilton Depression Rating Scale
HIPAA	Health Insurance Portability and Accountability Act of 1996
HIV	human immunodeficiency virus
IASMHS	Inventory of Attitudes Toward Seeking Mental Health Services
IRB	Institutional Review Board
ISEL	Interpersonal Support Evaluation List
mHealth	mobile health
MSM	men-who-have-sex-with-men
NSDUH	National Survey on Drug Use and Health
PHI	Protected Health Information
PHQ-9	Patient Health Questionnaire 9-item scale
PI	Principal Investigator

PII	personally identifiable information
PTSD	post-traumatic stress disorder
RCT	randomized controlled trial
TAM	Technology Acceptance Model
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
QIDS-SR	Quick Inventory of Depressive Symptomology
QUIS	Questionnaire for User Interface Satisfaction

## **CHAPTER 1: INTRODUCTION**

### **Introduction**

The chapter provides a general overview of the dissertation study. First, an introduction to the current state of mental illness, with focus on anxiety and depression among African American women is presented. Second, it discusses the problem of underutilization of mental health services among African American women, and the use of mobile technology to deliver mental health services and resources to this population. Third, the significance of the study is discussed, and how it aims to address the existing gaps in research literature. Fourth, the theoretical models and conceptual frameworks that guided this study are presented and discussed. Finally, this chapter concludes with the study aims and research questions posed in this dissertation, and a discussion of how the study contributes to the field of health informatics.

### **1.1 Background**

The rates of mental illness among African American women are comparable to the general population (20.6% vs. 19.1%), however they significantly underutilize mental health services compared to their white counterparts (10.2% vs. 27.2%) (SAMHSA, 2019). Approximately 16% of non-Hispanic Black women reported having generalized anxiety in their lifetime (HRSA, 2010). Furthermore, 27% of non-Hispanic Black women also reported experiencing depression in their lifetime (HRSA, 2010). Historically, mental illness has been

underreported in the African American community; therefore, the true burden may actually be significantly higher than reported prevalence estimates.

The mental health and capacity of African American women has been studied for over a century. There have been numerous studies published on anxiety and depression among African American women -- a search returned results in PubMed and 2,054 in PsycINFO. However, studies in this population using telehealth modalities using smartphone apps, email, telephone, and text messages to deliver interventions for treatment of anxiety or depression, has lagged behind their white counterparts. In general, there is a scarcity of published research on the use of culturally-tailored telehealth interventions for the management of anxiety and depression in African American adults. Results of my recent systematic review found three studies (Glueckauf et al., 2012; Hightow-Weidman et al., 2015; Himelhoch et al., 2011), and only two included women (Glueckauf et al., 2012; Himelhoch et al., 2011).

The application of technology for health care often takes longer to reach traditionally underserved populations due to political, sociodemographic, and socioeconomic factors, in addition to underrepresentation in health research (Brown et al., 2012). Historically, this is the trend not only in mental health but also in health studies overall. If included in the study sample, African Americans are often underrepresented (Brown et al., 2012; Nicholson, Schwirian, & Groner, 2015), and tailoring of research methods and materials to better reach and retain this group is lacking. A recent systematic review (n=56 studies) on the participation of African Americans in e-Health and mHealth studies revealed that only eight were interventions exclusively tailored for African American participants (James, Harville, Sears, Efunbumi, & Bondoc, 2017). However, 80% (n=45) of the studies consisted of majority female participants (James et al., 2017). Furthermore, of the 56 studies included in the review, only two studies had

interventions that focused on mental health, specifically, post-traumatic stress disorder (PTSD) in veterans (Tan et al., 2013; Ziemba et al., 2014). Both studies reported statistically significant improvement in PTSD symptoms (Tan et al., 2013; Ziemba et al., 2014). See Figure 1 for the frequency of health conditions for the e-Health and mHealth studies from the systematic review by James et al (2017).

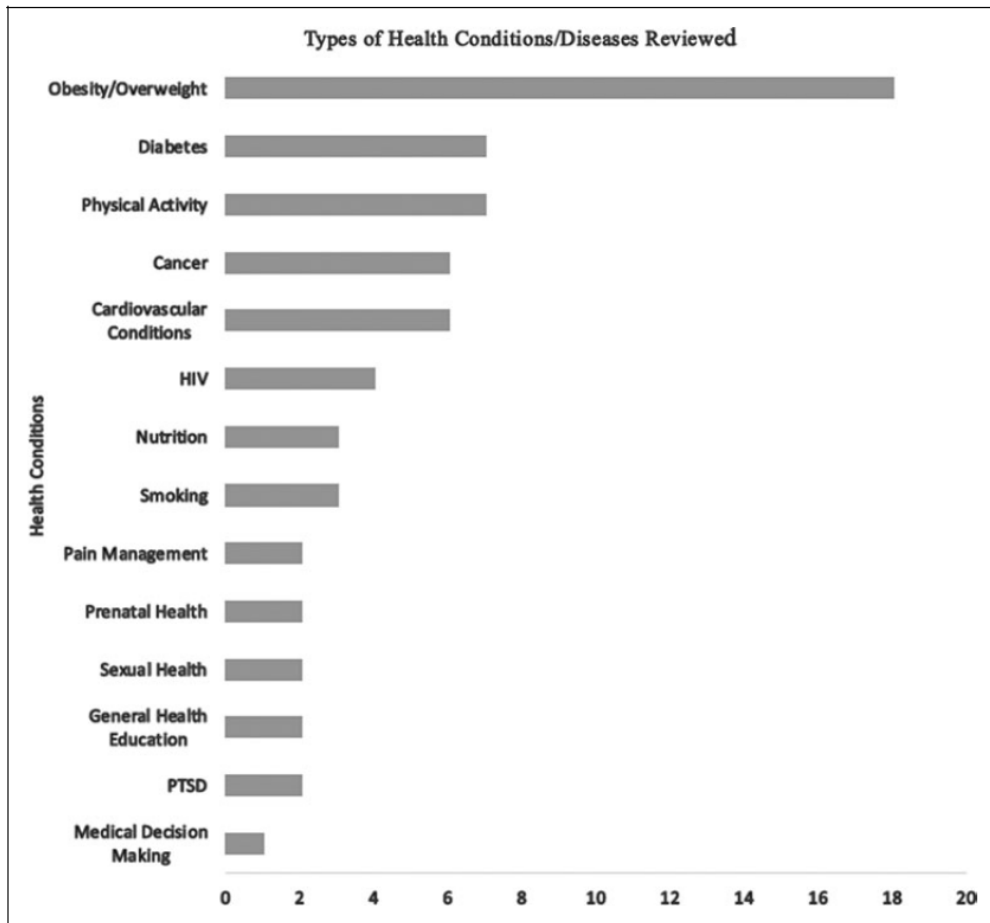


Figure 1. Frequency of health conditions for the e-Health and mHealth studies (James et al., 2017, pg. 360)

African American women are more likely to participate in mHealth research than their male counterparts (James et al., 2017). Moreover, they are more willing to participate in mHealth research “if they were interested in the topic, if they had an opportunity to become more educated about the topic, and to contribute to the greater good” (James et al., 2016). Eighty percent of African American women own smartphones (The Nielsen Company, 2017). This presents a great opportunity to utilize mobile technology to help reduce the disparity in mental health service utilization and improve health outcomes.

## **1.2 Problem Statement**

Approximately 1 in 5 African American women experienced mental illness in the past year (SAMHSA, 2019). Of those who reported experiencing mental illness in the past year, 69.9% did not receive any mental health treatment during that time (SAMHSA, 2019). A study by Watson & Hunter (2015) explored the attitudes and perceptions of African American women toward seeking professional help for mental health services, and found that they “held less favorable attitudes toward professional help-seeking than previous, non-African American samples.” There are many reasons why African American women may not seek mental health services when needed. Barriers such as stigmatization of mental illness, less access to treatment, lack of or inadequate health insurance, mistrust of providers, and low health literacy all prevent traditionally marginalized populations from seeking care (Hines-Martin, Malone, Kim, & Brown-Piper, 2003; Merritt-Davis & Keshavan, 2006; Thompson, Bazile, & Akbar, 2004).

Actual and perceived racism and sexism may cause undue stress and lead to increased anxiety or depression in African American women. A study published by Ward & Heidrich (2009) found that African American women’s preferred coping strategies included praying and seeking medical and mental health care. Taking this into consideration, how do we make mental

health services and resources more accessible to this population? The ideal solution would incorporate technology they already have access to and require minimal education on its use. Interventions using telehealth may be a viable answer to the problem of underutilization of mental health services in this population.

### **1.3 Significance**

To my knowledge, this study is one of the first to explore the use of a smartphone application (app) to deliver culturally-tailored mental health information and resources to African American women. Part I of the study will build on previous work from the exploratory study on the acceptability of video call (McCall, Schwartz, & Khairat, 2019) and text messaging (McCall, Schwartz, & Khairat, 2020) to help African American women manage anxiety and depression. Specifically, the survey instrument was expanded to include questions on past use of mental health services, acceptability of additional modalities (e.g., mobile app and voice call) to deliver mental health services and resources, and anxiety and depression screening questions. The survey results will help future researchers better understand the modalities that this population finds acceptable for mental health interventions, and identify barriers to use of mobile technology for mental health care.

The insights gained from the focus groups (Part II) will help future researchers and clinicians identify key topics that should be covered when considering content to include in mental health interventions for African American women, regardless of mode of delivery. Preferred resources to include, and features for apps designed for this group will also be identified to help researchers and developers create apps that are both useful and “sticky.” Furthermore, researchers will have a greater understanding of the concerns and limitations of using an app to deliver mental health services and resources to African American women.

Lastly, the results from the usability testing and evaluation (Part III) will help to improve the design and functionality of the app. For example, evaluating the user interface design on how well it supports users to complete basic tasks (e.g. finding information about therapists) will help inform how to make the layout of the interface more intuitive. This will also help to increase efficiency in task completion, and reduce user burden, leading to greater user satisfaction with the app. In addition to the contributions of insights shared from the survey and focus groups, the results from the usability testing will help future researchers and developers understand the information seeking thought process of African American women when using an app to find content to help them manage their anxiety or depression. The outcomes of the usability testing will help to identify recommendations to improve system performance, and enhance our understanding of what content and features the participants found most and least useful, and what they liked and disliked about the app.

#### **1.4 Theoretical Frameworks**

The dissertation study is guided by two theoretical frameworks: (1) Theory of Planned Behavior (TPB) model (Ajzen, 1985); and (2) Technology Acceptance Model (TAM) (Davis, 1986). The TPB model (Ajzen, 1985) expands on Fishbein and Ajzen's (1975) Theory of Reasoned Action (TRA) by including the concept of perceived behavioral control. Ajzen proposes that attitude toward behavior, subjective norm, and perceived behavioral control collectively form one's behavioral intentions and behaviors (Ajzen, 1985). In the TPB model, attitude refers to an individual's positive or negative assessments of the behavior (e.g., going to therapy is good); subjective norm refers to perceived pressure from others to perform the behavior (e.g., my friends would want me to go to therapy); and perceived behavioral control refers to one's beliefs about the ease or difficulty of performing the behavior (e.g., it would be



easy for me to go to therapy) (Ajzen, 1985; White et al., 2015). Perceived behavioral control can also directly influence behavior. See Figure 2.

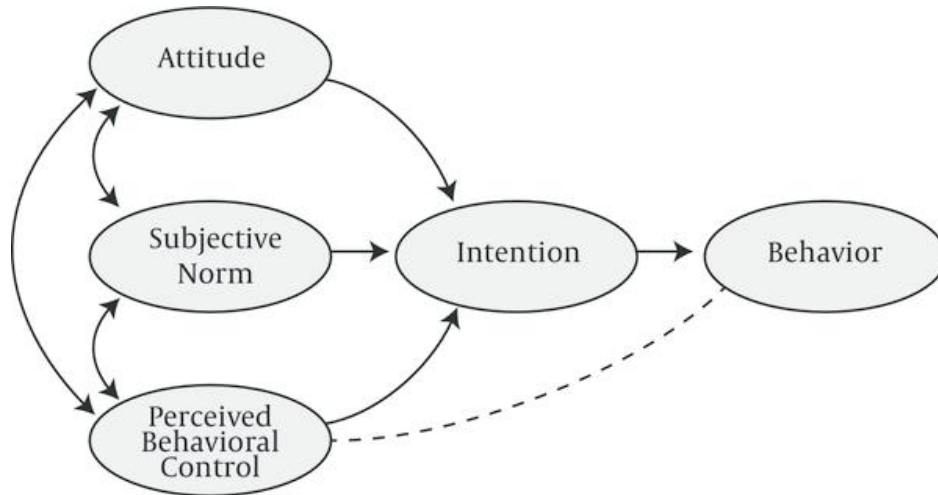


Figure 2. The Theory of Planned Behavior Model (Soorgi, Miri, & Sharifzadeh, 2015)

Aim I of this study is to gauge the attitudes and perceptions of African American women towards utilizing mental health services, and determine the acceptability of using mobile technology to help them manage anxiety and depression. Therefore, I developed and pilot tested the *Attitudes Toward Seeking Mental Health Services and Use of Mobile Technology Survey* which contains questions from an adapted version of the validated *Inventory of Attitudes Toward Seeking Mental Health Services* (IASMHS) (Mackenzie, Knox, Gekoski, & Macaulay, 2004). The IASMHS was adapted from the *Attitudes Toward Seeking Professional Psychological Help Scale* (ATSPPHS) (Fischer & Turner, 1970). In creating the IASMHS, Mackenzie and colleagues extended the ATSPPHS and used Ajzen's TPB to guide item development, with the goal of improving the inventory's ability to predict mental health service use. Hence, the TPB model is used for this study. Identifying individuals' beliefs can inform interventions designed to

encourage healthy behaviors by modifying existing beliefs or exposure to new beliefs (Ajzen, 2006).

Furthermore, the Technology Acceptance Model (TAM) is used to inform the study design. The TAM is a theory that suggests perceived usefulness and perceived ease of use of a new technology impacts attitude toward using the technology, which in turn influences how users come to accept (i.e., behavioral intention to use) and use a new technology (i.e., actual system use) (Davis, 1986). See Figure 3. The two key components of the model, perceived usefulness and perceived ease-of-use, are impacted by external variables, such as, system design characteristics.

“A key purpose of TAM, therefore, is to provide a basis for tracing the impact of external factors on internal beliefs, attitudes, and intentions” (Davis, Bagozzi, & Warshaw, 1989). Aim II-a of this study is to design and develop a user-centered prototype that presents important content and preferred features for an app to help African American women manage anxiety and depression. The feedback from the focus groups will inform content and design of the app, as well as gather data on internal beliefs, attitudes, and intentions about use of an app to help users manage anxiety and depression.

Aim II-b of this study is to test and evaluate a user-centered prototype of an app tailored to help African American women manage anxiety and depression. The *Questionnaire for User Interface Satisfaction* (QUIS) (Chin, Diehl, & Norman, 1988) will be administered after the cognitive walkthrough session. Items in the survey will capture information on **perceived ease of use** and **perceived usefulness** (e.g., participants were asked to list the three most positive aspects and three most negative aspects of the app). One critique of the TAM is that it does not consider

social influence on adoption of technology (Taherdoost, 2018; Taylor & Todd, 1995). However, information on social influence will be collected during the focus group.

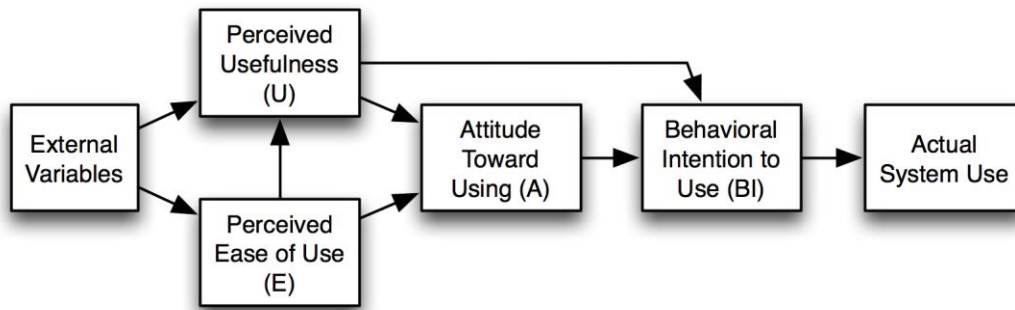


Figure 3. The Technology Acceptance Model, version 1 (Davis et al., 1989)

### 1.5 Study Aims and Research Questions

The purpose of this study is to examine the attitudes and perceptions of African American women towards using mental health services, and the feasibility of using mobile technology to deliver mental health services and resources. Table 1 summarizes the study aims, research questions, and data collection methods.

**Aim I.** To gauge the attitudes and perceptions of African American women towards utilizing mental health services, and determine the acceptability of using mobile technology to help them manage anxiety and depression. There are four research questions under this aim:

**R1.** What are the attitudes and perceptions of African American women toward using mental health services?

**R2.** What are the barriers to utilization of mental health services?

**R3.** Is the use of mobile technology acceptable to African American women, in terms of delivering mental health services and resources, and helping them manage anxiety and depression?

**R4.** Which modalities are more acceptable than others (e.g., mobile app, video call, voice call, text messaging) to use to deliver mental health services and resources to African American women?

**Aim II.**

- **Aim II-a.** To design and develop a user-centered prototype that presents important content and preferred features for smartphone applications to help African American women manage anxiety and depression.
- **Aim II-b.** To test and evaluate a user-centered prototype of a smartphone application tailored to help African American women manage anxiety and depression.

There is one research question under this aim:

**R5.** What user-centered recommendations should be addressed in a smartphone application designed to help African American women manage anxiety and depression?

Table 1. Overview of study aims, research questions, and data collection methods

Study aims	Research questions	Data Collection Methods
<ul style="list-style-type: none"> <li>To gauge the attitudes and perceptions of African American women towards utilizing mental health services, and determine the acceptability of using mobile technology to help them manage anxiety and depression.</li> </ul>	R1 through R4	<ul style="list-style-type: none"> <li>Web-based self-administered survey (Qualtrics)</li> <li>Focus groups</li> </ul>
<ul style="list-style-type: none"> <li>To design and develop a user-centered prototype that presents important content and preferred features for smartphone applications to help African American women manage anxiety and depression.</li> <li>To test and evaluate a user-centered prototype of a smartphone application tailored to help African American women manage anxiety and depression.</li> </ul>	R5	<ul style="list-style-type: none"> <li>Focus groups</li> <li>Web-based self-administered survey (Qualtrics)</li> <li>Usability testing using Cognitive Walkthrough Method</li> <li>Eye tracking (Tobii Pro Glasses 2)</li> <li>The Questionnaire for User Interface Satisfaction (QUIS)</li> </ul>

## 1.6 Conclusions

In the following chapters, I present a systematic review of the literature that has been published about culturally-tailored telehealth interventions for managing anxiety and depression in African American adults. I also share the results from my preliminary study conducted on the acceptability of using telemedicine to help African American women manage anxiety and depression. Next, I discuss the methods used for data collection and analysis. Lastly, I present the results of this study, discuss key findings, and highlight the implications of the findings for researchers and clinicians in the areas of telemedicine and mental health.

## CHAPTER 2: SYSTEMATIC REVIEW

### Introduction

Approximately 18% of African American adults (18 years and older) experienced mental illness in the last year (SAMHSA, 2019). Although there is less than a 7% difference in the prevalence of mental illness among African Americans compared to white adults (24.6%), African Americans utilize mental health services at less than half the rate of their white counterparts (8.9% compared to 20.6%) (SAMHSA, 2019). Anxiety and depressive disorders are among the most common mental illnesses (Kessler et al., 2005). Approximately 9% of non-Hispanic Black adults reported receiving a diagnosis of anxiety in their lifetime (CDC, 2011). Furthermore, 12.3% of non-Hispanic Black adults reported receiving a diagnosis of depression in their lifetime (CDC, 2011). However, the true burden may actually be significantly higher than reported prevalence estimates because they received less mental health treatment.

Over 70% of African American adults that reported experiencing mental illness in the last year did not receive any mental health treatment during that time (SAMHSA, 2019). There are many reasons why African Americans may not seek mental health services when needed. Barriers such as stigmatization of mental illness, less access to treatment, lack of or inadequate health insurance, mistrust of providers, and low health literacy prevent traditionally marginalized populations from seeking care. Findings from previous studies showed that telehealth interventions for anxiety (Brenes, Danhauer, Lyles, Hogan, & Miller, 2015; Cukrowicz & Joiner,

2007; Dunstan & Tooth, 2012; Ivanova et al., 2016; Mavandadi, Benson, DiFilippo, Streim, & Oslin, 2015; Musiat et al., 2014; Proudfoot et al., 2013; Yuen et al., 2013) and depression (Aguilera & Berridge, 2014; Agyapong et al., 2017; Arean et al., 2016; Brenes et al., 2015; Buntrock et al., 2016; N. G. Choi et al., 2014; Cukrowicz & Joiner, 2007; Dunstan & Tooth, 2012; Dwight-Johnson et al., 2011; Mavandadi et al., 2015; Morgan, Jorm, & Mackinnon, 2012; Proudfoot et al., 2013; Yuen et al., 2013) are effective.

Use of telehealth modalities (e.g., video calls) has the potential to reduce access issues, such as, geographic proximity to a preferred mental health care professional (e.g., therapist), and eliminates traveling time. A recent study by McCall *et al* (2019) found that over 70% of African American women endorsed the use of video calls to communicate with a professional to receive help to manage anxiety and depression. The convenience and familiarity of using telehealth modalities, coupled with use of proven psychotherapy treatments, such as cognitive behavioral therapy (CBT), make use of telehealth interventions feasible alternatives to traditional in-person treatment.

Successful interventions have used modalities such as telephone (Brenes et al., 2015; Dwight-Johnson et al., 2011; Mavandadi et al., 2015), videoconferencing (N. G. Choi et al., 2014; Dunstan & Tooth, 2012; Yuen et al., 2013), text messaging (Aguilera & Berridge, 2014; Agyapong et al., 2017), web-based formats (e.g. websites, email) (G. Clarke et al., 2002; Morgan et al., 2012; Musiat et al., 2014), and mobile applications (Arean et al., 2016; J. Clarke et al., 2014; Proudfoot et al., 2013) to help participants reduce anxiety or depressive symptoms. However, the majority of the published studies were conducted with predominantly white study populations. Therefore, the results may not be generalizable to all racial groups, which suggests more investigation into the effectiveness of telehealth use with the African American adult

population is needed. Furthermore, interventions should be culturally-tailored to meet the needs of the population to increase adoption, retention, and effectiveness. The aim of this systematic review is to survey the available peer-reviewed literature for studies that used telehealth interventions, specifically tailored for African American adults, to reduce anxiety or depression, and determine their effectiveness.

## **2.1 Methods**

### 2.1.1 Search Strategy

Consistent with methods outlined in the *PRISMA Statement* for systematic reviews the search strategy consisted of three steps (Moher, Liberati, Tetzlaff, Altman, & PRISMA Group, 2009). First, a comprehensive literature search was conducted using the PubMed, PsycINFO, Scopus, and Web of Science electronic databases for relevant articles published from January 1970 to December 2019. A combination of keywords relating to African Americans, depression, anxiety, and telehealth were used. Table 2 provides an example of search terms and queries executed in PubMed. Second, reference lists of the included primary articles and retrieved systematic reviews were examined to identify any relevant publications. Finally, key technology journals (*Journal of Telemedicine and Telecare* and *Telemedicine and e-Health*) were searched. The PRISMA flow diagram (Moher et al., 2009) for the review is shown in Figure 4. This systematic review has been registered in the PROSPERO international prospective register of systematic reviews (registration number: CRD42018104469; registration date: 09 August 2018).



Table 2. Keywords and Boolean operators used in the PubMed database search

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african americans[MeSH Terms] OR (african[ALL] AND americans[ALL]) OR african americans[ALL] OR blacks[ALL] OR african continental ancestry group[MeSH Terms] OR (african[ALL] AND continental[ALL] AND ancestry[ALL] AND group[ALL]) OR african continental ancestry group[ALL]

depression[ALL] OR depression[MeSH Terms] OR (Depressive[ALL] AND Symptom[ALL]) OR (Depressive[ALL] AND (syndrome[MeSH Terms] OR syndrome[ALL])) OR depressive disorder[MeSH Terms] OR (depressive[ALL] AND disorder[ALL]) OR "depressive disorder"[ALL]

anxiety[MeSH Terms] OR anxiety[ALL] OR (Social[ALL] AND (anxiety[MeSH Terms] OR anxiety[ALL])) OR hypervigilance[ALL] OR nervousness[ALL] OR ((anxiety[MeSH Terms] OR anxiety[ALL]) AND (disorder[ALL]))

((Mobile[ALL] AND (technology[MeSH Terms] OR technology[ALL])) OR (Mobile[ALL] AND (health[MeSH Terms] OR health[ALL])) OR m-health[ALL] OR telecounseling[ALL] OR (telemedicine[MeSH Terms] OR telemedicine[ALL]) OR (telemedicine[MeSH Terms] OR telemedicine[ALL] OR telehealth[ALL]) OR telepsych[ALL] OR telepsychiatry[ALL] OR (telemedicine[MeSH Terms] OR telemedicine[ALL] OR ehealth[ALL]) OR (Digital[ALL] AND (health[MeSH Terms] OR health[ALL])) OR (Text[ALL] AND Messaging[ALL]) OR (Text[ALL] AND Message[ALL]) OR (Mobile[ALL] AND Phone[ALL]) OR (Mobile[ALL] AND Phones[ALL]) OR (Mobile[ALL] AND Application[ALL]) OR (Mobile[ALL] AND Applications[ALL]) OR (Short[All Fields] AND Message[All Fields] AND Service[All Fields]) OR sms[ALL] OR ((multimedia[MeSH Terms] OR multimedia[ALL]) AND Messaging[ALL] AND Service[ALL]) OR mms[ALL] OR (Remote[ALL] AND(patients[MeSH Terms] OR patients[ALL] OR patient[ALL]) AND Monitoring[ALL]))

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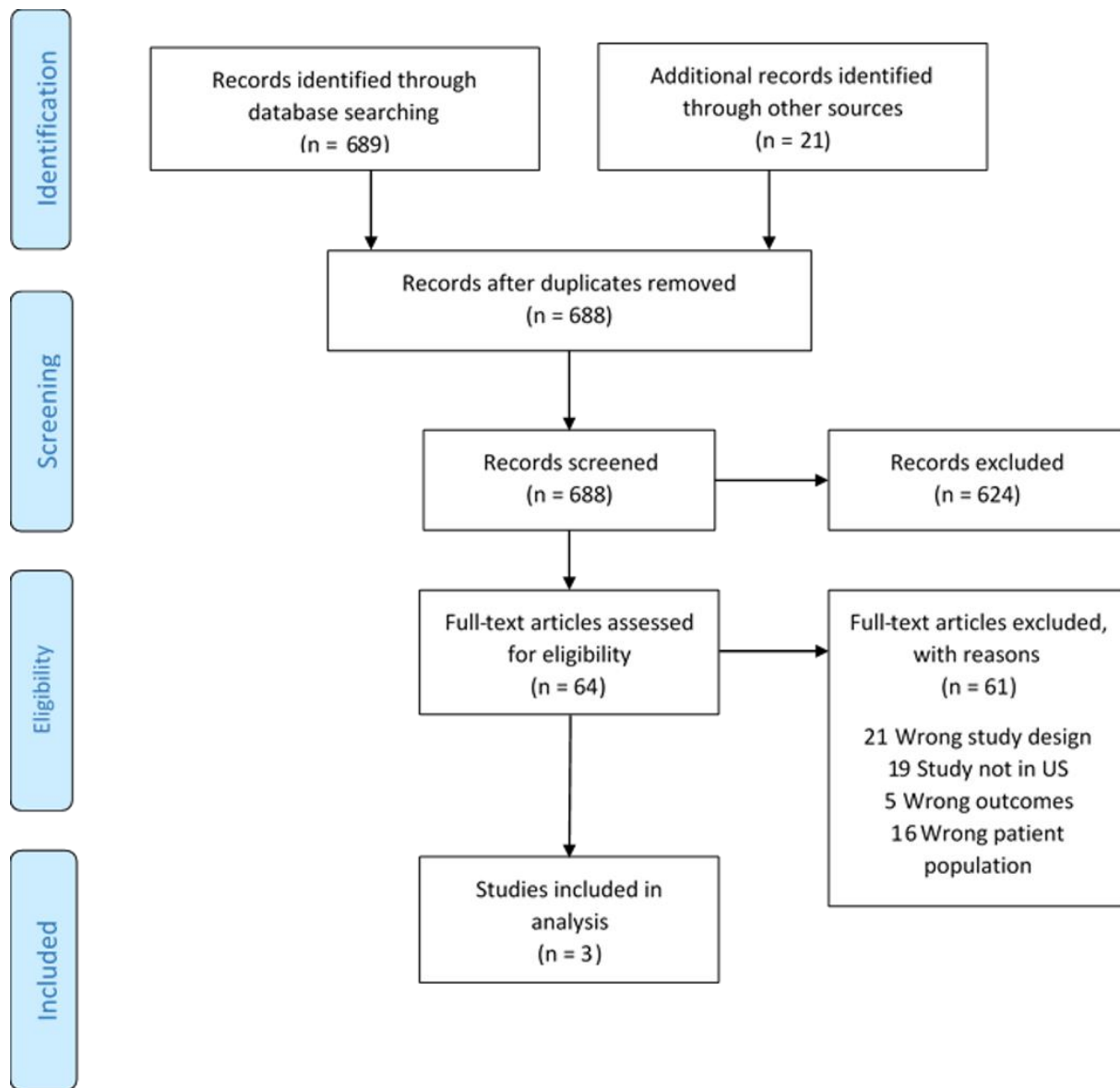


Figure 4. PRISMA Flow Diagram of search strategy

### 2.1.2 Inclusion and Exclusion Criteria

The criteria used for inclusion in this review were: (1) intervention targeted Black/African American female adults ( $\geq 18$  years old); (2) primary outcome(s) include either diagnosis or symptom severity of depressive or anxiety disorder; (3) telehealth-based psychological intervention; (4) intervention effectiveness evaluated using one or more

standardized measures of anxiety or depression (e.g., Generalized Anxiety Disorder 7-item scale, Patient Health Questionnaire-9) administered pre- and post-intervention; and (5) feasibility of using telehealth modality to receive psychological help (e.g. retention rate), acceptability of using telehealth modality to receive mental health services (e.g. satisfaction questionnaire), or self-management through participation in the intervention (e.g. patient follow-up survey) assessed post-intervention. Studies excluded from the review were (1) not peer-reviewed; (2) not an independent study (e.g. systematic review or meta-analysis); (3) not conducted in the USA; or (4) used a pediatric population.

### 2.1.3 Study Evaluation

Covidence software was used for article screening and data extraction (Veritas Health Innovation, n.d.). Two independent reviewers (T.M. and C.B.) independently analyzed each title and abstract of articles retrieved to determine their relevance. The full text of potentially eligible studies was retrieved and similarly analyzed by T.M. and C.B. to exclude papers that did not meet inclusion criteria. Any disagreement over the eligibility of particular studies was resolved by an adjudicator (S.K.).

The data extraction template in the Covidence software was used (Veritas Health Innovation, n.d.). Extracted data included information on study setting, study population and participant demographics and baseline characteristics, details of the intervention, study methodology, recruitment and study completion rates, outcomes and times of measurement, indicators of acceptability to users, and suggested mechanisms of intervention action. Information for assessment of the risk of bias was included.

The *Critical Appraisal Skills Programme (CASP)* checklists were used to assess the

quality of the identified studies (Critical Appraisal Skills Programme, n.d.-a, n.d.-b). The checklists were developed and piloted by a group of experts for use in assessing the quality of various study types, therefore, they were deemed appropriate for use in this review. Reviewers T.M. and C.B. independently assessed the risk of bias of all included studies. Disagreements between the reviewers over the risk of bias in particular studies were resolved by discussion, with involvement of an adjudicator (S.K.) where necessary. Intervention effectiveness was determined by significant reduction in depressive or anxiety symptoms post-intervention ( $P < .05$ ).

## **2.2 Results**

### 2.2.1 Overview of Search Results

A comprehensive search in the selected citation databases identified a total of 689 articles. Twenty-one additional articles were identified through other sources (see search strategy section). After the removal of duplicates, 688 unique articles were included in the title and abstract screening process. The majority of the articles that were excluded did not involve psychological interventions that targeted African American adults. Sixty-four papers were identified as relevant to the research question and included in the full-text screening process. During the independent full-text screening process, 21 articles were identified as having the wrong study design, 19 were not conducted in the U.S., 16 had the wrong patient population, and five focused on the wrong primary outcomes. Three articles were identified that met the inclusion criteria and were included in the analysis (Glueckauf et al., 2012; Hightow-Weidman et al., 2015; Himelhoch et al., 2011). Summaries of study characteristics are provided in Table 3.

The three independent studies had a pooled total of 32 participants (range 6-15 per study). Only one of the studies was a randomized controlled trial (RCT) (Glueckauf et al., 2012). The remaining two studies were prospective cohort studies assessing the feasibility of interventions (Hightow-Weidman et al., 2015; Himelhoch et al., 2011). Two of the studies reported a majority (> 80%) of their sample were female (Glueckauf et al., 2012; Himelhoch et al., 2011). One study had all HIV-positive participants (Himelhoch et al., 2011), and another reported 60% of participants were HIV-positive (Hightow-Weidman et al., 2015). All of the studies used validated assessments (i.e., the Center for Epidemiological Studies Depression Scale (CES-D) or Hamilton Depression Rating Scale (HAM-D)) to assess the primary outcome of depression pre and post intervention.

The randomized controlled trial by Glueckauf *et al* (2012) focused on African American caregivers (CG) with depression. Telephone-based CBT was used for the treatment group and traditional face-to-face CBT for controls. The content and structure of the CBT intervention was the same for both groups; 12 weekly one-hour sessions led by a trained counselor (7 group sessions and 5 individual goal setting and implementation sessions). The telephone-based CBT sessions occurred in the participant's home via a teleconferencing system, and the face-to-face sessions were performed in a conference room at a university or in a private room in a public library.

Similarly, the prospective cohort study by Himelhoch *et al* (2011) also utilized telephone-based CBT for an intervention targeting urban dwelling HIV-positive African Americans with major depression. The structure of the intervention comprised of 11 sessions, delivered over 14 weeks by a trained therapist (one initial evaluation session, five behavioral activation sessions, and five cognitive restructuring sessions). All sessions were scheduled in advance, and

participants were reminded to select a private and confidential place to participate in the CBT session. The calls lasted from 27–70 minutes.

In contrast, the prospective cohort study by Hightow-Weidman *et al* (2015) used a peer support intervention for both young Black men-who-have-sex-with-men (MSM) and transgender women. Participants were asked to spend at least one hour per week on the mobile phone-optimized site (HealthMpowerment.org) for four weeks. The aims of the site were to promote health and wellness and serve as a platform for social support.

Table 3. Study characteristics

Authors	Objective	Sample	Study Design	Outcomes
Glueckauf et al. (2012)	Compare the effects of telephone-based and face-to-face CBT on changes in caregiver burden, assistance support, depression, and health status for African American caregivers with depression	N=11 (6 treatment, 5 control); African American caregivers with depression (Age 18+); 91% female	<ul style="list-style-type: none"> <li>• Randomized controlled trial</li> <li>• Two-phases (focus group and pilot study)</li> <li>• Telephone-based CBT treatment group</li> <li>• Face-to-face CBT control group</li> <li>• Trained counselors</li> <li>• Weekly CBT sessions x 12 weeks</li> <li>• Pre and post treatment assessments</li> <li>• Validated measures for selected outcomes: CES-D, CAI, ISEL</li> </ul>	<ul style="list-style-type: none"> <li>• Significant within-subjects effects for time were found across CG subjective burden (<math>P &lt; .02</math>), assistance support (<math>P &lt; .03</math>), and depressive symptoms (<math>P &lt; .05</math>) post-treatment</li> <li>• No statistically significant effects for group (telephone vs. face-to-face CBT) and the group x time interaction (all <math>P &gt; .05</math>) on any of the measures</li> </ul>
Hightow-Weidman et al. (2015)	Assess overall levels of intervention (HealthMpowerment.org) acceptability, satisfaction, and initial effect sizes of outcomes known to be associated with sexual risk behaviors	N=15; young Black MSM/Transgender women (Age 18-30); 60% of participants HIV-positive	<ul style="list-style-type: none"> <li>• Prospective cohort study</li> <li>• Peer support</li> <li>• Participants asked to spend at least 1 hour/week on a mobile phone-optimized website x 4 weeks</li> <li>• Survey administered at baseline and 1-month follow-up</li> <li>• Validated measures for selected outcomes: CES-D</li> </ul>	<ul style="list-style-type: none"> <li>• Statistically significant improvements for social support (<math>P = .012</math>), social isolation (<math>P = .050</math>), and depressive symptoms (<math>P = .045</math>) for study participants post-intervention</li> </ul>
Himelhoch et al. (2011)	Determine the feasibility and depression outcomes of a telephone-based CBT intervention targeting low income, urban dwelling, HIV infected African-Americans with major depression	N= 6; HIV-positive African American adults (Age 18+) with major depression; 83% female	<ul style="list-style-type: none"> <li>• Prospective cohort study</li> <li>• Telephone-based CBT</li> <li>• Trained therapists</li> <li>• 11 sessions delivered over 14 weeks</li> <li>• Assessments administered at baseline, midpoint and at study conclusion</li> <li>• Validated measures for selected outcomes: HAM-D, QIDS-SR</li> </ul>	<ul style="list-style-type: none"> <li>• Statistically significant reduction of depressive symptoms (<math>P = .006</math>) and depression severity (<math>P = .02</math>) was observed post-intervention</li> </ul>

CBT: Cognitive Behavioral Therapy; CG: caregiver; MSM: men-who-have-sex-with-men; CES-D: Center for Epidemiological Studies Survey-Depression scale; CAI: Caregiver Appraisal Inventory; ISEL: Interpersonal Support Evaluation List; HAM-D: Hamilton Depression Rating Scale; QIDS-SR: Quick Inventory of Depressive Symptomology

### 2.2.2 Quality Assessment

All three of the studies met a majority of the criteria used for consideration in the assessment of study quality in the CASP appraisal checklists (Critical Appraisal Skills Programme, n.d.-a, n.d.-b) (i.e., reviewers T.M. and C.B. answered ‘yes’ for more than 80% of the questions). Two studies lacked control groups (Hightow-Weidman et al., 2015; Himelhoch et al., 2011), and all had small sample sizes (6-15 participants) and short follow-up periods (< 6-months). This resulted in the reviewers rating all of the studies to be of ‘fair’ quality. However, all studies were published in peer reviewed journals and deemed appropriate for inclusion.

### 2.2.3 Outcomes

Statistically significant reduction of depressive symptoms (measured by improvement in mean CES-D or HAM-D score) was observed post-intervention in all of the studies ( $P < .05$ ). In addition, one study showed a significant reduction in depression severity post-intervention ( $P = .02$ , measured by improvement in mean Quick Inventory of Depressive Symptomology (QIDS-SR) score) (Himelhoch et al., 2011). All studies reported patient satisfaction with the interventions. Hightow-Weidman *et al* (2015) also reported improvements for social support ( $P = .012$ ) and social isolation ( $P = .050$ ) for study participants post-intervention.

Furthermore, the RCT conducted by Glueckauf *et al* (2012) found significant within-subjects effects for time across CG subjective burden ( $P < .02$ , measured by improvement in the subjective burden subscale of the Caregiver Appraisal Inventory (CAI)) and assistance support ( $P < .03$ , measured by improvement the Assistance subscale of Interpersonal Support Evaluation List (ISEL)) post-treatment. However, no statistically significant effects were observed for group (telephone vs. face-to-face CBT) and the group x time interaction on any of the measures (all



P>.05) (Glueckauf et al., 2012). The effect sizes for changes in physical symptoms over the past month for both treatment groups were small, however improvement in physical symptoms post-treatment was somewhat higher for CGs in the telephone CBT group than those in the face-to-face CBT group (Glueckauf et al., 2012).

## **2.3 Discussion**

### 2.3.1 Principal Findings

To our knowledge, this is one of the first systematic reviews to examine studies aimed at managing anxiety or depression in African American adults through use of culturally-tailored telehealth interventions. None of the three studies included in the review assessed the effectiveness of telehealth interventions to reduce anxiety. The results of the review showed significant reduction of depressive symptoms (Glueckauf et al., 2012; Hightow-Weidman et al., 2015; Himelhoch et al., 2011) and depression severity post-intervention (Himelhoch et al., 2011) (all  $P < .05$ ). One study also found a significant increase in social support post-intervention ( $P = .012$ ) (Hightow-Weidman et al., 2015). However, in the RCT, the effectiveness of a telehealth intervention compared to face-to-face was not determined (Glueckauf et al., 2012). Telehealth intervention satisfaction and retention was high among participants ( $> 75\%$ ) (Glueckauf et al., 2012; Hightow-Weidman et al., 2015; Himelhoch et al., 2011).

These findings are consistent with literature on the use of telehealth interventions to manage depression in other populations. Previous studies have also found the use of telehealth interventions to be effective in reducing depressive symptoms (all  $P < .05$ ) among predominantly white (Arean et al., 2016; Brenes et al., 2015; Buntrock et al., 2016; G. Clarke et al., 2002; J. Clarke et al., 2014; Dunstan & Tooth, 2012; Mavandadi et al., 2015; Morgan et al., 2012;

Proudfoot et al., 2013), Latino (I. Choi et al., 2012; Chong & Moreno, 2012; Dwight-Johnson et al., 2011; Moreno, Chong, Dumbauld, Humke, & Byreddy, 2012), Hispanic (Chong & Moreno, 2012; Moreno et al., 2012), and Chinese (I. Choi et al., 2012) participants. Overall, participants reported satisfaction with the telehealth interventions.

The scarcity of published research on the use of telehealth for management of anxiety and depression in African American adults is highlighted in this review. Research in this area is premature for African American adults in comparison to other populations, which indicates the need for more research. Only three studies were identified, and all of them were pilot trials assessing the feasibility of the telehealth interventions.

### 2.3.2 Strengths and Limitations

The main strengths of this review are the systematic search strategy used, and independent screening and quality assessment of the articles by two reviewers (with involvement of an adjudicator where necessary). However, there were limitations which should be considered when interpreting the findings. The main limitations were the number of articles identified (n=3) and small sample sizes (range 6-15 participants per study). Two of the three studies lacked control groups (Hightow-Weidman et al., 2015; Himelhoch et al., 2011), which limits the ability to make inferences regarding the efficacy of the interventions. Due to the difference in study types (RCT vs. prospective cohort study), a quantitative analysis and comparison of treatment effectiveness across studies was not feasible. Also, the generalizability of the findings is limited due to the majority of participants in the studies having a specific health condition (e.g. HIV-positive) (Hightow-Weidman et al., 2015; Himelhoch et al., 2011) or special circumstance (e.g. caregivers of dementia patients) (Glueckauf et al., 2012).

### 2.3.3 Conclusions and Future Directions

Future research should investigate the effectiveness of using telehealth interventions to manage anxiety and depression in more generalizable samples of African American adults. Furthermore, studies should include larger sample sizes, control groups, longer intervention periods, and follow-up assessments to determine the long-term sustainability of using telehealth to manage anxiety and depression. Socio-cultural factors that promote or discourage positive coping skills and help-seeking behavior should be considered by researchers and clinicians when designing interventions and providing treatment. The population should also be surveyed to determine acceptable modalities to receive care. For example, a recent survey of African American women revealed that video call was an acceptable modality to communicate with a professional to receive help for managing anxiety and depression (McCall, Schwartz, & Khairat, 2019), whereas text messaging was not (McCall, Schwartz, & Khairat, 2020).

Taking into account the burden of unmet need and disparity in mental health service utilization among African American adults, there is great potential to use telehealth to deliver services to this population. Telehealth is proving to be acceptable for some mental health services, such as CBT (Brenes et al., 2015; Glueckauf et al., 2012; Himelhoch et al., 2011). Given that 75% of African American adults own a smartphone (Pew Research Center, n.d.), the use of smartphones to deliver interventions to this population needs to be explored further. This presents an opportunity to create innovative interventions that increase convenience and access to much needed mental health services. However, to increase the likelihood of adoption among African American adults, telehealth interventions should be culturally-tailored. A *one-size-fits-all* approach to designing telehealth interventions to help African American adults manage anxiety or depression may lead to more options but continued disparity in receiving care. While

the use of telehealth to treat mental illness is gaining traction, more research is needed on its effectiveness in traditionally underserved populations so that harm is minimized and all benefit from advances in mental health care.

## CHAPTER 3: PRELIMINARY STUDY<sup>1</sup>

### Introduction

The chapter includes the methods, results, and discussion of the key findings from the preliminary dissertation study. The aim of the exploratory study is to gauge the acceptability of mobile phone use to deliver mental health services to help African American women manage anxiety and depression. Findings from the preliminary study informed the design of the dissertation study.

### 3.1 Methods

#### 3.1.1 Study Design and Recruitment

The Web-based questionnaire was opened in June 2018 and closed in August 2018. Women (18 years or older) who identify as African American and reside within the United States, regardless of mental health history, were eligible to participate. Participants were recruited through convenience sampling. Recruitment methods included receiving an invitation to take the survey via a direct email from the first author or email sent through listservs whose membership is primarily African American women or solicitation via social media posts (e.g., posts in Facebook groups) or direct messages. A research information sheet about the study was

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<sup>1</sup> The content of this chapter previously appeared as articles in JMIR Mental Health and the Studies in Health Technology and Informatics. The original citations are as follows: McCall T, Schwartz TA, Khairat S. “The Acceptability of Text Messaging to Help African American Women Manage Anxiety and Depression: Cross-Sectional Survey Study,” JMIR Ment Health, (February 2020): 7(2):e15801. McCall T, Schwartz TA, Khairat S. “Acceptability of Telemedicine to Help African American Women Manage Anxiety and Depression,” Stud Health Technol Inform, (August 2019): 264:699–703.

provided via a link in the email text or social media posts. Following the snowball sampling method, respondents were encouraged to share the link to the survey with their networks (e.g., family, friends, and professional organizations). No remuneration was offered for participation. The Institutional Review Board of the University of North Carolina at Chapel Hill provided the study a notification of exemption from further review.

### 3.1.2 Measures

The computer-assisted Web interviewing data collection method was used to administer the survey because of the sensitive nature of the questions and to reduce respondent burden. Respondents were provided an anonymous link to the Web-based questionnaire. No personally identifiable information (PII) was collected in the survey. The survey was self-administered using Qualtrics software. The 53 questions included in the survey covered the following domains: sociodemographic characteristics, attitudes toward seeking professional psychological help, mobile phone use, and acceptability of using a mobile phone to receive mental health care.

Questions about sociodemographic characteristics, such as the respondent's race, ethnicity, age, gender, and highest level of education attained, were asked at the beginning of the survey. The race, age, and gender questions were used as screener questions to determine eligibility to continue the survey. If the respondent did not self-identify as African American (or multiracial, African American, and another race), female, and 18 years or older, they were routed directly to the end of the survey.

#### 3.1.2.1 Attitudes Toward Seeking Professional Psychological Help

Respondents' attitudes toward seeking professional psychological help were measured using questions from an adapted version of the validated *Inventory of Attitudes Toward Seeking*

*Mental Health Services* (IASMHS) (Mackenzie et al., 2004). The IASMHS consists of 24 questions that contribute to a total IASMHS score and the following factors: psychological openness (i.e., the extent to which individuals are open to acknowledging psychological problems and to the possibility of seeking professional help for them), help-seeking propensity (i.e., the extent to which individuals believe they are willing and able to seek professional psychological help), and indifference to stigma (i.e., the extent to which individuals are concerned about what various important others might think should they find out that the individual were seeking professional help for psychological problems). Response options to the survey items were on a 5-point Likert-type scale ranging from 0 (disagree) to 4 (agree). Before data analysis, all negatively worded items were reverse coded.

In the survey, the term *professional* referred to individuals who have been trained to deal with mental health problems (e.g., psychologists, psychiatrists, social workers, and family physicians). To collect data specifically about attitudes toward seeking professional help for managing anxiety and depression, six questions in the inventory were revised. In these six questions, the words *psychological problems* or *mental disorder* were substituted with *anxiety* and then repeated for substitution with *depression*. For example, item #16 in the IASMHS reads, “I would be uncomfortable seeking professional help for psychological problems because people in my social or business circles might find out about it.” The two corresponding revised survey questions state, “I would be uncomfortable seeking professional help for *anxiety* because people in my social or business circles might find out about it” and “I would be uncomfortable seeking professional help for *depression* because people in my social or business circles might find out about it.” This increased the total number of questions in the inventory to 30 and permitted calculation of a total IASMHS score related to anxiety; a total IASMHS score related to

depression; and subscores for psychological openness, help-seeking propensity, indifference to stigma for anxiety, and indifference to stigma for depression. Scores on the IASMHS range from 0 to 96, with subscale scores ranging from 0 to 32. Higher scores indicate more positive attitudes toward seeking professional psychological help.

### 3.1.2.2 Mobile Phone Use

Mobile phone use was ascertained with the following items: (1) current mobile phone ownership (yes/no); (2) frequency of sending text messages (never, less than 1 time per week, 1-6 times per week, 1-3 times per day, 4 or more times per day); (3) ability to complete video calls on mobile phone (yes/no); and (4) frequency of using mobile phone to complete video calls (never, less than 1 time per week, 1-6 times per week, 1-3 times per day, 4 or more times per day).

### 3.1.2.3 The Acceptability of Mobile Phone Use for Mental Health Care

The acceptability of using a mobile phone to receive mental health care to manage anxiety or depression was measured by the following items: (1) comfortability communicating with a professional through text messaging to receive help for managing anxiety/depression; (2) comfortability communicating with a profession through a video call to receive help for managing anxiety/depression; (3) whether having the option to use a video call to complete an appointment with a professional would increase access to mental health services; (4) convenience of using a video call to complete an appointment (due to less travel time); (5) convenience of using a video call to complete an appointment compared to an in-person visit; and (6) perceived helpfulness of having the option to use text messaging to communicate with a professional if feeling anxious/depressed. Response options to the survey items were on a 5-point



Likert-type scale ranging from 0 (disagree) to 4 (agree). Before completing the survey, respondents were asked, “Do you have any concerns about using [text messaging/video call] to communicate with a professional?” If they answered “Yes” to this question, they were presented with an open-ended question asking them to note their concerns in the textbox provided.

### 3.1.3 Statistical Analysis

#### 3.1.3.1 Quantitative Data Analysis

Descriptive statistics were calculated for sample characteristics and responses to text messaging questions as mean, standard deviation, and range for continuous variables and as frequencies and percentages for categorical variables. Age was dichotomized into two groups (<50 years and  $\geq$ 50 years), education was categorized into three levels (less than bachelor’s degree, bachelor’s degree, and graduate degree), and response options were dichotomized as agree/somewhat agree and disagree/somewhat disagree. Fisher exact test was used to: (1) determine whether an association exists between the response to each question about comfortability with using text messaging/video call and age group; (2) determine whether an association exists between the response to each question about comfortability with using a video call and education level; (3) determine whether an association exists between having concerns about using a video call to complete an appointment with a professional and age group and education level, respectively; and (4) test for association between agreement with comfortability and perceived helpfulness of having the option to communicate with a professional through text messaging to receive help for managing anxiety and depression, respectively. Independent groups *t* tests were separately performed to assess group differences in mean scores for each on psychological openness, help-seeking propensity, indifference to anxiety stigma, indifference to depression stigma, and IASMHS scores for anxiety and depression, respectively, between the

participants who agreed with the use of text messaging to communicate with a professional to receive help to manage anxiety and depression and those who disagreed.

Furthermore, a sensitivity analysis was performed using independent groups *t* tests to assess group differences in mean scores for each on psychological openness, help-seeking propensity, indifference to anxiety stigma, indifference to depression stigma, and IASMHS scores for anxiety and depression, respectively, between the participants who agreed (agree/somewhat agree) with the use of text messaging to communicate with a professional to receive help to manage anxiety and depression and those who did not indicate agreement (disagree/somewhat disagree/undecided). *Undecided* responses were included to see whether the statistical significance changed. Statistical significance was determined at the 2-sided  $P < .05$  level for all tests. Statistical analyses were conducted using SPSS version 25 software.

#### 3.1.3.2 Qualitative Data Analysis

Thematic analysis was conducted on responses to the question, “What are your concerns about using text messaging to communicate with a professional?” The responses were imported into NVivo 12 software for analysis. The data were categorized by TM and SK reading through each response and coding the emerging themes. Responses could be assigned as many themes as were pertinent.

### **3.2 Results**

#### 3.2.1 Text Messaging

The characteristics of the study participants are summarized in Table 4. Out of the 113 respondents who started the survey, 102 completed it (90.3% completion rate). Of the 102 respondents, one respondent’s data was removed because of item nonresponse, providing an

analysis sample of 101 participants. Participants ranged in age from 19 to 80 years (mean age 38.9 [SD 13.2] years), and all participants identified as African American or multiracial (i.e., African American and another race) and female. Most respondents (98.0%) identified as non-Hispanic. Approximately 15% of respondents had less than a bachelor’s degree, 23.8% obtained a bachelor’s degree, and 61.4% had a graduate degree. All participants reported the use of text messaging, and 90.1% of participants indicated texting 4 or more times per day.

Table 4. Characteristics of study participants (N=101)

Age in years, mean (SD)	38.9 (13.2)
Age group in years, n (%)	
Under 50	80 (79.2)
50 and older	21 (20.8)
Race, n (%)	
Black or African American	99 (98.0)
Multiracial <sup>a</sup>	2 (2.0)
Ethnicity, n (%)	
Hispanic	2 (2.0)
Non-Hispanic	99 (98.0)
Education <sup>b</sup> , n (%)	
< Bachelor’s degree	15 (14.9)
Bachelor’s degree	24 (23.8)
Graduate degree	62 (61.4)
Frequency of using text messaging, n (%)	
1-6 times per week	2 (2.0)
1-3 times per day	8 (7.9)
4 or more times per day	91 (90.1)

<sup>a</sup>Multiracial defined as identifying as Black or African American and another race. <sup>b</sup>Percentages may not sum to 100% due to rounding.

### 3.2.1.1 Communicating with a Professional via Text Messaging

The results of this exploratory study showed that less than half of respondents endorsed the use of text messaging to communicate with a professional to receive help to manage anxiety and depression. Only 48.5% of respondents indicated agreement (25.7% agree and 22.8% somewhat agree), 10.9% were undecided, and 40.6% showed disagreement (25.7% disagree and 14.9% somewhat disagree) with the statement, “I would feel comfortable communicating with a professional through text messaging to receive help for managing *anxiety*.” Similarly, 42.6% of respondents indicated agreement (22.8% agree and 19.8% somewhat agree), 14.9% were undecided, and 42.5% showed disagreement (25.7% disagree and 16.8% somewhat disagree) with the statement, “I would feel comfortable communicating with a professional through text messaging to receive help for managing depression.”

Approximately 51% of respondents agreed that having the option to use text messaging to communicate with a professional if they are dealing with anxiety would be helpful. Similarly, 48.5% of respondents agreed that having the option to use text messaging to communicate with a professional if they are dealing with depression would be helpful. Figures 5 and 6 illustrate the bivariate relationship between perceived helpfulness and comfortability with having the option to communicate with a professional via text messaging to receive help dealing with anxiety and depression, respectively.

Among participants who agreed that text messaging would be helpful, approximately 86% noted being comfortable with its use to receive help for managing anxiety (highly significant positive association;  $P < .001$ ); in contrast, among participants who disagreed that text messaging would be helpful, approximately 7% noted being comfortable with its use to receive help for managing anxiety (Figure 5). Of those who agreed with the statement, “Having the

option to use text messaging to communicate with a professional if I am dealing with *depression* would be helpful for me,” approximately 82% indicated being comfortable with its use to receive help for managing depression (highly significant positive association;  $P < .001$ ); however, among participants who disagreed that text messaging would be helpful, approximately 6% indicated being comfortable with its use to receive help for managing depression (Figure 6). No statistically significant associations were found between age and agreement with the use of text messaging to communicate with a professional to receive help for managing anxiety ( $P = .26$ ) or depression ( $P = .27$ ). Furthermore, no statistically significant association was found between age and response to the question, “Do you have any concerns about using text messaging to communicate with a professional?” ( $P > .99$ ).

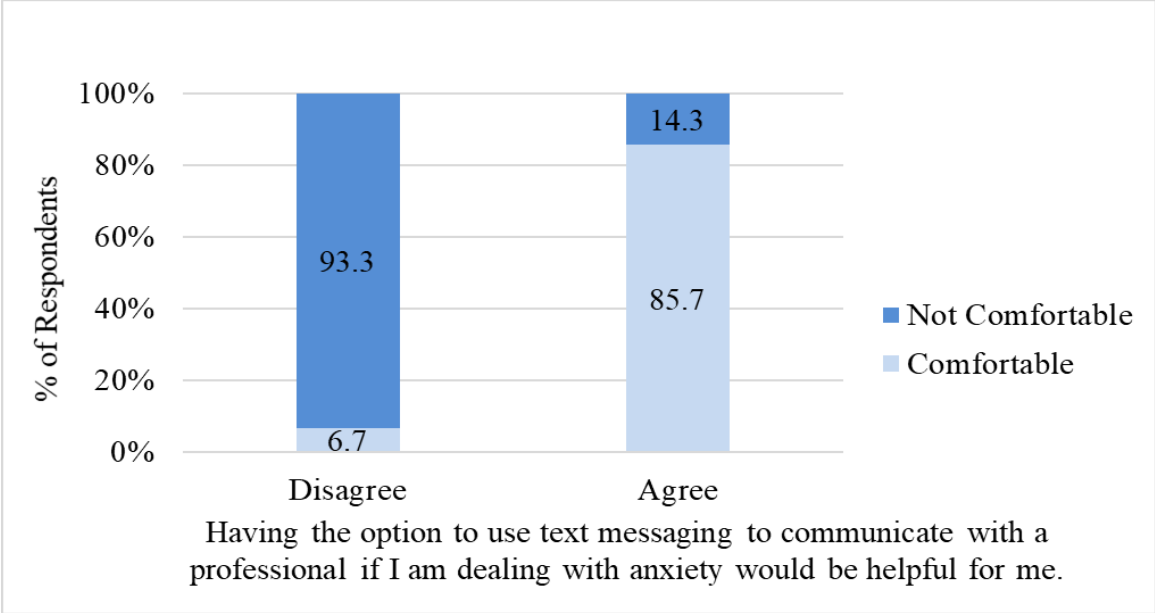


Figure 5. Sample percentages showing bivariate relationship between perceived helpfulness and comfortability with using text messaging to communicate with a professional to receive help to manage **anxiety** ( $P < .001$ ). Note: Respondents can agree that text messaging would be helpful, however not feel comfortable with using it to communicate with a professional.

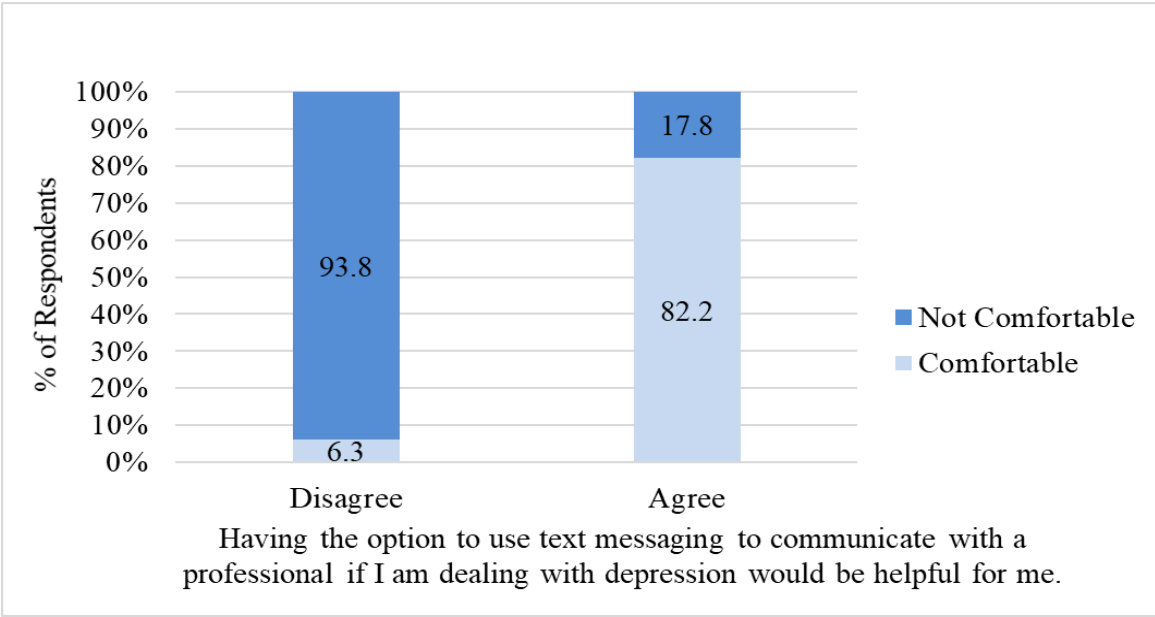


Figure 6. Sample percentages showing bivariate relationship between perceived helpfulness and comfortability with using text messaging to communicate with a professional to receive help to manage **depression** ( $P < .001$ ). Note: Percentages may not sum to 100% due to rounding. Respondents can agree that text messaging would be helpful, however they do not feel comfortable with using it to communicate with a professional.

### 3.2.1.2 Attitudes Toward Seeking Mental Health Service and Acceptance of Text Messaging

The study participants held favorable views toward seeking mental health services. Respondents' reports of psychological openness (mean 23.95, SD 4.53) and help-seeking propensity (mean 26.11, SD 4.89) were comparable with the adult female normative scores for psychological openness (mean 23.19, SD 6.00) and help-seeking propensity (mean 24.95, SD 4.74) (Mackenzie et al., 2004). The indifference to stigma questions were adapted to collect data on indifference to stigma for anxiety and depression. The participants' scores on indifference to anxiety stigma (mean 24.34, SD 6.08) and depression stigma (mean 23.58, SD 6.43) were similar.

Tables 5 and 6 display group IASMHS factor scores by the level of agreement with using text messaging to communicate with a professional to receive help for managing anxiety and depression, respectively. There were no statistically significant differences between group mean scores for psychological openness ( $P=.96$ ), help-seeking propensity ( $P=.68$ ), indifference to anxiety stigma ( $P=.28$ ), and IASMHS scores ( $P=.47$ ) between the participants who agreed (agree/somewhat agree) with the use of text messaging to communicate with a professional to receive help to manage anxiety and those who disagreed (disagree/somewhat disagree). Similarly, there were no statistically significant differences between group mean scores for psychological openness ( $P=.78$ ), help-seeking propensity ( $P=.93$ ), indifference to depression stigma ( $P=.67$ ), and IASMHS scores ( $P=.94$ ) between the participants who agreed (agree/somewhat agree) with the use of text messaging to communicate with a professional to receive help to manage depression and those who disagreed (disagree/somewhat disagree). In addition, the results of the sensitivity analysis revealed no statistically significant difference between group mean scores, in the aforementioned categories, between the participants who

agreed (agree/somewhat agree) and those who did not indicate agreement (disagree/somewhat disagree/undecided) with the use of text messaging to communicate with a professional to receive help to manage anxiety (psychological openness:  $P=.88$ ; help-seeking propensity:  $P=.93$ ; indifference to anxiety stigma:  $P=.32$ ; and IASMHS scores:  $P=.55$ ) and depression (psychological openness:  $P=.62$ ; help-seeking propensity:  $P=.56$ ; indifference to depression stigma:  $P=.81$ ; and IASMHS scores:  $P=.59$ ).



Table 5. IASMHS factor scores by agreement with using text messaging to communicate with a professional to receive help for managing **anxiety**

Factor	Agree (n=49)	Disagree (n=41)	Mean difference (95% confidence interval)
	Mean score (SD)	Mean score (SD)	
Psychological openness	23.9 (5.0)	23.9 (4.0)	0.0 (-1.9, 1.8)
Help-seeking propensity	26.1 (5.1)	26.5 (4.8)	-0.4 (-2.5, 1.6)
Indifference to anxiety stigma	23.7 (6.2)	25.1 (5.9)	-1.4 (-3.9, 1.1)
IASMHS total	73.7 (12.9)	75.5 (11.3)	-1.9 (-7.0, 3.2)

Table 6. IASMHS factor scores by agreement with using text messaging to communicate with a professional to receive help for managing **depression**

Factor	Agree (n=43)	Disagree (n=43)	Mean difference (95% confidence interval)
	Mean score (SD)	Mean score (SD)	
Psychological openness	24.2 (5.1)	23.9 (4.1)	0.3 (-1.7, 2.3)
Help-seeking propensity	26.4 (4.7)	26.3 (5.0)	0.1 (-2.0, 2.2)
Indifference to depression stigma	23.8 (6.5)	24.3 (6.1)	-0.6 (-3.3, 2.1)
IASMHS total	74.4 (12.8)	74.6 (12.0)	-0.2 (-5.5, 5.1)

### 3.2.1.3 Concerns About Text Messaging

More than half of the respondents (55.4%) indicated having concerns about using text messaging to communicate with a professional. The most common themes identified from responses to the question, “Do you have any concerns about using text messaging to communicate with a professional?” are presented in Table 7. A total of 78 responses were coded

into themes. Most of the concerns (94%) centered around the following themes: privacy and confidentiality (42%), the impersonal feel of communicating by text messaging (22%), possible miscommunication (21%), and belief that the mode is insufficient for treatment (9%).

Table 7. The most common concerns about using text messaging to communicate with a professional (N=78)

<b>Themes*</b>	<b>n (%)</b>	<b>Examples</b>
Privacy and confidentiality	33 (42)	<p><i>There are risks with sending sensitive information in text messages such as being mistakenly sent to the wrong person, someone other than the professional seeing/reading my messages, and someone other than the professional sending them in response to my messages. [Participant age 34]</i></p> <p><i>Security of the content of the text messages. [Participant age 31]</i></p> <p><i>Lack of privacy. The government has been known to search the cell phones of law abiding individuals for ridiculous reasons. [Participant age 58]</i></p>
Impersonal feel	17 (22)	<p><i>Lack of intimacy with counselor. How can healing take place without a relationship? [Participant age 29]</i></p> <p><i>Too impersonal - and tone is too difficult to determine and you cannot read compassion. [Participant age 48]</i></p> <p><i>Not personal enough. [Participant age 62]</i></p>
Miscommunication	16 (21)	<p><i>I believe body language is really important in communication. Text messaging doesn't allow for the counselor to observe body language. Writing can also sometimes be misunderstood by the reader. [Participant age 29]</i></p> <p><i>It's hard to convey emotions via text message. [Participant age 34]</i></p> <p><i>Words are just 35% of communication. [Participant age 65]</i></p>

Themes*	n (%)	Examples
Insufficient mode for treatment	7 (9)	<i>Their response time...with video conferencing you can get immediate feedback versus waiting for someone to respond [via text] which may increase my anxiety. [Participant age 34]</i>
		<i>It depends on the severity of the issue I am working through. I believe there are instances where text messaging is inappropriate or insufficient. [Participant age 32]</i>
		<i>I'm not sure if [text messaging] would be as effective. [Participant age 33]</i>

\*A total of 78 responses were coded into themes, however only the most common themes are presented in the table (n=73). Therefore, percentages may not sum to 100%.

### 3.2.2 Video Call

One hundred two participants were included in the sample for analysis. Most participants (96.1%) reported having video call capability on their mobile phone, and 39.2% reported completing a video call at least once per week.

#### 3.2.2.1 Communicating with a Professional via Video Call

The majority of respondents (> 70%) indicated agreement (agree/somewhat agree) with feeling comfortable using video call to communicate with a professional. Figure 7 shows 70.6% agreement (43.1% agree, 27.5% somewhat agree) with the statement, “I would feel comfortable communicating with a professional through a video call to receive help for managing *anxiety*.” Similarly, 71.6% (40.2% agree, 31.4% somewhat agree) of respondents showed agreement with the statement, “I would feel comfortable communicating with a professional through a video call to receive help for managing *depression*.” See Figure 8.

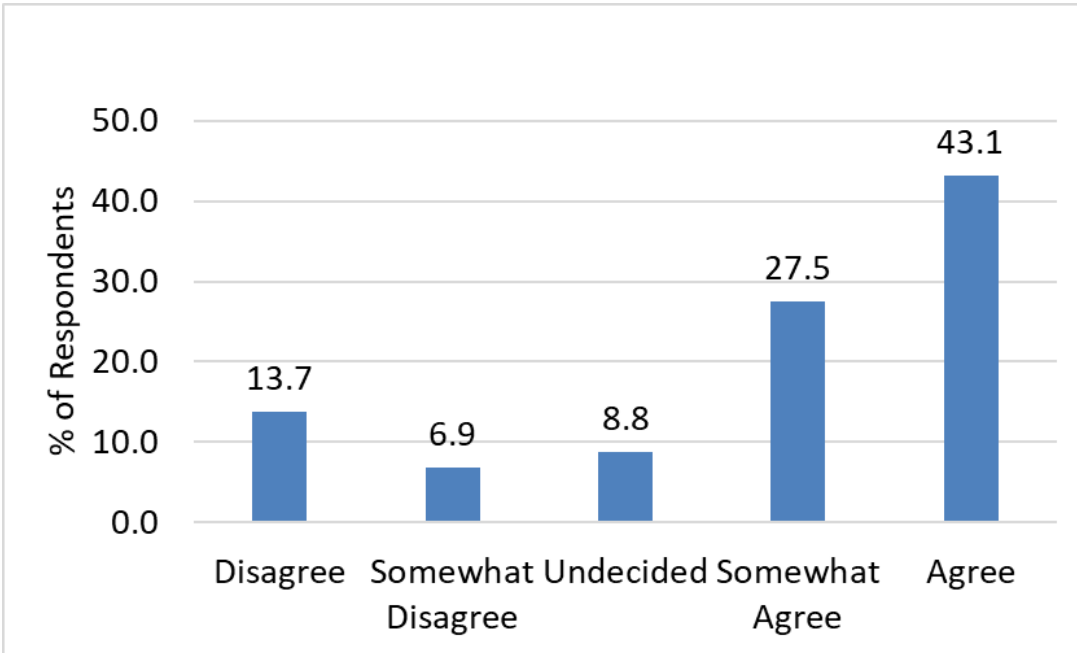


Figure 7. Sample percentages for response to the statement, “I would feel comfortable communicating with a professional through a video call to receive help for managing **anxiety**”

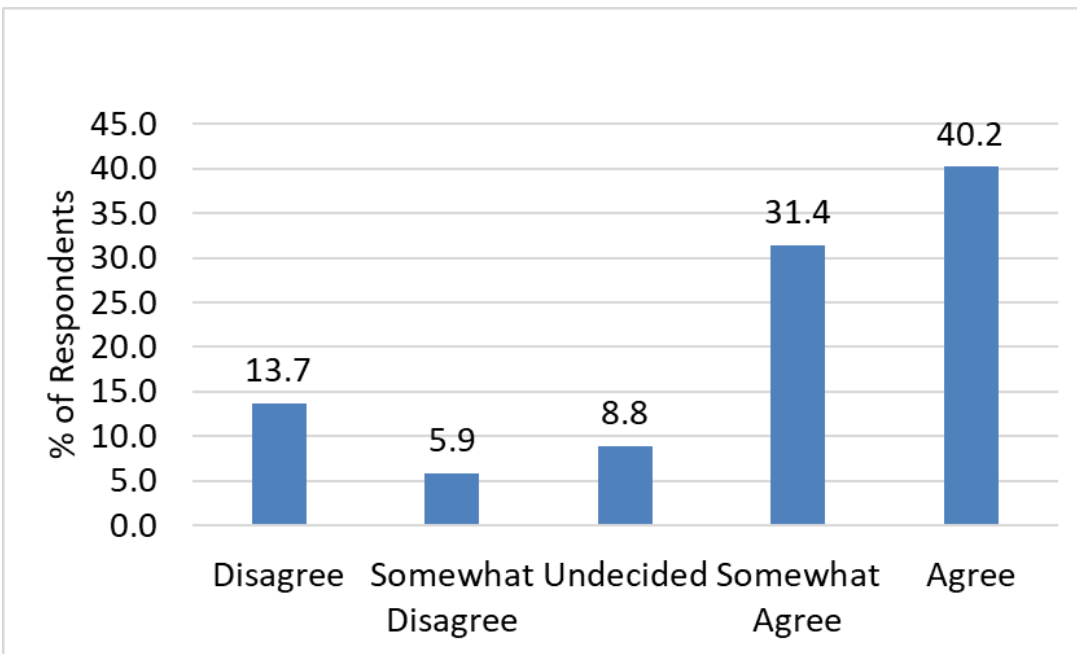


Figure 8. Sample percentages for response to the statement, “I would feel comfortable communicating with a professional through a video call to receive help for managing **depression**”

### 3.2.2.2 Access and Convenience

The survey results revealed high levels of agreement with the access and convenience statements. Figure 9 shows 83.3% agreement (69.6% agree, 13.7% somewhat agree) with the statement, “Having the option to use a video call to complete an appointment with a professional increases my access to mental health services.” Likewise, 88.2% (72.5% agree, 15.7% somewhat agree) of respondents indicated agreement with the statement, “Using a video call to complete an appointment would save me time traveling to a professional’s office.” See Figure 10. Furthermore, Figure 11 shows 71.6% (47.1% agree, 24.5% somewhat agree) of respondents indicated agreement with the statement, “Using a video call to complete an appointment with a professional would be more convenient for me than an in-person appointment.”

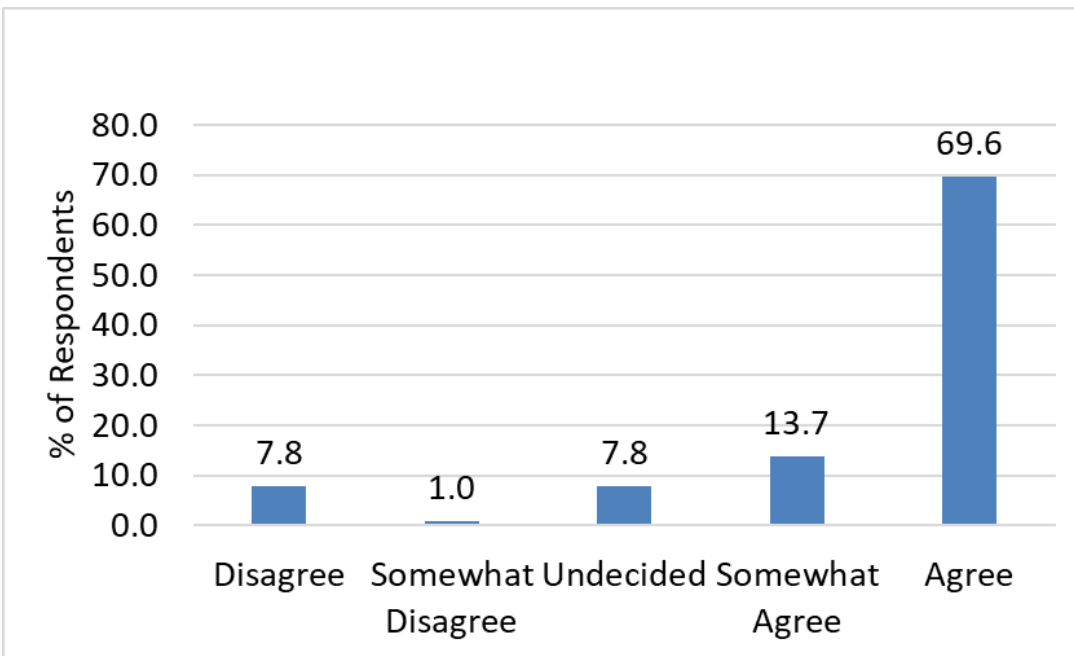


Figure 9. Sample percentages for response to the statement, “Having the option to use a video call to complete an appointment with a professional increases my access to mental health services”

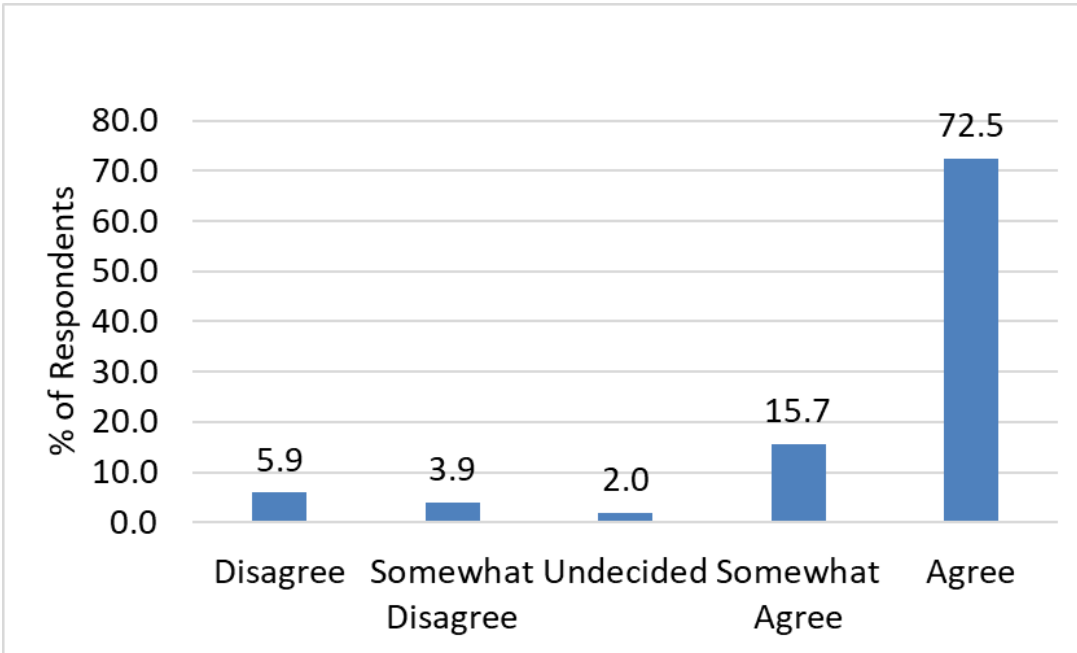


Figure 10. Sample percentages for response to the statement, “Using a video call to complete an appointment would save me time traveling to a professional’s office”

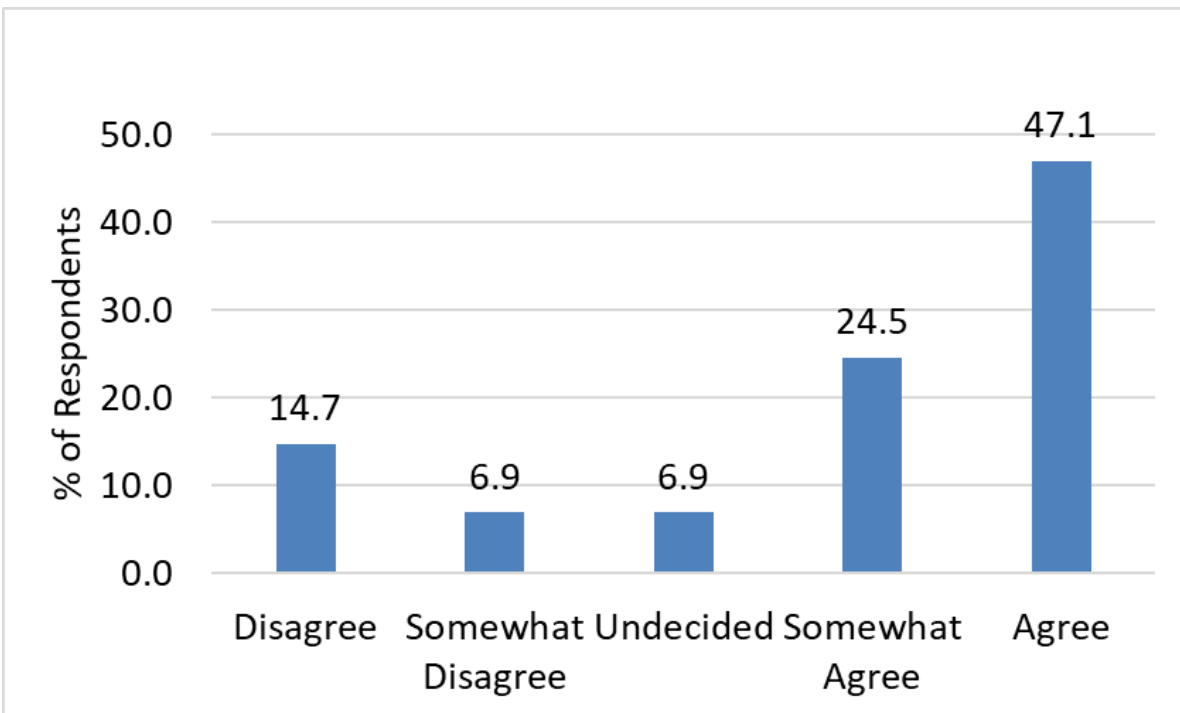


Figure 11. Sample percentages for response to the statement, “Using a video call to complete an appointment with a professional would be more convenient for me than an in-person appointment”

### 3.2.2.3 Concerns About Video Call

Although overall response to using video calls was positive, approximately 43% of respondents indicated having concerns about using a video call to complete an appointment with a professional. Most of the concerns centered around privacy and confidentiality, and maintaining the video call connection. Regarding privacy, one respondent stated:

*I would also be concerned about how private the call is, like is the professional alone, how would I know?*

Another respondent voiced connectivity concerns stating:

*The call could get disconnected. That breaks the rhythm of the conversation.*

### 3.2.2.4 The Acceptability of Video Call Use by Age and Education

Statistically significant associations were found between age and level of agreement with the following video call statements: “I would feel comfortable communicating with a professional through a video call to receive help for managing *anxiety*” (highly significant negative association,  $P=.002$ ); “I would feel comfortable communicating with a professional through a video call to receive help for managing *depression*” (highly significant negative association,  $P=.003$ ); “Using a video call to complete an appointment would save me time traveling to a professional’s office” (highly significant negative association,  $P=.001$ ); and “Do you have any concerns about using a video call to complete an appointment with a professional?” (positive association,  $P=.025$ ). No statistically significant associations were observed between level of agreement and education (all  $P>.05$ ).

### **3.3 Discussion**

#### 3.3.1 Principal Findings

To our knowledge, this preliminary study was one of the first to measure the acceptability of mobile phone use to deliver mental health care to African American women. The results of this study showed that less than half of respondents endorsed the use of text messaging to communicate with a professional to receive help to manage anxiety and depression. No statistically significant associations were found between age and agreement with the use of text messaging. Approximately half of the women agreed that having the option to use text messaging to communicate with a professional if they are dealing with anxiety or depression would be helpful. However, more than half of respondents indicated having concerns about using text messaging to communicate with a professional. No statistically significant association was found between age and having concerns about using text messaging to communicate with a professional.

In comparison, the results of this study showed high acceptance of video call use to communicate with a professional to receive help to manage anxiety and depression. A majority of the women responded that they agreed with the statements regarding feeling comfortable using a video call to communicate with a professional to receive help to manage anxiety and depression. Most respondents also believed that the use of video calls will increase their access to mental health services, and that it is a convenient option for care. Younger women (< 50 years) were more likely to indicate acceptance. While older women ( $\geq 50$  years) were more likely to have concerns about using a video call.



Furthermore, these findings are consistent with literature on the use of telehealth modalities. Although a positive overall reaction was observed in adults, in general, there is greater acceptance among younger adults for the use of technology (Newlin, McCall, Ottmar, Welch, & Khairat, 2018). Previous studies have also found that older adults generally have many concerns about the use of technology (Peek et al., 2014).

Moreover, the results revealed that African American women have favorable views toward seeking mental health services, comparable to non-African American women. Our findings are contrary to the results of a previous study by Watson and Hunter (2015) that found that African American women have less favorable attitudes toward professional help-seeking than their non-African American counterparts. However, the differences in reported results between the studies may be due to significant differences in age and education level between the study samples. The mean age of the women in Watson and Hunter's study was 20.9 years old, and the majority of participants (92.6%) reported attending a 4-year university. In comparison, the mean age of the women in our study was 38.9 years old, and majority of participants (85.2%) had at least a bachelor's degree. Therefore, the 18-year difference in mean age between the study samples, and difference in education level could contribute to the contrasting findings. Furthermore, time may also explain the difference in attitudes toward seeking mental health services. Use of mental health services may be less stigmatizing than in the past.

Exploration into the reason for low acceptance of text messaging was conducted by analyzing group IASMHS factor scores by level of agreement with using text messaging to communicate with a professional to receive help for managing anxiety and depression, respectively. Findings showed there was no statistically significant differences between group mean scores (all  $P > .05$ ) for any of the factors. One might expect to see a significant difference in

psychological openness, help-seeking propensity, indifference to anxiety stigma, or indifference to depression stigma between the participants who agreed (agree/somewhat agree) with use of text messaging versus those who disagreed (disagree/somewhat disagree). Specifically, the authors expected that those who indicated acceptance of the use of text messaging would have higher scores for all factors than those who did not. These findings could be interpreted as indicating that the reason for low acceptance is not due to a difference in attitudes toward seeking mental health care, but due to the modality used to do so.

The most common concerns respondents had about text messaging were about privacy and confidentiality, the impersonal feel of communicating by text messaging, possible miscommunication, and belief that the mode is insufficient for treatment. For example, regarding privacy and confidentiality, one respondent stated:

*There are risks with sending sensitive information in text messages such as being mistakenly sent to the wrong person, someone other than the professional seeing/reading my messages, and someone other than the professional sending them in response to my messages.*

Concerns around privacy and confidentiality must be addressed for successful implementation of mHealth interventions for African American women (D. C. S. James et al., 2016). Future studies should provide clear communication to participants about who they will receive text messages from, who will have access to the text messages, and information on how the data will be protected. The Health Insurance Portability and Accountability Act of 1996 (HIPAA) set national standards to protect sensitive patient health information. Researchers and clinicians should ensure that transmission and storage of text messages that contain electronic protected health information (ePHI) are HIPAA compliant.

Furthermore, concerns around the impersonal feel and possible miscommunication must be considered. One respondent noted:

*[Text messaging is] too impersonal - and tone is too difficult to determine and you cannot read compassion.*

Another respondent voiced concerns about possibly being misunderstood by stating:

*I believe body language is really important in communication. Text messaging doesn't allow for the counselor to observe body language. Writing can also sometimes be misunderstood by the reader.*

It is important that participants feel connected to the person they are disclosing sensitive information to, especially, within a population where mental illness is highly stigmatized. Feelings of disconnection and being misunderstood are counterproductive to treatment. Although text messaging is known to increase the feeling of connectedness between the client and mental health professionals, successful use is limited to simple messages (e.g., supportive messages to prevent suicide attempt), and not real-time prolonged conversation to manage a current episode (e.g., panic attack) (Berrouiguet, Baca-García, Brandt, Walter, & Courtet, 2016).

Lastly, text messaging may not be appropriate to use in all situations. One respondent stated:

*It depends on the severity of the issue I am working through. I believe there are instances where text messaging is inappropriate or insufficient.*

Furthermore, a unique finding was that use of text messaging may actually increase anxiety due to a lag in response time. A participant noted the following concern:

*Their response time...with video conferencing you can get immediate feedback versus waiting for someone to respond [via text] which may increase my anxiety.*

The combination of concerns around privacy and confidentiality, in addition to the impersonal feel, fear of miscommunication, and view of text messaging as an insufficient mode for treatment present a significant challenge to use of this modality for effective treatment of anxiety or depression. While text messaging is convenient, it may not be easily adopted or sustainable to use to converse with clients regarding their anxiety or depression. A systematic review on the use of text messaging for mental health care concluded that “due to the simplicity of its content, text messaging cannot be used as a remote counseling tool,” however, past studies have successfully used text messaging as an adjunct to in-person treatment (Berrouiguet et al., 2016). Text messaging may be considered for symptom monitoring, as well as appointment, medication, and “homework” reminders (e.g., CBT activities), which may help to reduce no-show rates, improve medication adherence, and increase the likelihood of completing “homework” assigned by the mental health professional (Aguilera & Muñoz, 2011; Agyapong et al., 2016; Schlicker, Ebert, Middendorf, Titzler, & Berking, 2018). A study by Aguilera et al. (Aguilera, Schueller, & Leykin, 2015), found that daily automatic text message-based mood ratings can be used as a proxy for the Patient Health Questionnaire-9 depression screener. This may be beneficial for tracking depression severity to identify trends and adjust treatment plans as needed.

In addition to the concerns of privacy and confidentiality, connectivity must be addressed when considering use of video calls. Transparency is key to reducing medical mistrust and adoption of video calls as a sustainable mode to deliver care to this population. Clients should also be advised to connect to Wi-Fi or ensure they have a strong cellular signal and sufficient mobile data for high quality video transmission and to prevent disconnection.

### 3.3.2 Limitations

The main limitations of this exploratory study were recruitment method and generalizability due to sample size. Participants were recruited through convenience sampling and encouraged to share the survey email or social media posts with their networks. Although no PII was collected in the survey and respondents accessed the survey through an anonymous link, social desirability and other selection biases could have resulted if the respondent personally knew the first author.

Furthermore, the sample size is small for this cross-sectional survey and consisted of mostly younger (<50 years) and highly educated women (more than 85% had at least a bachelor's degree). This limits the generalizability of the findings. Although stigma may continue to be a barrier for highly educated African American women, access to mental health services, insurance coverage, and health literacy may be less of an issue for this group.

### 3.3.3 Conclusions and Future Directions

Owing to the high smartphone ownership by African American women (80%) (The Nielsen Company, 2017), there is a great opportunity to use mobile technology to provide mental health care. A *one-size-fits-all* approach to designing telehealth interventions to help African American women manage anxiety or depression may lead to more options but continued disparity in receiving mental health care. This study adds to the literature by providing insight into the attitudes of African American women toward seeking mental health services to manage anxiety and depression and the acceptability of using text messaging and video call to communicate with a professional to receive help for managing anxiety and depression. Although the use of text messaging was not highly endorsed by African American women as an acceptable

mode to converse with a professional (<50% endorsed), mobile video calls were viewed favorably by the majority of respondents (>70% endorsed). Concerns around privacy and confidentiality, connectivity issues, and the impersonal feel of communicating about sensitive issues via text messages must be addressed for successful participation in text message-based and video call interventions among this population.

The findings of this study demonstrated the need for additional research into the use of mobile technology to provide African American women with more accessible and convenient options for mental health care. More research is needed to determine whether having a preexisting relationship with a professional (e.g., face-to-face sessions in the past) impacts acceptance and use of the technology to receive professional support. Future work will include relaunching the survey to a larger and more generalizable sample. Questions will be added to screen for the presence and severity of depression and anxiety and to collect data on previous mental health services utilization and history of mental illness.

## CHAPTER 4: METHODOLOGY

### Introduction

The chapter provides details of the research design and methods used to answer the questions posed for this study. The study aims and their related research questions are discussed. Study procedures including details on the population, sample, recruitment, and study variables are included. To conclude, the data collection and analysis plans are presented.

### 4.1 Research Questions

The study was guided by two aims and five research questions.

**Aim I.** To gauge the attitudes and perceptions of African American women towards utilizing mental health services, and determine the acceptability of using mobile technology to help them manage anxiety and depression. There are four research questions under this aim:

**R1.** What are the attitudes and perceptions of African American women toward using mental health services?

**R2.** What are the barriers to utilization of mental health services?

**R3.** Is the use of mobile technology acceptable to African American women, in terms of delivering mental health services and resources, and helping them manage anxiety and depression?

**R4.** Which modalities are more acceptable than others (e.g., mobile app, video call, voice call, text messaging) to use to deliver mental health services and resources to African American women?

## **Aim II.**

- **Aim II-a.** To design and develop a user-centered prototype that presents important content and preferred features for smartphone applications to help African American women manage anxiety and depression. There is one research question under this aim:
- **Aim II-b.** To test and evaluate a user-centered prototype of a smartphone application tailored to help African American women manage anxiety and depression.

There is one research question under this aim:

**R5.** What user-centered recommendations should be addressed in a smartphone application designed to help African American women manage anxiety and depression?

### **4.2 Overview of Research Design**

A mixed methods approach, incorporating both quantitative and qualitative methods, was used for the study. The study occurred in three parts. Part I was the development and launch of a self-administered web-based survey to gauge the attitudes and perceptions of African American women toward using mental health services, and use of mobile technology to manage anxiety and depression. Focus groups were conducted in Part II to identify important content and preferred features for smartphone applications designed to help African American women manage anxiety and depression. A prototype for a smartphone application (app) tailored to help African American women manage anxiety and depression was developed in the final phase of the study (Part III). Part III of the study focused on the development, testing, and evaluation of the app. This included the use of both qualitative (e.g., cognitive walkthrough think-aloud method) and quantitative (e.g., user interface satisfaction questionnaire) evaluation methods.

The Institutional Review Board of the University of North Carolina at Chapel Hill provided the study a notification of exemption from further review. Focus group and usability



testing participants were required to sign a written consent form prior to participation. For the online survey, participants received information about the study via email or social media posting. In addition, detailed information about the study was provided on the first screen of the survey. Participants were able to proceed with taking the survey once they had viewed this information.

## **4.3 Part I: Survey**

### 4.3.1 Study Design and Recruitment

The self-administered web-based survey was launched in October 2019 and closed January 2020. Women (18 years or older) who identify as Black/African American (or multiracial, Black/African American and another race) and reside within the United States, regardless of mental health history, were eligible to participate. Participants were recruited through convenience sampling. Recruitment methods included receiving an invitation to take the survey via an anonymous link distributed through listservs whose membership is primarily African American women (e.g., National Council of Negro Women, Inc.), university student group listservs, and church membership listservs. Participants were also recruited via posts on social media (e.g., Facebook, Twitter). Following a snowball sampling technique, respondents were allowed to share the link to the survey with their networks (e.g., family, friends). See Appendix A for the survey recruitment materials.

Respondents that completed the survey were eligible to provide their contact information for entry into a drawing to receive one of five \$100 Amazon eGift cards. Participation in the drawing was optional. The survey responses were collected and stored separately from the participants' identifiers. A separate Qualtrics questionnaire was used to collect contact

information for the drawing and notification of an opportunity to participate in a focus group (participants opt-in to both). This questionnaire was linked to the end of the main survey.

#### 4.3.2 Sample Size

Results of the preliminary study (N=102) showed that a majority of respondents (70.6%) indicated that they would feel comfortable communicating with a professional through a video call to receive help for managing anxiety (McCall, Schwartz, & Khairat, 2019). Conversely, only 48.5% of respondents indicated agreement that they would feel comfortable communicating with a professional through text messaging to receive help for managing anxiety (McCall, Schwartz, & Khairat, 2020). Using the aforementioned sample proportions, nQuery statistical software was used to determine the necessary sample size to obtain a specified level of precision via the width of a two-sided 95% confidence interval. For an expected true (population) proportion of 0.70, the needed sample size is 323 women to obtain a width for the 95% confidence interval of  $\pm 0.05$ . However, recognizing that the sample from the exploratory study is more highly educated (85.3% have a bachelor’s degree or higher) than the general population (22.4% of Black/African American women have a bachelor’s degree or higher) (DHHS, 2019), sample size estimates were also calculated under a conservative scenario: under an expected proportion of 0.50, the needed sample size would be **385 women** to obtain this level of precision. See Table 8.

Table 8. Sample size estimation by expected true population proportion

Expected true population proportion	Sample size needed (95% confidence interval)
0.70	323
0.60	369
0.50	385*

\*A conservative scenario under an expected proportion of 0.50 was used to determine the needed sample size for a 95% confidence interval width of  $\pm 0.05$ .

### 4.3.3 Measures

The *Attitudes Toward Seeking Mental Health Services and Use of Mobile Technology Survey* has been approved for use by the UNC IRB (#18-1375). The survey consists of 53 questions, and was administered using Qualtrics software. Survey domains included sociodemographic characteristics, attitudes toward seeking professional psychological help (questions from an adapted version of the validated *Inventory of Attitudes Toward Seeking Mental Health Services*) (Mackenzie et al., 2004), mobile phone use, and acceptability of using a mobile phone to receive mental health care. See Chapter 3 Preliminary Study for results from the pilot test of the survey.

The questionnaire was expanded for the dissertation study in order to capture information to better characterize respondents. The questionnaire now includes questions in the aforementioned domains, and additional questions to: (1) screen for the presence and severity of anxiety using the *Generalized Anxiety Disorder (GAD-7)* scale (Spitzer, Kroenke, Williams, & Löwe, 2006); (2) screen for the presence and severity of depression using the *Patient Health Questionnaire (PHQ-9)* (Kroenke, Spitzer, & Williams, 2001); (3) collect data on past mental health services utilization *2019 National Survey on Drug Use and Health (NSDUH)* (SAMHSA, 2018); and (4) to collect data on history of mental illness. The survey now consists of approximately 80 questions, and will take approximately 15-20 minutes to complete. Respondents can choose not to answer any question they do not wish to answer. They can also choose to stop taking the survey at any time. See Appendix B for the survey instrument.

Questions about sociodemographic characteristics, such as the respondent's race, ethnicity, age, gender, highest level of education attained, and annual household income were asked at the beginning of the survey. The race, age, and gender questions were used as screener

questions to determine eligibility to continue the survey. If the respondent did not self-identify as African American (or multiracial, African American and another race) and 18 years or older, they were routed directly to the end of the survey. Also, if the respondent self-identified as male, they were routed directly to the end of the survey.

#### 4.3.3.1 Anxiety and Depression Screening

If respondents passed the screening questions, they were permitted to complete the rest of the survey. The next set of questions were from the Generalized Anxiety Disorder (GAD-7) scale (Spitzer, Kroenke, Williams, & Löwe, 2006) and Patient Health Questionnaire (PHQ-9) (Kroenke, Spitzer, & Williams, 2001) were included in the survey to screen for the presence and severity of anxiety and depression, respectively. The GAD-7 scale is a seven-item measure evaluating the presence and severity of generalized anxiety disorder. The scale ranges from a score of 0 to 21. A score of  $\geq 10$  on the GAD-7 represents a reasonable cut-point for identifying cases of GAD (Spitzer et al., 2006). Scores of 0 to 4 indicate *minimal*, 5 to 9 *mild*, 10 to 14 *moderate*, and 15 to 21 *severe* level of anxiety. The PHQ-9 is a nine-item measure evaluating the presence and severity of depression. The scale ranges from a score of 0 to 27. A score of  $\geq 10$  on the PHQ-9 represents a reasonable cut-point for identifying depressive disorders (Kroenke, Spitzer, & Williams, 2001). Scores of 0 to 4 indicate *minimal*, 5 to 9 *mild*, 10 to 14 *moderate*, 15 to 19 *moderately severe*, and 20 to 27 *severe* level of depression.

#### 4.3.3.2 Attitudes Toward Seeking Professional Psychological Help

Respondents' attitudes toward seeking professional psychological help were measured using questions from an adapted version of the validated *Inventory of Attitudes Toward Seeking Mental Health Services* (IASMHS) (Mackenzie et al., 2004). The IASMHS consists of 24

questions that contribute to a total IASMHS score and the following factors: psychological openness (i.e., the extent to which individuals are open to acknowledging psychological problems and to the possibility of seeking professional help for them), help-seeking propensity (i.e., the extent to which individuals believe they are willing and able to seek professional psychological help), and indifference to stigma (i.e., the extent to which individuals are concerned about what various important others might think should they find out that the individual were seeking professional help for psychological problems). Response options to the survey items were on a 5-point Likert-type scale ranging from 0 (disagree) to 4 (agree). Before data analysis, all negatively worded items were reverse coded.

In the survey, the term *professional* referred to individuals who have been trained to deal with mental health problems (e.g., psychologists, psychiatrists, social workers, and family physicians). To collect data specifically about attitudes toward seeking professional help for managing anxiety and depression, six questions in the inventory were revised. In these six questions, the words *psychological problems* or *mental disorder* were substituted with *anxiety* and then repeated for substitution with *depression*. For example, item #16 in the IASMHS reads, “I would be uncomfortable seeking professional help for psychological problems because people in my social or business circles might find out about it.” The two corresponding revised survey questions state, “I would be uncomfortable seeking professional help for *anxiety* because people in my social or business circles might find out about it” and “I would be uncomfortable seeking professional help for *depression* because people in my social or business circles might find out about it.” This increased the total number of questions in the inventory to 30 and permitted calculation of a total IASMHS score related to anxiety; a total IASMHS score related to depression; and subscores for psychological openness, help-seeking propensity, indifference to

stigma for anxiety, and indifference to stigma for depression. Scores on the IASMHS range from 0 to 96, with subscale scores ranging from 0 to 32. Higher scores indicate more positive attitudes toward seeking professional psychological help.

#### 4.3.3.3 Mental Health Service Utilization

Data on past mental health services use and barriers to receiving treatment despite perceived need was collected through use of questions from the *2019 National Survey on Drug Use and Health (NSDUH)* (SAMHSA, 2018). Respondents were given instructions that the questions were about treatment and counseling for problems with emotions, nerves or mental health. They were also asked not to include treatment for alcohol or drug use. The option to *Select all that apply* was given for the questions, “Where did you receive mental health treatment or counseling during the past 12 months?” and “Which of these statements explain why you did not get the mental health treatment or counseling you needed?”

#### 4.3.3.4 Mobile Phone Use

Mobile phone use was ascertained with the following items: (1) current mobile phone ownership (yes/no); (2) frequency of sending text messages (never, less than 1 time per week, 1-6 times per week, 1-3 times per day, 4 or more times per day); (3) frequency of accessing apps on phone (never, less than 1 time per week, 1-6 times per week, 1-3 times per day, 4 or more times per day); (4) ability to complete video calls on mobile phone (yes/no); and (5) frequency of using mobile phone to complete video calls (never, less than 1 time per week, 1-6 times per week, 1-3 times per day, 4 or more times per day).

#### 4.3.3.5 The Acceptability of Mobile Phone Use for Mental Health Care

The acceptability of using a mobile phone to receive mental health care to manage anxiety or depression was measured by the following items: (1) comfortability communicating with a professional through [text messaging/voice call/mobile app/video call] to receive help for managing anxiety; and (2) comfortability communicating with a professional through [text messaging/voice call/mobile app/video call] to receive help for managing depression. Moreover, the following statements were presented to further gauge acceptability of using the telehealth modalities:

1. “Having the option to use [text messaging/voice call/mobile app/video call] to communicate with a professional if I am dealing with anxiety would be helpful for me.”
2. “Having the option to use [text messaging/voice call/mobile app/video call] to communicate with a professional if I am dealing with depression would be helpful for me.”
3. “Would having the option to use a [voice call/mobile app/video call] to complete an appointment with a professional increase your access to mental health services?”
4. “Would having the option to use a [voice call/mobile app/video call] to complete an appointment save you time traveling to a professional’s office?”
5. “Would having the option to use a [voice call/mobile app/video call] to complete an appointment with a professional be more convenient for you than an in-person appointment?”

Response options to the survey items were on a 5-point Likert-type scale ranging from 1 (disagree) to 5 (agree). Before completing the survey, respondents were asked, “Do you have any

concerns about using a [voice call/mobile app/video call] to receive mental health treatment or counseling?” and “Do you have any concerns about using text messaging to communicate with a professional about your mental health?” If they answered “Yes” to these questions, they were presented with open-ended questions asking them to note their concerns in the textboxes provided.

#### 4.3.3.6 Mental Health History

The final section of the survey asked questions about past diagnosis of anxiety and depression. Respondents were also asked if they currently have health insurance. If so, they were presented with the question, “Does your health insurance pay for any type of mental health treatment or counseling services?”

#### 4.3.3.7 Survey Questions and Corresponding Research Questions

Table 9 lists survey questions and the corresponding research question(s) they address. The responses provided to the survey questions were analyzed, the results reported, and the key findings discussed in later chapters of this dissertation.



Table 9. Survey questions and corresponding research questions

Research Questions	Survey Questions
<b>R1.</b> What are the attitudes and perceptions of African American women toward using mental health services?	Q11 through Q40
<b>R2.</b> What are the barriers to utilization of mental health services?	Q44
<b>R3.</b> Is the use of mobile technology acceptable to African American women, in terms of delivering mental health services and resources, and helping them manage anxiety and depression?	Q52 through Q58
<b>R4.</b> Which modalities are more acceptable than others (e.g., mobile app, video call, voice call, text messaging) to use to deliver mental health services and resources to African American women?	Q52 through Q58
<b>R5.</b> What user-centered recommendations should be addressed in a smartphone application designed to help African American women manage anxiety and depression?	Q62

#### 4.3.4 Statistical Analysis

##### 4.3.4.1 Quantitative Data Analysis

Similar to the preliminary study, descriptive statistics were calculated as means, standard deviations, and ranges for continuous variables, and as frequencies and percentages for categorical variables for sample characteristics and responses to questions about use of telehealth modalities (e.g., video call) to receive mental health services. As reported in the preliminary study, age was dichotomized into two groups (<50 years and  $\geq$ 50 years). Education was categorized into two levels (less than bachelor’s degree and bachelor’s degree or higher), and response options dichotomized as agreed (*agree/somewhat agree*) versus disagreed (*disagree/somewhat disagree*). Fisher’s exact test was used to: (1) determine whether an

association exists between the responses to questions about comfortability with using each telehealth modality to communicate with a professional to receive help for managing anxiety (agreed vs. disagreed), with each of age group and education level, respectively; (2) determine whether an association exists between the responses to questions about comfortability with using each telehealth modality to communicate with a professional to receive help for managing depression (agreed vs. disagreed), with age group and education level, respectively; and (3) test for association between agreement (agreed vs. disagreed) with comfortability, with perceived helpfulness of having the option to communicate with a professional via telehealth modalities to receive help for managing anxiety and depression, respectively. For this dissertation study, independent groups *t* tests were performed separately to assess group differences in mean scores for PHQ-9, GAD-7, psychological openness, help-seeking propensity, indifference to anxiety stigma, indifference to depression stigma, and IASMHS scores for anxiety and depression, respectively, between the groups of participants who agreed with use of various telehealth modalities to communicate with a professional to receive help to manage anxiety and depression, respectively, versus those who disagreed.

Furthermore, sensitivity analyses were performed using Fisher's exact and independent groups *t* tests. *Undecided* responses were combined with *disagree* and *somewhat disagree* responses to form a category for those who did not indicate agreement, and test whether the statistical significance changed when *undecided* responses are included. Fisher's exact test was used to: (1) determine whether an association exists between the responses to questions about comfortability with using each telehealth modality to communicate with a professional to receive help for managing anxiety (agreed vs. those who did not indicate agreement), with each of age group and education level, respectively; (2) determine whether an association exists between the

responses to questions about comfortability with using each telehealth modality to communicate with a professional to receive help for managing depression (agreed vs. those who did not indicate agreement), with each of age group and education level, respectively; and (3) test for association between agreement (agreed vs. those who did not indicate agreement) with comfortability, with perceived helpfulness of having the option to communicate with a professional via telehealth modalities to receive help for managing anxiety and depression, respectively.

For this dissertation study, independent groups *t* tests were performed separately to assess group differences in mean scores for PHQ-9, GAD-7, psychological openness, help-seeking propensity, indifference to anxiety stigma, indifference to depression stigma, and IASMHS scores for anxiety and depression, respectively, between the groups of participants who agreed with use of various telehealth modalities to communicate with a professional to receive help to manage anxiety and depression, respectively, versus those who did not indicate agreement. Statistical significance was determined at the 2-sided  $P < .05$  level for all tests. Statistical analyses were conducted using SPSS version 26 software.

#### 4.3.4.2 Qualitative Data Analysis

In addition, thematic analysis, a method for identifying, analyzing and reporting patterns (themes) within data (Braun & Clarke, 2006), was conducted on responses to the questions, “What are your concerns about using a [voice call/mobile app/video call] to receive mental health treatment or counseling?” and “What are your concerns about using text messaging to communicate with a professional about your mental health?” The responses were imported into NVivo 12 software for analysis. The data was categorized by reading through each response and coding the emerging themes. Responses were assigned as many themes as were pertinent.

## **4.4 Part II: Focus Groups**

### 4.4.1 Study Design and Recruitment

Focus groups were conducted to learn more about the attitudes and perceptions of African American women towards mental health and using mental health services, and to inform the design of an app tailored to help African American women manage anxiety and depression. The focus group sessions were held at a Durham County library (3 sessions) and at the University of North Carolina at Chapel Hill (1 session) in January 2020. Women (18 years or older) who identify as Black/African American (or multiracial, Black/African American and another race) and reside within the United States were eligible to participate, regardless of mental health history. Participants were recruited via the aforementioned survey, posts on social media (e.g., Facebook, Twitter), and flyers posted on community boards at local coffee shops, county libraries, churches, and college and university campuses in the Durham and Chapel Hill areas. See Appendix C for the focus group recruitment materials.

The sessions were held in private meeting rooms. A moderator (T.M.) conducted each session, and a notetaker was present to take notes on body language, non-verbal cues, emerging themes, etc. Focus group participants were required to sign a written consent form prior to participation. See Appendix D for the focus group consent form. Participants were advised that the session is confidential and that anything shared in the room should not be discussed outside of the session. Each participant received a \$25 Amazon gift card and an information sheet with mental health resources (e.g., therapist directory, Therapy for Black Girls podcast) to use personally or share with others. The sessions were audio recorded and transcribed for analysis. The moderator (T.M.) and notetaker debriefed after each session.

#### 4.4.2 Sample Size

Results from a study by Guest *et al* (2017) revealed that more than 80% of all themes are discoverable within two to three focus groups, and 90% of themes could be discovered within three to six focus groups. The ideal number of participants for a focus group is five to eight participants. A total of 20 women were recruited to participate in the focus groups. Four focus groups sessions were conducted. Each session was capped at five participants in order to allow for all participants to fully engage in the discussions.

#### 4.4.3 Interview Guide

The focus group interview guide was developed to help the moderator (T.M.) facilitate the discussions. After consulting with a qualitative data expert at the Odum Institute for Research in Social Science, the interview guide was revised to collect pertinent information within a session that lasts 1 hour to 1 hour 15 minutes. See Appendix E for the focus group interview guide. The first 25 minutes of the session was used to ask questions about the following topics:

- Past and current causes of stress, anxiety, and/or depression. Coping skills used.
- Attitudes and perceptions towards mental health and receiving mental health treatment.
- Time in their life they felt anxious or depressed, and what type of support and/or resources would have been helpful to have access to during that time.

The next 40 minutes of the session was used to ask questions about the following topics:

- Personal use of mobile technology.
- Barriers and facilitators for use of a smartphone app.

- Key topics that should be covered in the content of a smartphone application designed to help African American women manage anxiety and depression.
- Preferred resources and features.
- Concerns about use of the app.
- Promoting use of a mobile app for managing anxiety and depression.

The last 10 minutes of the session was used for:

- Notetaker comments/questions to group.
- Solicit written comments about session to give participants the opportunity to provide feedback, and express things they felt uncomfortable stating to the group.

#### 4.4.3.1 Focus Group Interview Questions and Corresponding Research Questions

Table 10 lists the focus group interview questions and the corresponding research question(s) they address. The responses provided by the group were analyzed, the results reported, and the key findings discussed in later chapters of this dissertation.

Table 10. Focus group interview questions and corresponding research questions

<b>Research Questions</b>	<b>Interview Questions</b>
<b>R1.</b> What are the attitudes and perceptions of African American women toward using mental health services?	Q8
<b>R2.</b> What are the barriers to utilization of mental health services?	Q8
<b>R5.</b> What user-centered recommendations should be addressed in a smartphone application designed to help African American women manage anxiety and depression?	Q11 through Q16

#### 4.4.4 Qualitative Data Analysis

The sessions were recorded using a Zoom H4N audio recorder. After each session, the audio file was downloaded and stored in a secure location. The waveform audio files (.wav) were uploaded to Rev.com for transcription, and the transcript was imported into NVivo 12 software for analysis.

Qualitative content analysis was conducted. “Qualitative content analysis is a dynamic form of analysis of verbal and visual data that is oriented toward summarizing the informational contents of that data” (Sandelowski, 2000). Furthermore, a pragmatic qualitative research approach was employed to offer a “comprehensive summary of events in the everyday terms of those events” (Sandelowski, 2000) for responses to questions that describe personal experiences or opinions. For example, a participant may describe a time in their life they felt depressed, and the event(s) that caused them to feel that way. Thematic analysis was conducted on responses to questions about preferences or concerns. For example, a participant may indicate that they have concerns about the confidentiality of using a mental health app to communicate with a professional.

### **4.5 Part III: Mobile App Development and Usability Testing**

#### 4.5.1 Mobile App Development

During the summer of 2018, I completed a rotation at the National Library of Medicine (Bethesda, MD). One of my projects for the summer was to create a wireframe for a mobile application (app) culturally-tailored to help African American women manage anxiety and depression. With guidance from my preceptors Drs. Paul Fontelo and Craig Locatis, I was able to

create a wireframe using Axure RP software. Ms. Fang Liu also assisted in the UX design, and began working on a version of the app for Android.

The student group, CS + Social Good (CS + SG) at UNC Chapel Hill, assisted with development of the app. CS + SG is a student led organization dedicated to “empowering nonprofits in our community by giving them technology to achieve their goals of social good.” Most of the members are Computer Science majors using their time and coding skills to help nonprofits. Each Fall and Spring semester, two projects are chosen for the students to work on pro bono. In March 2019, I learned that CS + SG accepted my proposal to develop the app during the Fall 2019 semester. A tech team was assigned to begin development of a prototype of the app.

For the purposes of this study, the app was only used as a tool to collect data on system usability and user satisfaction with an app developed to help African American women manage anxiety and depression. The goal is to gain a better understanding of the attitudinal and acceptability issues around the use of mobile technology for the delivery of mental health services and resources to this population. Insights on design challenges or special considerations for this population will be beneficial to future researchers.

#### 4.5.2 Study Design and Recruitment

Participants were recruited for a usability study to test and evaluate an app designed to help African American women manage anxiety and depression. In February and March 2020, individual usability testing sessions were held for each participant in the University of North Carolina at Chapel Hill School of Nursing’s Biobehavioral Lab (BBL). Women (18 years or older) who identify as Black/African American (or multiracial, Black/African American and



another race) and reside within the United States were eligible to participate, regardless of mental health history. Participants were recruited via posts on social media (e.g., Facebook, Twitter), a recruitment listing on Research for Me @UNC, and flyers posted on community boards at local coffee shops, county libraries, churches, and college and university campuses in the Durham and Chapel Hill areas. See Appendix F for the app usability testing recruitment materials.

The Principal Investigator (T.M.) was present to conduct the study, and a research associate assisted in setting up the lab for usability testing and recording observations. Usability testing participants were required to sign a written consent form prior to participation. Participants were advised that the study will last approximately 1 hour. See Appendix G for the app usability testing consent form. First, the participants received a brief overview of the study aims and a description of the Tobii software and eye tracking glasses. The Tobii Pro 2 glasses were calibrated for each participant prior to beginning usability testing.

Participants were provided with an Android mobile phone, assigned a persona (i.e., a fictional character created to represent a target user) and scenario (i.e., a fictitious story about a target user and their motivation for using the app), and asked to perform a series of four tasks in the app and think aloud as they completed them. In order to limit participant burden while testing most of the features of the app, there were two different personas and scenarios with four tasks each. Participants were either given scenario 1 or scenario 2. For scenario 1, the following tasks were completed in sequence on the Google Pixel 2: (1) find out your levels of anxiety for the past 6 weeks; (2) find information on how to manage anxiety; (3) add a new entry to your journal; and (4) locate a therapist to schedule an appointment. For scenario 2, the following tasks were completed in sequence on the Google Pixel 2: (1) find out your levels of depression

for the past 6 weeks; (2) find information on how to overcome depression; (3) create a self-care plan; and (4) locate a therapist to schedule an appointment. Participants did not enter any personal information into the app. The instructions for each task included dummy information for the participants to enter to complete the task. See Appendix H for the personas, scenarios, and tasks.

The Cognitive Walkthrough Method (Polson, Lewis, Rieman, & Wharton, 1992) was used to evaluate the user interface design on how well it supported users in learning to complete tasks. Specifically, this method was used to “evaluate the ease with which users can perform a task with little or no formal instruction or informal coaching” (Polson et al., 1992). Participants were told to speak aloud their thoughts and actions so that it can be recorded by the Tobii software. The PI read the persona and scenario to the participant. Then the PI read the first task, afterward instructing the participant to begin the task. This was repeated for tasks 2 through 4.

In the background, the Tobii software recorded video of the participant completing the tasks, including taps on the phone screen, eye movements, and the amount time spent on each task. The *Questionnaire for User Interface Satisfaction* (QUIS) (Chin, Diehl, & Norman, 1988) was self-administered after the usability testing was complete to collect data on system performance and the most positive and most negative aspects of the app. Participants received a \$25 Amazon gift card for their participation in the study.

#### 4.5.3 Sample Size

Findings from a notable study by Virzi (1992) show that 80% of usability problems are detected with four or five participants. A total of 15 women were recruited to participate in usability testing of the app. This provided a more than adequate study sample size.

#### 4.5.4 Measures

##### 4.5.4.1 Benchmarks for Cognitive Walkthrough Tasks

The PI created benchmarks; a list of actions that should be performed to most efficiently complete each task. Each task was divided into the steps that should be taken to complete the actions along the “happy path.” The benchmarks were used to evaluate the participant’s actions in completing the tasks. See Appendix I for the benchmarks for each task.

##### 4.5.4.2 The Questionnaire for User Interface Satisfaction

After usability testing was complete, each participant was given a hardcopy of an adapted version of *Questionnaire for User Interface Satisfaction (QUIS)* (Chin, Diehl, & Norman, 1988) to complete. In the QUIS the words “system” and “computer” were replaced with “app” in sections of the instrument. The QUIS “measures the user’s subjective rating of the human-computer interface” (Chin, Diehl, & Norman, 1988). The domains of the QUIS cover overall reaction to the software, information representation, language clarity, ease of use, and system functionality. Response options for each question were displayed on a bipolar Likert scale from low to high satisfaction (score of 0 to 9). All of the 27 quantitative questions were weighted equally. Participants were informed to select “N/A” for survey items that were not applicable. The questionnaire also included two qualitative questions which asked participants to list the most positive and negative aspects of the app. See Appendix J for the adapted QUIS.

##### 4.5.4.3 Usability Testing Questions and Corresponding Research Questions

Table 11 lists the usability testing questions and the corresponding research question(s) they address. The responses were analyzed, the results reported, and the key findings discussed in later chapters of this dissertation.

Table 11. Usability testing questions and corresponding research question

<b>Research Questions</b>	<b>Interview Questions</b>
<b>R5.</b> What user-centered recommendations should be addressed in a smartphone application designed to help African American women manage anxiety and depression?	Q28 and Q29

#### 4.5.5 Statistical Analysis

##### 4.5.5.1 Quantitative Data Analysis

Descriptive statistics were calculated as means, standard deviations, and ranges for continuous variables, and as frequencies and percentages for categorical variables for sample characteristics. To measure efficiency, mean, standard deviation, and range was calculated for time to complete each task, and the number of taps required to complete each task. To measure user interface satisfaction, means, standard deviations, and ranges for scores in each QUIS domain was calculated. Statistical analyses were conducted using SPSS version 26 software.

##### 4.5.5.2 Qualitative Data Analysis

The results of the cognitive walkthrough sessions were summarized. Tobii eye tracking software was used to create heat maps. Heat maps were created to reveal the focus of visual attention on the screens.

Furthermore, the most positive and negative aspects of the app reported in the QUIS were summarized. Specifically, common issues with the app that were identified were discussed. In addition, positive aspects of the app were highlighted.

## CHAPTER 5: RESULTS

### Introduction

The chapter presents the results of the survey, focus groups, and usability testing. This mixed methods approach was designed to comprehensively examine the attitudes and perceptions of African American women towards using mental health services, and the feasibility of using mobile technology to deliver mental health services and resources. User-centered recommendations for the design of a mental health app culturally-tailored to help African American women manage anxiety and depression are given.

### 5.1 Part I: Survey

#### 5.1.1 Sociodemographic Characteristics

The sociodemographic characteristics of the survey respondents are summarized in Table 12. Three hundred ninety-five completed the survey out of the 491 respondents that started the survey (80.4% completion rate). Respondents ranged in age from 18 to 107 years (mean age of  $44.8 \pm SD 18.4$  years), and all identified as either Black/African American or multiracial (i.e. Black/African American and another race) and female. Most respondents (96.2%) identified as non-Hispanic. Furthermore, 79.0% obtained a bachelor's degree or higher. Annual household income was reported as less than \$50,000 for 40.3%, \$50,000 – \$100,000 for 34.9%, and more than \$100,000 for 23.8% of respondents. The majority (93.9%) indicated that they had health insurance.

### 5.1.2 Mobile Phone Use

Survey respondents' mobile phone use is summarized in Table 13. Most (99.0%) indicated that they have a mobile phone. Respondents that indicated that they did not own a mobile phone were not presented with questions on mobile phone usage. Approximately 98% reported use of text messaging, and 72.7% indicated texting four or more times per day. The majority of respondents (96.4%) indicated that they use mobile apps, and 73.4% indicated using a mobile app four or more times per day. Most (90.6%) indicated that their phone had video call capability. Respondents that indicated that their phone did not have video call capability were not presented with the frequency of use question. Approximately 80% reported use of video call, and 38.4% indicated using video call at least one time per week.

### 5.1.3 Anxiety and Depression Severity

Approximately, 29% of respondents reported being diagnosed with anxiety in the past. Questions from the Generalized Anxiety Disorder (GAD-7) were asked to screen for current presence and severity of anxiety. The sample percentages for anxiety severity by age group are displayed in Figure 12. The 25 to 34-year-old age group had the highest percentage of anxious individuals, reporting 15.3% of respondents with moderate and 20.4% of respondents with severe level of anxiety. Respondents in the 18 to 24-year-old age group had the next highest percentage of anxious individuals, reporting 18.6% of respondents with moderate and 15.3% of respondents with severe level of anxiety. The 35 to 44-year-old age group reported 6.5% of respondents with moderate and 8.7% of respondents with severe level of anxiety. The 45 to 54-year-old age group reported 6.9% of respondents with moderate and 3.4% of respondents with severe level of anxiety. The 55 to 64-year-old age group reported no respondents with moderate

or severe level of anxiety. Finally, the 65 and older age group reported 1.3% of respondents with moderate and no respondents with severe level of anxiety.

Similarly, 29.6% of respondents reported being diagnosed with depression in the past. Questions from the Patient Health Questionnaire (PHQ-9) were asked to screen for current presence and severity of depression. The sample percentages for depression severity by age group are displayed in Figure 13. The 25 to 34-year-old age group had the highest percentage of depressed individuals, reporting 17.3% of respondents with moderate, 17.3% of respondents with moderately severe, and 5.1% of respondents with severe level of depression. Respondents in the 18 to 24-year-old age group had the next highest percentage of depressed individuals, reporting 15.3% of respondents with moderate, 8.5% of respondents with moderately severe, and 8.5% of respondents with severe level of depression. The 35 to 44-year-old age group reported 10.9% of respondents with moderate, 2.2% of respondents with moderately severe, and 2.2% of respondents with severe level of depression. The 45 to 54-year-old age group reported 10.3% of respondents with moderate, 1.7% of respondents with moderately severe, and no respondents with severe level of depression. The 55 to 64-year-old age group reported 7.3% of respondents with moderate, and no respondents with moderately severe or severe level of depression. Finally, the 65 and older age group reported 2.5% of respondents with moderate, and no respondents with moderately severe or severe level of depression.

Table 12. Sociodemographic characteristics of the survey (N=395)

Age in years, mean (SD)	44.8 (18.4)
Age group in years, n (%)	
18-24	59 (14.9)
25-34	98 (24.8)
35-44	46 (11.6)
45-54	58 (14.7)
55-64	55 (13.9)
65 and older	79 (20.0)
Age group in years, n (%)	
Less than 50	232 (58.7)
50 or older	163 (41.3)
Race, n (%)	
Black or African American	377 (95.4)
Multiracial <sup>a</sup>	18 (4.6)
Ethnicity, n (%)	
Hispanic	15 (3.8)
Non-Hispanic	380 (96.2)
Education, n (%)	
High school diploma or GED	13 (3.3)
Some college, less than 4-year degree	70 (17.7)
Bachelor's degree or higher	312 (79.0)
Education, n (%)	
Less than bachelor's degree	83 (21.0)
Bachelor's degree or higher	312 (79.0)
Income <sup>b</sup> , n (%)	
Less than \$10,000	30 (7.6)
\$10,000 – 24,999	37 (9.4)
\$25,000 – 49,999	92 (23.3)
\$50,000 – 100,000	138 (34.9)
More than \$100,000	94 (23.8)
Health Insurance <sup>c</sup> , n (%)	
Yes	371 (93.9)
No	23 (5.8)

<sup>a</sup>Multiracial defined as identifying as Black or African American and at least one other race. <sup>b</sup>Total N less than 395 and percentages may not sum to 100% because of item missingness (n=4) and rounding. <sup>c</sup>Total N less than 395 and percentages may not sum to 100% because of item missingness (n=1) and rounding.



Table 13. Mobile phone use (N=395)

Mobile phone ownership, n (%)	
Yes	391 (99.0)
No	4 (1.0)
Frequency of sending text messages <sup>a</sup> , n (%)	
Never	3 (0.8)
Less than 1 time per week	9 (2.3)
1-6 times per week	36 (9.1)
1-3 times per day	56 (14.2)
4 or more times per day	287 (72.7)
Frequency of accessing mobile apps <sup>a</sup> , n (%)	
Never	10 (2.5)
Less than 1 time per week	16 (4.1)
1-6 times per week	29 (7.3)
1-3 times per day	46 (11.6)
4 or more times per day	290 (73.4)
Mobile phone video call capability <sup>a</sup> , n (%)	
Yes	358 (90.6)
No	33 (8.4)
Frequency of video call use <sup>a,b</sup> , n (%)	
Never	40 (10.1)
Less than 1 time per week	166 (42.0)
1-6 times per week	98 (24.8)
1-3 times per day	27 (6.8)
4 or more times per day	27 (6.8)

<sup>a</sup>Participants that indicated that they did not own a mobile phone (n=4) were not presented with questions on mobile phone usage. <sup>b</sup>Participants that indicated that their phone did not have video call capability (n=33) were not presented with the frequency of use question.

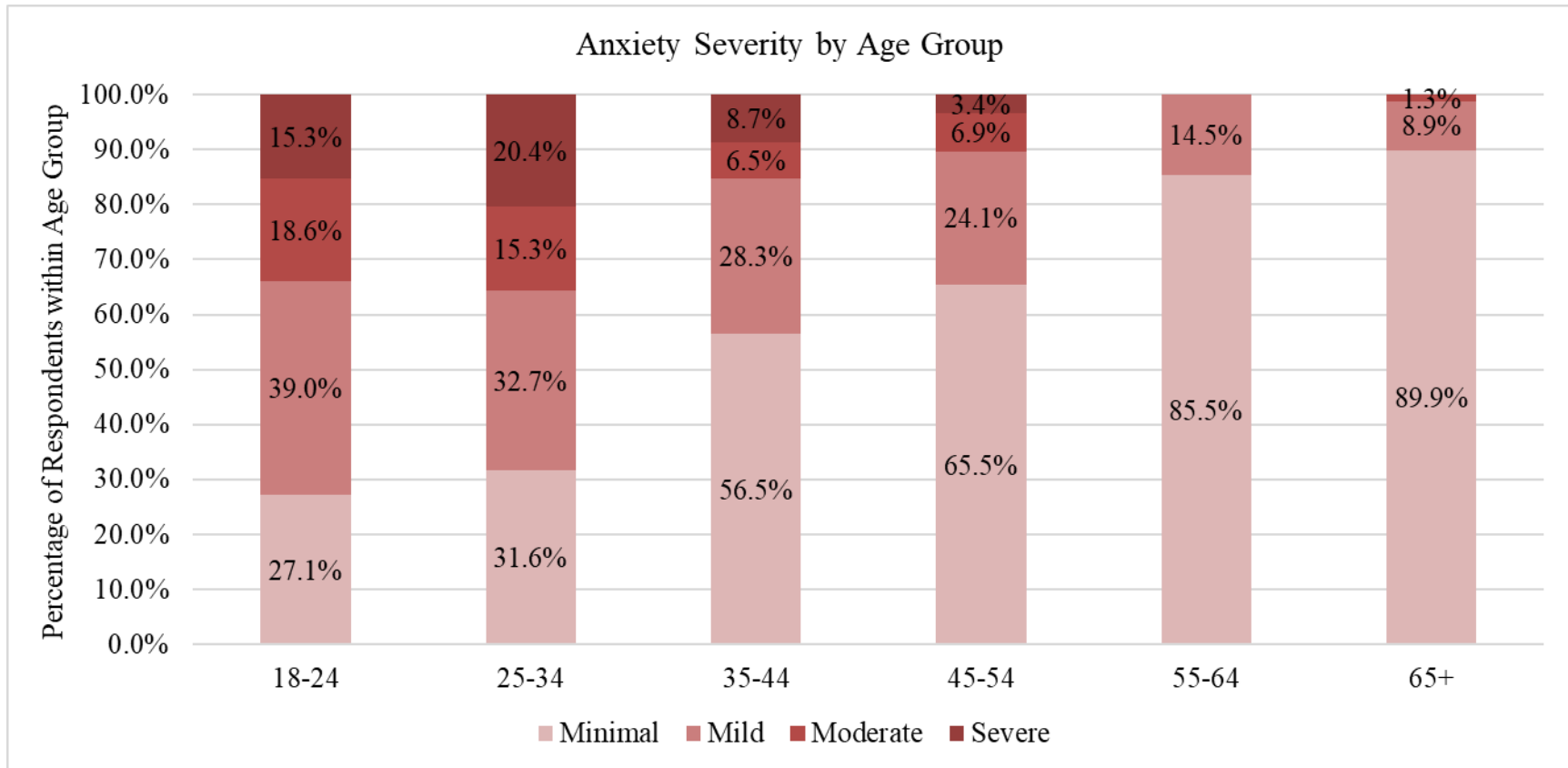


Figure 12. Sample percentages for **anxiety severity** by age group

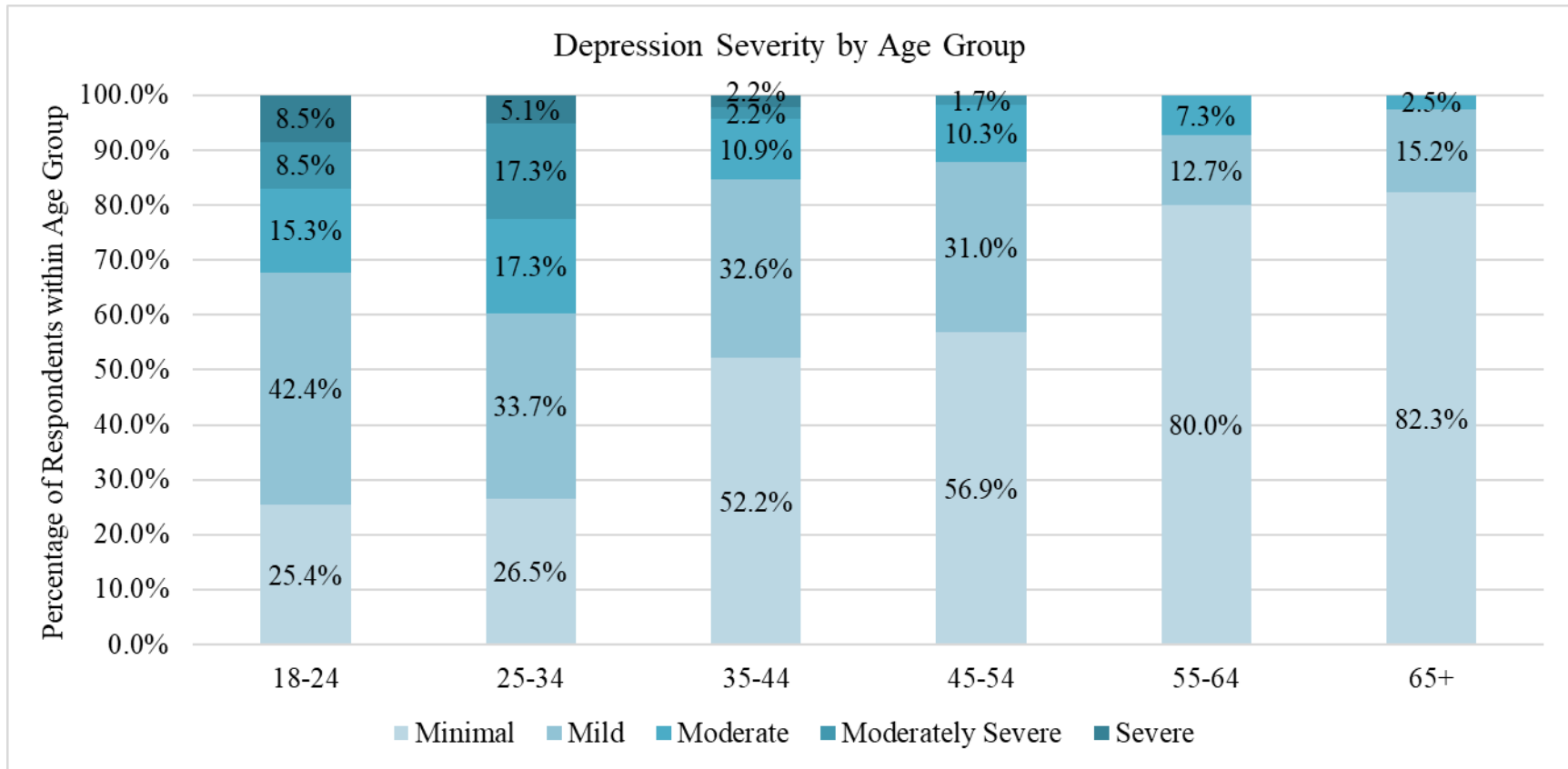


Figure 13. Sample percentages for **depression severity** by age group

#### 5.1.4 Barriers to Receiving Mental Health Care

Approximately 40% of respondents (n= 159) answered “Yes” to the question, “During the past 12 months, was there any time when you needed mental health treatment or counseling for yourself but didn’t get it?” Participants were permitted to select all responses that apply. A total of 304 responses were selected, however only the top 10 reasons are presented in Table 14. Most of the responses identified the following barriers: 23% couldn’t afford the cost; 12% indicated that their health insurance does not pay enough for mental health treatment or counseling; 11% did not know where to go get services; 10% indicated lack of time; 7% indicated their health insurance does not cover any mental health treatment or counseling; 7% indicated they were concerned that getting mental health treatment or counseling might have a negative effect on their job; 6% were concerned that they might be committed to a psychiatric hospital or might have to take medicine; 5% indicated that it was hard to find a preferred provider (i.e., African American woman); 4% were concerned that the information they gave the counselor might not be kept confidential; and 2% simply decided not to seek mental health treatment or counseling.

Table 14. The top 10 reasons for not seeking mental health treatment or counseling when needed (N = 261 out of 304)

<b>Reasons*</b>	<b>n (%)</b>
1. You could not afford the cost	71 (23)
2. Your health insurance does not pay enough for mental health treatment or counseling	37 (12)
3. You did not know where to go to get services	32 (11)
4. Lack of time	30 (10)
5. Your health insurance does not cover any mental health treatment or counseling	20 (7)
6. You were concerned that getting mental health treatment or counseling might have a negative effect on your job	20 (7)
7. You were concerned that you might be committed to a psychiatric hospital or might have to take medicine	19 (6)
8. Hard to find preferred provider	14 (5)
9. You were concerned that the information you gave the counselor might not be kept confidential	11 (4)
10. Decided not to seek mental health treatment or counseling	7 (2)

\*A total of 304 responses were given, however only the most common reasons are presented in the table (n=261). Therefore, percentages will not sum to 100%. Participants were permitted to select all responses that apply.

### 5.1.5 The Acceptability of Mobile Phone Use for Mental Health Care

#### 5.1.5.1 Communicating with a Professional to Receive Help for Managing Anxiety

The results of the survey revealed that respondents were most comfortable with the use of a voice call, followed by video call, mobile app, and lastly text messaging to communicate with a professional to receive help to manage anxiety. Total percentages may not sum to 100% due to item missingness. Approximately 73% of respondents indicated agreement (46.6% agree and 26.1% somewhat agree), 6.3% were undecided, and 19.3% showed disagreement (14.2%

disagree and 5.1% somewhat disagree) with the use of a voice call to receive help for managing anxiety. Furthermore, 66.1% of respondents indicated agreement (41.3% agree and 24.8% somewhat agree), 8.9% were undecided, and 22.8% showed disagreement (15.2% disagree and 7.6% somewhat disagree) with the use of a video call to receive help for managing anxiety. Approximately 48% of respondents indicated agreement (28.6% agree and 19.2% somewhat agree), 17.7% were undecided, and 31.9% showed disagreement (25.8% disagree and 6.1% somewhat disagree) with the use of a mobile app to receive help for managing anxiety. Similarly, 46.3% of respondents indicated agreement (26.3% agree and 20.0% somewhat agree), 10.4% were undecided, and 41.5% showed disagreement (33.7% disagree and 7.8% somewhat disagree) with the use of text messaging to receive help for managing anxiety. See Figure 14.

Approximately 72% of respondents agreed (46.8% agree and 25.1% somewhat agree) that having the option to use voice call to communicate with a professional if they are dealing with anxiety would be helpful. Furthermore, 68.4% of respondents agreed (46.1% agree and 22.3% somewhat agree) that a video call option would be helpful, 49.1% agreed (31.1% agree and 18.0% somewhat agree) that a mobile app option would be helpful, and 49.6% agreed (31.1% agree and 18.5% somewhat agree) that a text messaging option would be helpful. See Figure 15. Statistically significant associations were found between agreement with comfortability (agree/somewhat agree) and perceived helpfulness with having the option to communicate with a professional through text messaging (96.6% of respondents that agreed they would be comfortable using text messaging also agreed that it would be helpful to have the option to use,  $P < .001$ ), voice call (94.2% agreed both comfortable and helpful,  $P < .001$ ), mobile app (92.7% agreed both comfortable and helpful,  $P < .001$ ), and video call (96.0% agreed both comfortable and helpful,  $P < .001$ ) for managing anxiety.

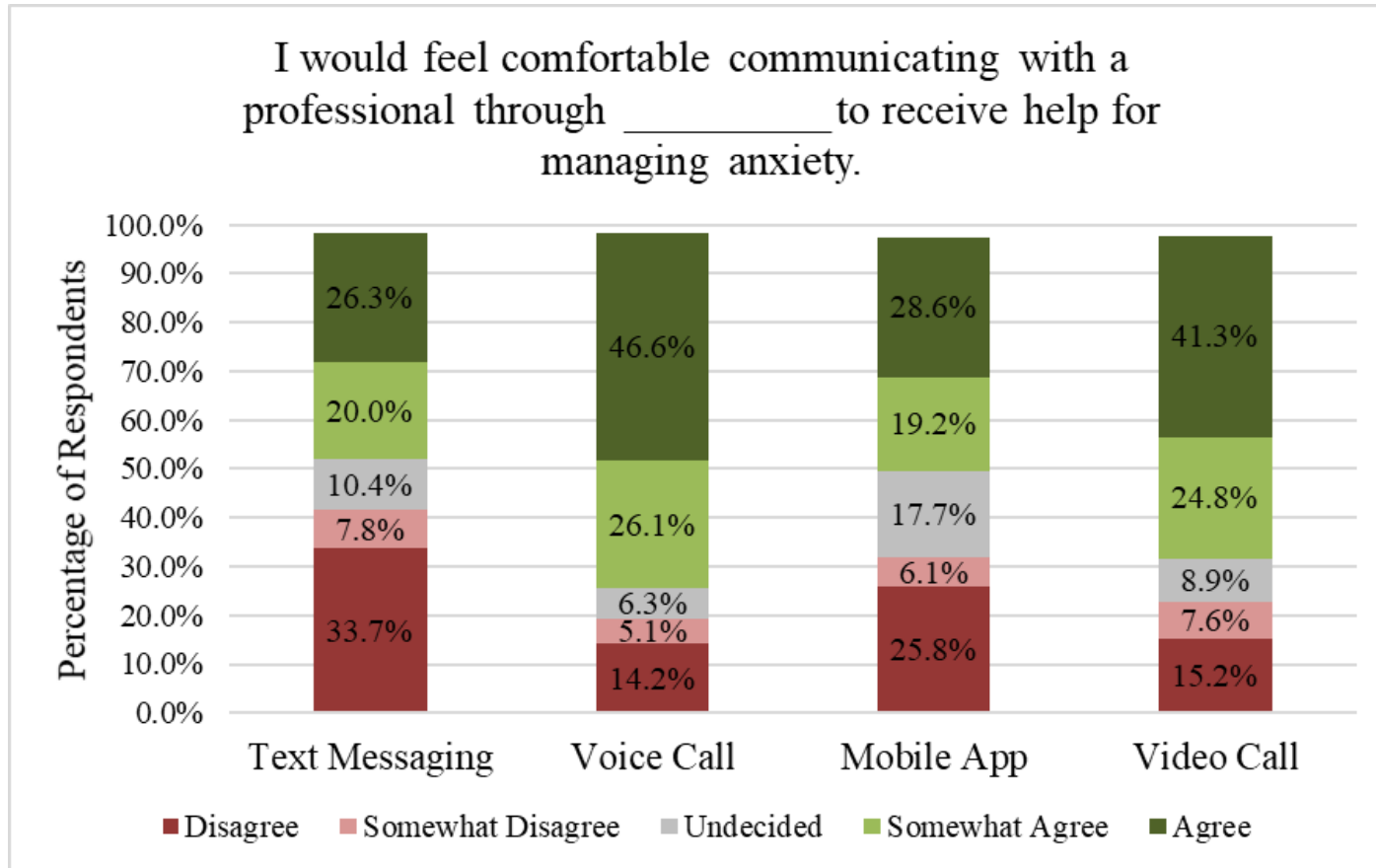


Figure 14. Sample percentages, by modality, for response to the statement, “I would feel comfortable communicating with a professional through [modality] to receive help for managing **anxiety**”

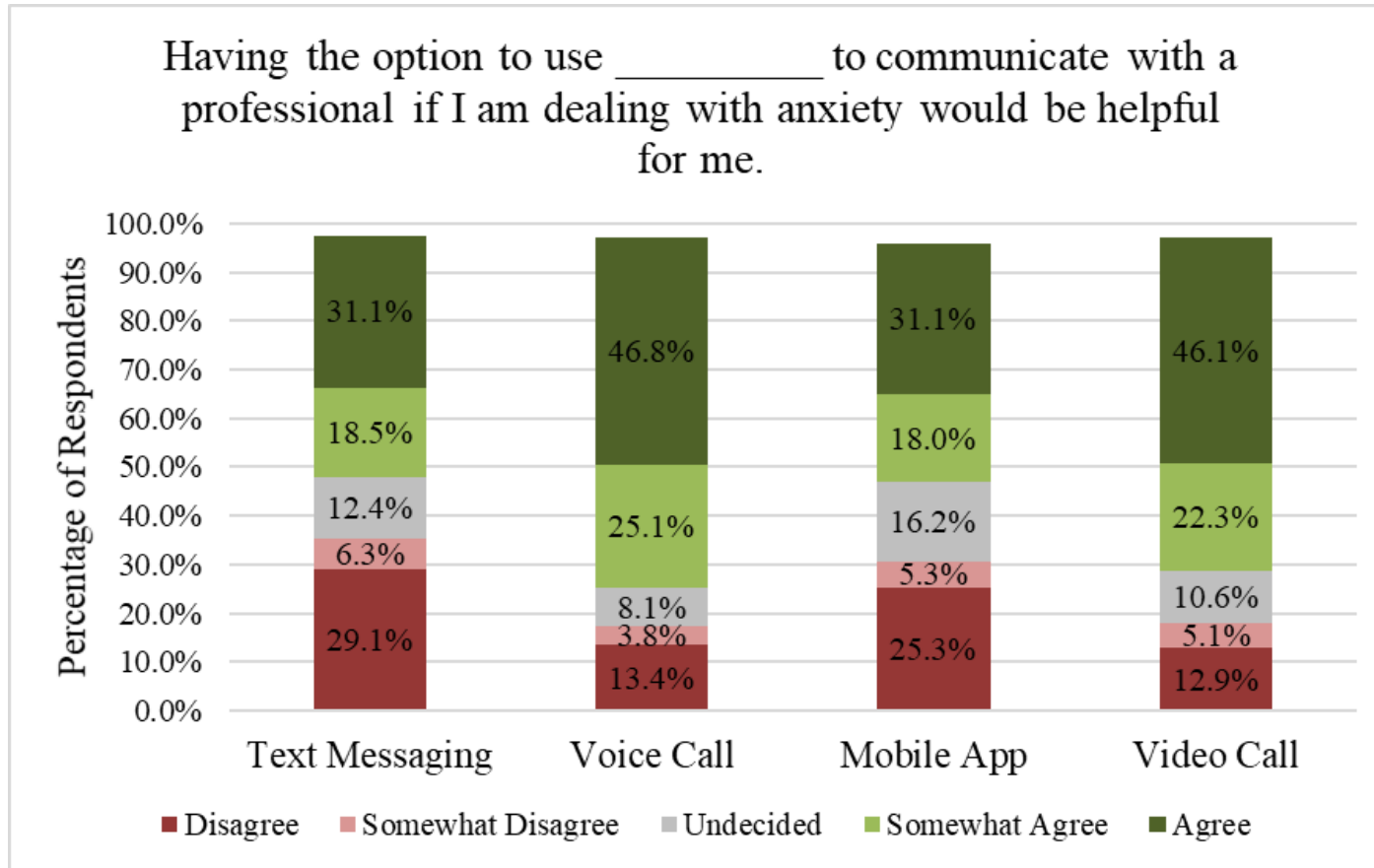


Figure 15. Sample percentages, by modality, for response to the statement, “Having the option to use [modality] to communicate with a professional if I am dealing with **anxiety** would be helpful for me”



Statistically significant associations were found between age (less than 50 years old vs. 50+) and agreement (agree/somewhat agree) with the use of text messaging (55.2% agreed vs. 33.7% agreed, respectively,  $P < .001$ ), mobile app (58.2% agreed vs. 33.1% agreed, respectively,  $P < .001$ ), and video call (74.1% agreed vs. 54.6% agreed, respectively,  $P = .001$ ) to communicate with a professional to receive help for managing anxiety. No statistically significant association was found between age (less than 50 years old vs. 50+) and agreement (agree/somewhat agree) with the use of voice call to communicate with a professional to receive help for managing anxiety (76.3% agreed vs. 67.5% agreed, respectively,  $P = .188$ ). See Table 15. Furthermore, no statistically significant associations were found between education (less than Bachelors vs. Bachelors degree or higher) and agreement (agree/somewhat agree) with the use of text messaging (54.2% agreed vs. 44.2% agreed, respectively,  $P = .148$ ), voice call (71.1% agreed vs. 73.1% agreed, respectively,  $P = 1.000$ ), mobile app (56.6% agreed vs. 45.5% agreed, respectively,  $P = .094$ ), and video call (61.4% agreed vs. 67.3% agreed, respectively,  $P = .452$ ) to communicate with a professional to receive help for managing anxiety. See Table 16.

Furthermore, sensitivity analyses were performed using Fisher's exact tests. *Undecided* responses were combined with disagree and somewhat disagree responses to form a category for those who did not indicate agreement, and to determine whether the statistical significance changed when undecided responses are included. All sensitivity analysis results were supportive of the main findings. See Appendix K for results of the sensitivity analyses.

Table 15. Agreement with use of modality to communicate with a professional to receive help for managing **anxiety by age group**

¥Modality	Less than 50 yrs old (N = 232)		50 years and older (N = 163)		Fisher's exact p-value
	Agree N (%)	Disagree N (%)	Agree N (%)	Disagree N (%)	
Text messaging	128 (55.2)	76 (32.8)	55 (33.7)	88 (54.0)	< .001**
Voice call	177 (76.3)	40 (17.2)	110 (67.5)	36 (22.1)	.188
Mobile app	135 (58.2)	57 (24.6)	54 (33.1)	69 (42.3)	< .001**
Video call	172 (74.1)	41 (17.7)	89 (54.6)	49 (30.1)	.001*

¥Total N less than 395 and percentages may not sum to 100% due to exclusion of “Undecided” responses or item missingness. \*Denotes statistical significance, P<.05. \*\*Denotes statistical significance, P<.001.

∞

Table 16. Agreement with use of modality to communicate with a professional to receive help for managing **anxiety by education**

¥Modality	Less than bachelor's degree (N =83)		Bachelor's degree or higher (N = 312)		Fisher's exact p-value
	Agree N (%)	Disagree N (%)	Agree N (%)	Disagree N (%)	
Text messaging	45 (54.2)	29 (34.9)	138 (44.2)	135 (43.3)	.148
Voice call	59 (71.1)	16 (19.3)	228 (73.1)	60 (19.2)	1.00
Mobile app	47 (56.6)	21 (25.3)	142 (45.5)	105 (33.7)	.094
Video call	51 (61.4)	21 (25.3)	210 (67.3)	69 (22.1)	.452

¥Total N less than 395 and percentages may not sum to 100% due to exclusion of “Undecided” responses or item missingness.

### 5.1.5.2 Communicating with a Professional to Receive Help for Managing Depression

The results of the survey revealed that respondents were most comfortable with the use of a voice call, followed by video call, mobile app, and text messaging to communicate with a professional to receive help to manage depression. Total percentages may not sum to 100% due to item missingness. Approximately 70% of respondents indicated agreement (44.3% agree and 25.6% somewhat agree), 5.6% were undecided, and 23.1% showed disagreement (16.5% disagree and 6.6% somewhat disagree) with the use of a voice call to receive help for managing depression. Furthermore, 64.3% of respondents indicated agreement (41.8% agree and 22.5% somewhat agree), 9.4% were undecided, and 24.3% showed disagreement (18.2% disagree and 6.1% somewhat disagree) with the use of a video call to receive help for managing depression. Approximately 45% of respondents indicated agreement (28.1% agree and 17.0% somewhat agree), 15.2% were undecided, and 37.2% showed disagreement (30.4% disagree and 6.8% somewhat disagree) with the use of a mobile app to receive help for managing depression. Similarly, 45.1% of respondents indicated agreement (27.6% agree and 17.5% somewhat agree), 8.6% were undecided, and 44.3% showed disagreement (37.2% disagree and 7.1% somewhat disagree) with the use of text messaging to receive help for managing depression. See Figure 16.

Approximately 71% of respondents agreed (46.1% agree and 25.1% somewhat agree) that having the option to use voice call to communicate with a professional if they are dealing with depression would be helpful. Furthermore, 68.4% of respondents agreed (47.1% agree and 21.3% somewhat agree) that a video call option would be helpful, 48.9% agreed (32.2% agree and 16.7% somewhat agree) that a text messaging option would be helpful, and 47.4% agreed (30.4% agree and 17.0% somewhat agree) that a mobile app option would be helpful. See Figure 17. Statistically significant associations were found between agreement with comfortability

(agree/somewhat agree) and perceived helpfulness with having the option to communicate with a professional through text messaging (97.1% agreed both comfortable and helpful,  $P < .001$ ), voice call (96.3% agreed both comfortable and helpful,  $P < .001$ ), mobile app (95.2% agreed both comfortable and helpful,  $P < .001$ ), and video call (97.1% agreed both comfortable and helpful,  $P < .001$ ) to receive help for managing depression.

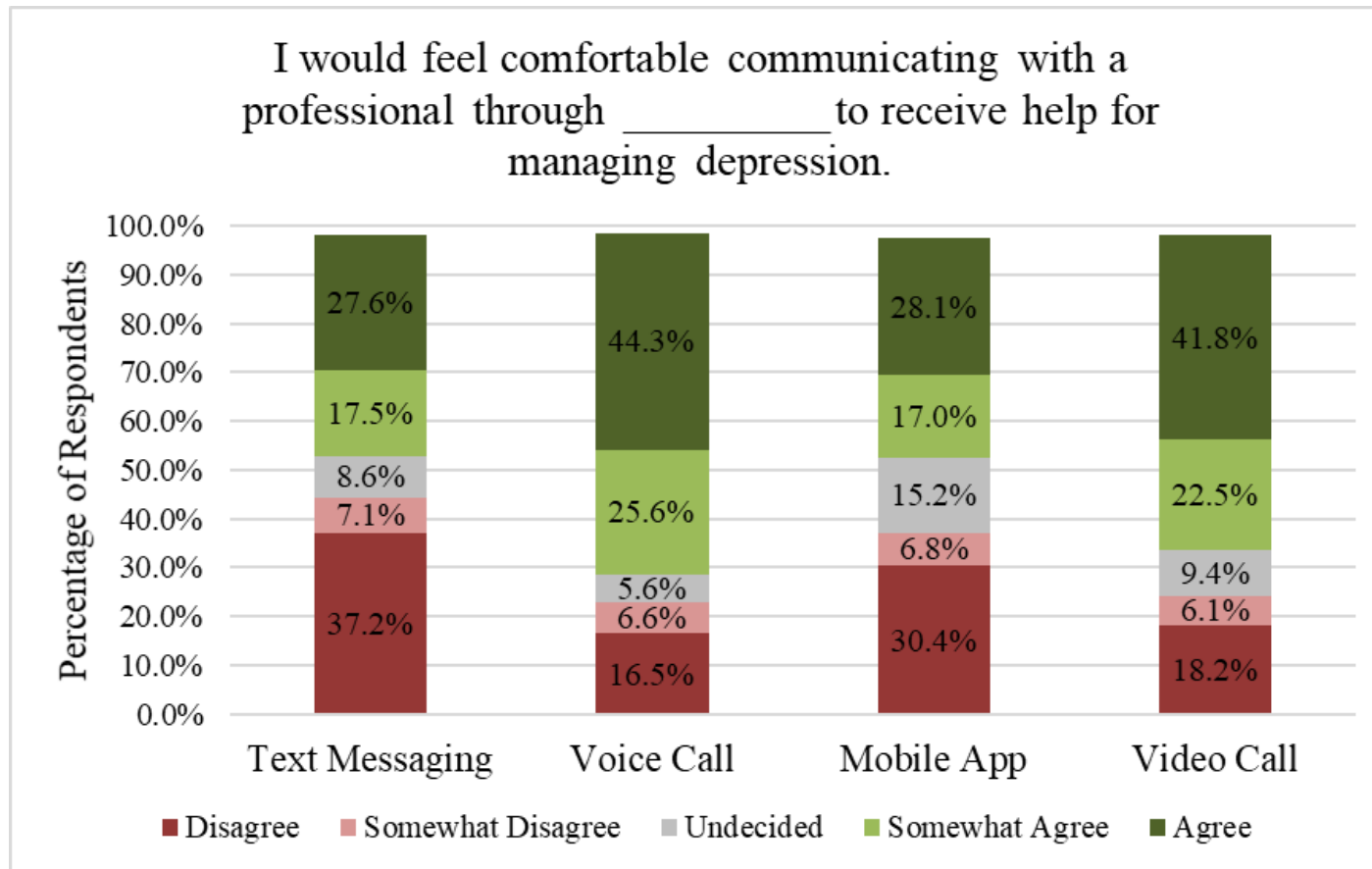


Figure 16. Sample percentages, by modality, for response to the statement, “I would feel comfortable communicating with a professional through [modality] to receive help for managing **depression**”

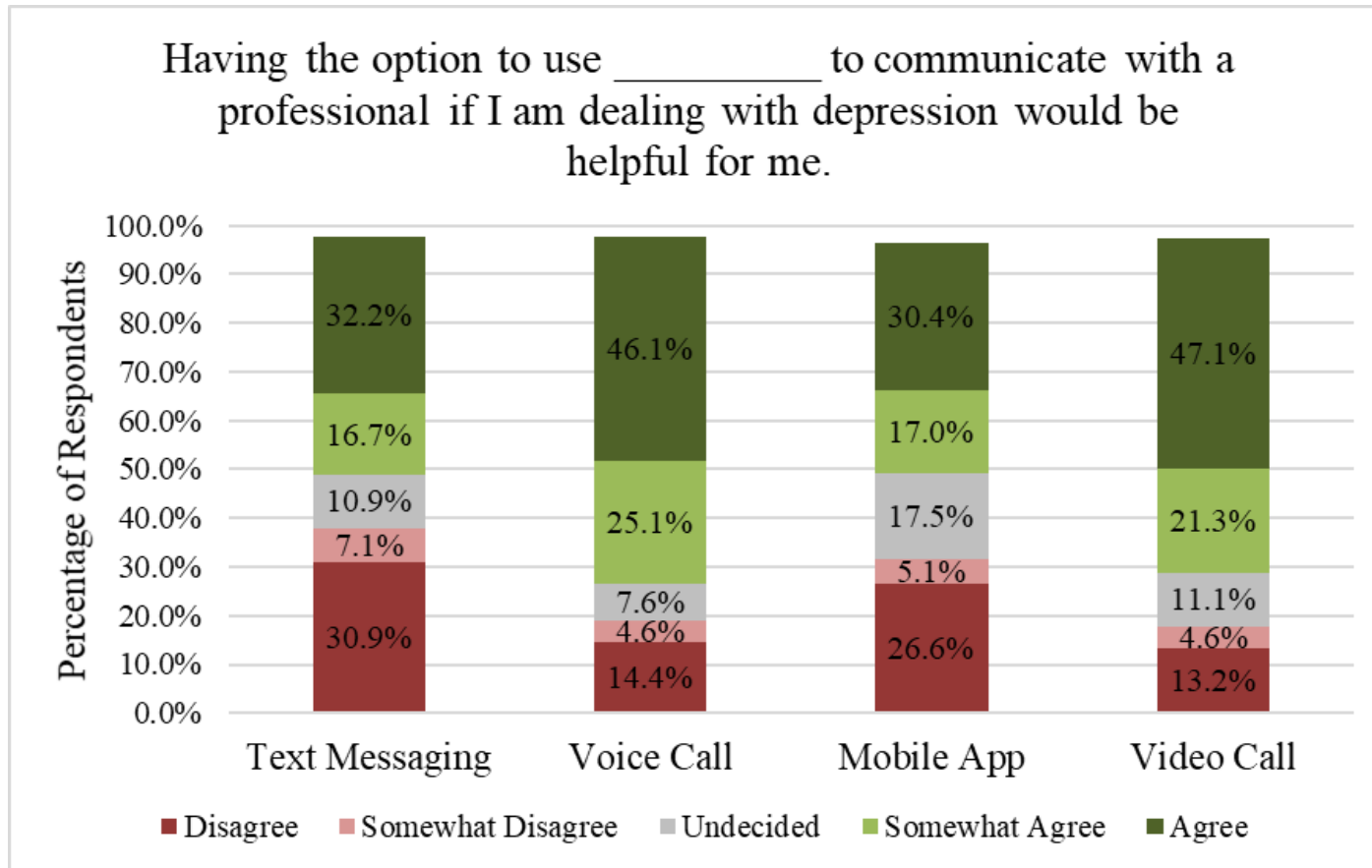


Figure 17. Sample percentages, by modality, for response to the statement, “Having the option to use [modality] to communicate with a professional if I am dealing with **depression** would be helpful for me”

Statistically significant associations were found between age (less than 50 years old vs. 50+) and agreement (agree/somewhat agree) with the use of text messaging (53.9% agreed vs. 32.5% agreed, respectively,  $P < .001$ ), voice call (75.0% agreed vs. 62.6% agreed, respectively,  $P = .037$ ), mobile app (56.5% agreed vs. 28.8% agreed, respectively,  $P < .001$ ), and video call (72.4% agreed vs. 52.8% agreed, respectively,  $P = .002$ ) to communicate with a professional to receive help for managing depression. See Table 17. Furthermore, statistically significant associations were found between education (less than Bachelors vs. Bachelors degree or higher) and agreement (agree/somewhat agree) with the use of text messaging to communicate with a professional to receive help for managing depression (55.4% agreed vs. 42.3% agreed, respectively,  $P = .026$ ). No statistically significant associations were found between education (less than Bachelors vs. Bachelors degree or higher) and agreement (agree/somewhat agree) with the use of voice call (69.9% agreed vs. 69.9%, respectively,  $P = .882$ ), mobile app (54.2% agreed vs. 42.6% agreed, respectively,  $P = .057$ ), and video call (62.7% agreed vs. 64.7% agreed, respectively,  $P = .770$ ) to communicate with a professional to receive help for managing depression. See Table 18.

Furthermore, sensitivity analyses were performed using Fisher's exact tests. *Undecided* responses were combined with disagree and somewhat disagree responses to form a category for those who did not indicate agreement, and test whether the statistical significance changed when undecided responses are included. All sensitivity analysis results were supportive except for the following case: Statistically significant associations were found between education (less than Bachelors vs. Bachelors degree or higher) and agreement (agree/somewhat agree) with the use of mobile app (54.2% agreed vs. 42.6% agreed, respectively,  $P = .045$ ) to communicate with a professional to receive help for managing depression. Primary results show  $P > .05$  and sensitivity

analysis results have  $P < .05$  when the *Undecided* responses were added. However, there is only a slight difference in P-values (.057 vs. .045). See Appendix L for results of the sensitivity analyses.

#### 5.1.5.3 Noteworthy Findings

Although the following findings were not statistically significant, they are noteworthy:

- Association between education (less than Bachelors vs. Bachelors degree or higher) and agreement (agree/somewhat agree) with the use of mobile app (56.6% agreed vs. 45.5% agreed, respectively,  $P = .094$ ) to communicate with a professional to receive help for managing anxiety.
- Association between education (less than Bachelors vs. Bachelors degree or higher) and agreement (agree/somewhat agree) with the use of mobile app (54.2% agreed vs. 42.6% agreed, respectively,  $P = .057$ ) to communicate with a professional to receive help for managing depression.
- Association between education (less than Bachelors vs. Bachelors degree or higher) and concerns (selected “Yes” to concerns) with the use of mobile app (51.8% vs. 63.5%, respectively,  $P = .058$ ) to receive mental health treatment or counseling.



Table 17. Agreement with use of modality to communicate with a professional to receive help for managing **depression by age group**

‡Modality	Less than 50 yrs old (N = 232)		50 years and older (N = 163)		Fisher's exact p-value
	Agree N (%)	Disagree N (%)	Agree N (%)	Disagree N (%)	
Text messaging	125 (53.9)	86 (37.1)	53 (32.5)	89 (54.6)	< .001**
Voice call	174 (75.0)	46 (19.8)	102 (62.6)	45 (27.6)	.037*
Mobile app	131 (56.5)	68 (29.3)	47 (28.8)	79 (48.5)	< .001**
Video call	168 (72.4)	46 (19.8)	86 (52.8)	50 (30.7)	.002*

‡Total N less than 395 and percentages may not sum to 100% due to exclusion of “Undecided” responses or item missingness. \*Denotes statistical significance, P<.05. \*\*Denotes statistical significance, P<.001.

§

Table 18. Agreement with use of modality to communicate with a professional to receive help for managing **depression by education**

‡Modality	Less than bachelor's degree (N =83)		Bachelor's degree or higher (N = 312)		Fisher's exact p-value
	Agree N (%)	Disagree N (%)	Agree N (%)	Disagree N (%)	
Text messaging	46 (55.4)	28 (33.7)	132 (42.3)	147 (47.1)	.026*
Voice call	58 (69.9)	18 (21.7)	218 (69.9)	73 (23.4)	.882
Mobile app	45 (54.2)	24 (28.9)	133 (42.6)	123 (39.4)	.057
Video call	52 (62.7)	21 (25.3)	202 (64.7)	75 (24.0)	.770

‡Total N less than 395 and percentages may not sum to 100% due to exclusion of “Undecided” responses or item missingness. \*Denotes statistical significance, P<.05.

### 5.1.6 Attitudes Toward Seeking Mental Health Services

The study participants held favorable views toward seeking mental health services. Higher scores indicated more positive attitudes toward seeking professional psychological help (range from 0 to 32). The mean score for psychological openness was 23.53 (SD 5.52), and the mean score for help-seeking propensity was 25.91 (SD 5.53). The indifference to stigma questions were adapted to collect data on indifference to anxiety stigma and depression stigma, respectively. The mean score for indifference to anxiety stigma was 25.27 (SD 5.97), and the mean score for indifference to depression stigma was 24.50 (SD 6.56).

### 5.1.7 Anxiety, Depression, and Attitudes Toward Seeking Help by Agreement with Modality

#### 5.1.7.1 Anxiety and Attitudes Toward Seeking Help by Agreement with Modality

The results of the study showed statistically significant differences between group mean scores for GAD-7 ( $5.98 \pm \text{SD } 5.72$  vs.  $3.74 \pm \text{SD } 4.83$ , respectively,  $P < .001$ ) and indifference to anxiety stigma ( $24.46 \pm 6.44$  vs.  $26.35 \pm 5.39$ , respectively,  $P = .003$ ) between the participants who agreed (agree/somewhat agree) with the use of text messaging to communicate with a professional to receive help to manage anxiety and those who disagreed (disagree/somewhat disagree). No statistically significant differences were found between group mean scores for psychological openness ( $23.27 \pm 5.71$  vs.  $24.07 \pm 5.29$ , respectively,  $P = .180$ ), help-seeking propensity ( $25.97 \pm 5.09$  vs.  $26.02 \pm 5.96$ , respectively,  $P = .932$ ), and IASMHS total score ( $73.68 \pm 13.96$  vs.  $76.29 \pm 13.26$ , respectively,  $P = .077$ ) between the participants who agreed with the use of text messaging to communicate with a professional to receive help to manage anxiety and those who disagreed. See Table 19. Likewise, no statistically significant differences were found between group mean scores for GAD-7 ( $4.85 \pm 5.28$  vs.  $5.11 \pm 5.55$ , respectively,  $P = .719$ ),

psychological openness ( $23.54 \pm 5.54$  vs.  $23.61 \pm 5.65$ , respectively,  $P=.916$ ), help-seeking propensity ( $26.19 \pm 5.37$  vs.  $25.07 \pm 6.04$ , respectively,  $P=.146$ ), indifference to anxiety stigma ( $25.22 \pm 6.04$  vs.  $25.23 \pm 6.14$ , respectively,  $P=.991$ ), and IASMHS total score ( $74.89 \pm 13.62$  vs.  $73.72 \pm 14.42$ , respectively,  $P=.529$ ) between the participants who agreed with the use of voice call to communicate with a professional to receive help to manage anxiety and those who disagreed. See Table 20.

Moreover, statistically significant differences were found between group mean scores for GAD-7 ( $5.78 \pm 5.58$  vs.  $4.46 \pm 5.36$ , respectively,  $P=.036$ ) between the participants who agreed with the use of mobile app to communicate with a professional to receive help to manage anxiety and those who disagreed. However, no statistically significant differences were found between group mean scores for psychological openness ( $23.32 \pm 5.67$  vs.  $23.09 \pm 5.39$ , respectively,  $P=.718$ ), help-seeking propensity ( $25.72 \pm 5.78$  vs.  $25.83 \pm 5.52$ , respectively,  $P=.869$ ), indifference to anxiety stigma ( $24.75 \pm 6.37$  vs.  $25.70 \pm 5.52$ , respectively,  $P=.162$ ), and IASMHS total score ( $73.79 \pm 14.38$  vs.  $74.38 \pm 12.79$ , respectively,  $P=.706$ ) between the participants who agreed with the use of mobile app to communicate with a professional to receive help to manage anxiety and those who disagreed. See Table 21. Similarly, no statistically significant differences were found between group mean scores for GAD-7 ( $5.13 \pm 5.45$  vs.  $4.79 \pm 5.10$ , respectively,  $P=.591$ ), psychological openness ( $23.95 \pm 5.44$  vs.  $22.61 \pm 5.76$ , respectively,  $P=.055$ ), help-seeking propensity ( $26.23 \pm 5.23$  vs.  $24.86 \pm 6.37$ , respectively,  $P=.067$ ), indifference to anxiety stigma ( $25.34 \pm 5.96$  vs.  $24.91 \pm 6.36$ , respectively,  $P=.577$ ), and IASMHS total score ( $75.46 \pm 12.95$  vs.  $72.26 \pm 15.30$ , respectively,  $P=.080$ ) between the participants who agreed with the use of video call to communicate with a professional to receive help to manage anxiety and those who disagreed. See Table 22.

Furthermore, sensitivity analyses were performed using independent groups *t* tests. *Undecided* responses were combined with disagree and somewhat disagree responses to form a category for those who did not indicate agreement, and test whether the statistical significance changed when undecided responses are included. All sensitivity analysis results were supportive except for the following cases: Statistically significant differences were found between group mean scores for psychological openness ( $23.95 \pm 5.44$  vs.  $22.51 \pm 5.66$ , respectively,  $P=.019$ ), help-seeking propensity ( $26.23 \pm 5.23$  vs.  $24.98 \pm 6.11$ , respectively,  $P=.049$ ), and IASMHS total score ( $75.46 \pm 12.95$  vs.  $72.24 \pm 14.92$ , respectively,  $P=.041$ ) between the participants who agreed with the use of video call to communicate with a professional to receive help to manage anxiety and those who did not indicate agreement. Primary results show  $P>.05$  and sensitivity analysis results have  $P<.05$  when the *Undecided* responses were added. However, there was less than 1.0 difference between the means for those who disagreed and those who did not indicate agreement. See Appendix M for results of the sensitivity analyses.

#### 5.1.7.1.1 Noteworthy Findings

Although the following findings were not statistically significant, they are noteworthy:

- Differences between group mean scores for IASMHS total score ( $73.68 \pm 13.96$  vs.  $76.29 \pm 13.26$ , respectively,  $P=.077$ ) between the participants who agreed with the use of text messaging to communicate with a professional to receive help to manage anxiety and those who disagreed.
- Differences between group mean scores for psychological openness ( $23.95 \pm 5.44$  vs.  $22.61 \pm 5.76$ , respectively,  $P=.055$ ), help-seeking propensity ( $26.23 \pm 5.23$  vs.  $24.86 \pm 6.37$ , respectively,  $P=.067$ ), and IASMHS total score ( $75.46 \pm 12.95$  vs.  $72.26 \pm 15.30$ , respectively,  $P=.080$ ) between the participants who agreed with the

use of video call to communicate with a professional to receive help to manage anxiety and those who disagreed.

Table 19. Generalized Anxiety Disorder (GAD-7) and Inventory of Attitudes Toward Seeking Mental Health Services factor scores by agreement with using **text messaging** to communicate with a professional to receive help for managing **anxiety**.

¥Measure	Agree		Disagree		t	df	p-value
	N	Mean score (SD)	N	Mean score (SD)			
GAD-7	183	5.98 (5.72)	164	3.74 (4.83)	3.96	343.80	< .001**
Psychological openness	183	23.27 (5.71)	163	24.07 (5.29)	-1.34	343.45	.180
Help-seeking propensity	183	25.97 (5.09)	163	26.02 (5.96)	-.09	320.61	.932
Indifference to anxiety stigma	182	24.46 (6.44)	162	26.35 (5.39)	-2.95	340.68	.003*
IASMHS total	182	73.68 (13.96)	161	76.29 (13.26)	-1.78	339.26	.077

¥Total N less than 395 due to exclusion of “Undecided” responses or item missingness. \*Denotes statistical significance, P<.05. \*\*Denotes statistical significance, P<.001.

Table 20. Generalized Anxiety Disorder (GAD-7) and Inventory of Attitudes Toward Seeking Mental Health Services factor scores by agreement with using **voice call** to communicate with a professional to receive help for managing **anxiety**

¥Measure	Agree		Disagree		t	df	p-value
	N	Mean score (SD)	N	Mean score (SD)			
GAD-7	287	4.85 (5.28)	76	5.11 (5.55)	-.36	113.57	.719
Psychological openness	287	23.54 (5.54)	75	23.61 (5.65)	-.11	114.05	.916
Help-seeking propensity	287	26.19 (5.37)	75	25.07 (6.04)	1.46	106.55	.146
Indifference to anxiety stigma	285	25.22 (6.04)	75	25.23 (6.14)	-.01	114.55	.991
IASMHS total	285	74.89 (13.62)	74	73.72 (14.42)	.63	109.20	.529

¥Total N less than 395 due to exclusion of “Undecided” responses or item missingness.

Table 21. Generalized Anxiety Disorder (GAD-7) and Inventory of Attitudes Toward Seeking Mental Health Services factor scores by agreement with using **mobile app** to communicate with a professional to receive help for managing **anxiety**

¥Measure	Agree		Disagree		t	df	p-value
	N	Mean score (SD)	N	Mean score (SD)			
GAD-7	189	5.78 (5.58)	125	4.46 (5.36)	2.11	273.01	.036*
Psychological openness	189	23.32 (5.67)	125	23.09 (5.39)	.36	274.93	.718
Help-seeking propensity	189	25.72 (5.78)	125	25.83 (5.52)	-.17	273.81	.869
Indifference to anxiety stigma	189	24.75 (6.37)	123	25.70 (5.52)	-1.40	285.74	.162
IASMHS total	189	73.79 (14.38)	122	74.38 (12.79)	-.38	279.30	.706

¥Total N less than 395 due to exclusion of “Undecided” responses or item missingness. \*Denotes statistical significance, P<.05.



Table 22. Generalized Anxiety Disorder (GAD-7) and Inventory of Attitudes Toward Seeking Mental Health Services factor scores by agreement with using **video call** to communicate with a professional to receive help for managing **anxiety**

¥Measure	Agree		Disagree		t	df	p-value
	N	Mean score (SD)	N	Mean score (SD)			
GAD-7	260	5.13 (5.45)	90	4.79 (5.10)	.54	164.56	.591
Psychological openness	260	23.95 (5.44)	90	22.61 (5.76)	1.93	147.63	.055
Help-seeking propensity	260	26.23 (5.23)	90	24.86 (6.37)	1.85	132.81	.067
Indifference to anxiety stigma	259	25.34 (5.96)	89	24.91 (6.36)	.56	144.61	.577
IASMHS total	258	75.46 (12.95)	89	72.26 (15.30)	1.77	134.07	.080

¥Total N less than 395 due to exclusion of “Undecided” responses or item missingness.

#### 5.1.8.1 Depression and Attitudes Toward Seeking Help by Agreement with Modality

The results of the study showed statistically significant differences between group mean scores for PHQ-9 ( $6.69 \pm 6.08$  vs.  $4.97 \pm 5.02$ , respectively,  $P=.004$ ) between the participants who agreed with the use of text messaging to communicate with a professional to receive help to manage depression and those who disagreed. No statistically significant differences were found between group mean scores for psychological openness ( $23.16 \pm 5.73$  vs.  $24.07 \pm 5.16$ , respectively,  $P=.120$ ), help-seeking propensity ( $25.84 \pm 5.19$  vs.  $26.07 \pm 5.78$ , respectively,  $P=.693$ ), indifference to depression stigma ( $23.90 \pm 6.93$  vs.  $25.00 \pm 6.42$ , respectively,  $P=.124$ ), and IASMHS total score ( $72.88 \pm 14.49$  vs.  $75.03 \pm 13.77$ , respectively,  $P=.155$ ) between the participants who agreed with the use of text messaging to communicate with a professional to receive help to manage depression and those who disagreed. See Table 23. Statistically significant differences were found between group mean scores for help-seeking propensity ( $26.52 \pm 4.93$  vs.  $24.52 \pm 6.47$ , respectively,  $P=.008$ ) and IASMHS total score ( $74.88 \pm 13.47$  vs.  $71.15 \pm 15.87$ , respectively,  $P=.049$ ) between the participants who agreed with the use of voice call to communicate with a professional to receive help to manage depression and those who disagreed. However, no statistically significant differences were found between group mean scores for PHQ-9 ( $5.75 \pm 5.51$  vs.  $5.56 \pm 5.18$ , respectively,  $P=.761$ ), psychological openness ( $23.61 \pm 5.64$  vs.  $23.57 \pm 5.27$ , respectively,  $P=.953$ ), and indifference to depression stigma ( $24.76 \pm 6.30$  vs.  $23.32 \pm 7.61$ , respectively,  $P=.109$ ) between the participants who agreed with the use of voice call to communicate with a professional to receive help to manage depression and those who disagreed. See Table 24.

Moreover, statistically significant differences were found between group mean scores for PHQ-9 ( $6.97 \pm 6.25$  vs.  $4.88 \pm 4.72$ , respectively,  $P=.001$ ) between the participants who agreed

with the use of mobile app to communicate with a professional to receive help to manage depression and those who disagreed. No statistically significant differences were found between group mean scores for psychological openness ( $23.09 \pm 5.93$  vs.  $23.53 \pm 5.22$ , respectively,  $P=.474$ ), help-seeking propensity ( $25.86 \pm 5.56$  vs.  $25.57 \pm 5.80$ , respectively,  $P=.647$ ), indifference to depression stigma ( $24.37 \pm 6.69$  vs.  $24.58 \pm 6.37$ , respectively,  $P=.775$ ), and IASMHS total score ( $73.32 \pm 14.66$  vs.  $73.51 \pm 13.74$ , respectively,  $P=.905$ ) between the participants who agreed with the use of mobile app to communicate with a professional to receive help to manage depression and those who disagreed. See Table 25. Statistically significant differences were found between group mean scores for psychological openness ( $24.05 \pm 5.47$  vs.  $22.25 \pm 5.73$ , respectively,  $P=.009$ ), indifference to depression stigma ( $24.97 \pm 6.16$  vs.  $22.83 \pm 7.72$ , respectively,  $P=.017$ ) and IASMHS total score ( $75.22 \pm 13.29$  vs.  $69.84 \pm 16.03$ , respectively,  $P=.004$ ) between the participants who agreed with the use of video call to communicate with a professional to receive help to manage depression and those who disagreed. However, no statistically significant differences were found between group mean scores for PHQ-9 ( $6.00 \pm 5.59$  vs.  $5.80 \pm SD 5.54$ , respectively,  $P=.761$ ) and help-seeking propensity ( $26.26 \pm SD 5.24$  vs.  $24.88 \pm SD 6.35$ , respectively,  $P=.059$ ) between the participants who agreed with the use of video call to communicate with a professional to receive help to manage depression and those who disagreed. See Table 26.

Furthermore, sensitivity analyses were performed using independent groups *t* tests. *Undecided* responses were combined with disagree and somewhat disagree responses to form a category for those who did not indicate agreement, and test whether the statistical significance changed when undecided responses are included. All sensitivity analysis results were supportive. See Appendix N for results of the sensitivity analyses.

#### 5.1.8.1.1 Noteworthy Findings

Although the following findings did not achieve statistical significance, they are noteworthy:

- Differences between group mean scores for help-seeking propensity ( $26.26 \pm 5.24$  vs.  $24.88 \pm 6.35$ , respectively,  $P=.059$ ) between the participants who agreed with the use of video call to communicate with a professional to receive help to manage depression and those who disagreed.

Table 23. Patient Health Questionnaire (PHQ-9) and Inventory of Attitudes Toward Seeking Mental Health Services factor scores by agreement with using **text messaging** to communicate with a professional to receive help for managing **depression**

¥Measure	Agree		Disagree		t	df	p-value
	N	Mean score (SD)	N	Mean score (SD)			
PHQ-9	176	6.69 (6.08)	174	4.97 (5.02)	2.89	337.39	.004*
Psychological openness	178	23.16 (5.73)	174	24.07 (5.16)	-1.56	347.74	.120
Help-seeking propensity	178	25.84 (5.19)	174	26.07 (5.78)	-.40	344.15	.693
Indifference to depression stigma	177	23.90 (6.93)	172	25.00 (6.42)	-1.54	346.20	.124
IASMHS total	177	72.88 (14.49)	172	75.03 (13.77)	-1.42	346.82	.155

¥Total N less than 395 due to exclusion of “Undecided” responses or item missingness. \*Denotes statistical significance, P<.05.

Table 24. Patient Health Questionnaire (PHQ-9) and Inventory of Attitudes Toward Seeking Mental Health Services factor scores by agreement with using **voice call** to communicate with a professional to receive help for managing **depression**

¥Measure	Agree		Disagree		t	df	p-value
	N	Mean score (SD)	N	Mean score (SD)			
PHQ-9	273	5.75 (5.51)	90	5.56 (5.18)	.31	160.57	.761
Psychological openness	276	23.61 (5.64)	90	23.57 (5.27)	.06	160.80	.953
Help-seeking propensity	276	26.52 (4.93)	90	24.52 (6.47)	2.69	124.43	.008*
Indifference to depression stigma	275	24.76 (6.30)	88	23.32 (7.61)	1.61	127.31	.109
IASMHS total	275	74.88 (13.47)	88	71.15 (15.87)	1.99	129.54	.049*

¥Total N less than 395 due to exclusion of “Undecided” responses or item missingness. \*Denotes statistical significance, P<.05.

Table 25. Patient Health Questionnaire (PHQ-9) and Inventory of Attitudes Toward Seeking Mental Health Services factor scores by agreement with using **mobile app** to communicate with a professional to receive help for managing **depression**

¥Measure	Agree		Disagree		t	df	p-value
	N	Mean score (SD)	N	Mean score (SD)			
PHQ-9	176	6.97 (6.25)	146	4.88 (4.72)	3.42	317.36	.001*
Psychological openness	178	23.09 (5.93)	146	23.53 (5.22)	-.72	320.38	.474
Help-seeking propensity	178	25.86 (5.56)	146	25.57 (5.80)	.46	304.30	.647
Indifference to depression stigma	178	24.37 (6.69)	143	24.58 (6.37)	-.29	309.88	.775
IASMHS total	178	73.32 (14.66)	143	73.51 (13.74)	-.12	311.49	.905

¥Total N less than 395 due to exclusion of “Undecided” responses or item missingness. \*Denotes statistical significance, P<.05.

Table 26. Patient Health Questionnaire (PHQ-9) and Inventory of Attitudes Toward Seeking Mental Health Services factor scores by agreement with using **video call** to communicate with a professional to receive help for managing **depression**

¥Measure	Agree		Disagree		t	df	p-value
	N	Mean score (SD)	N	Mean score (SD)			
PHQ-9	252	6.00 (5.59)	95	5.80 (5.54)	.31	170.42	.761
Psychological openness	253	24.05 (5.47)	96	22.25 (5.73)	2.65	164.82	.009*
Help-seeking propensity	253	26.26 (5.24)	96	24.88 (6.35)	1.90	146.75	.059
Indifference to depression stigma	251	24.97 (6.16)	95	22.83 (7.72)	2.42	141.65	.017*
IASMHS total	251	75.22 (13.29)	95	69.84 (16.03)	2.91	145.55	.004*

¥Total N less than 395 due to exclusion of “Undecided” responses or item missingness. \*Denotes statistical significance, P<.05.



### 5.1.8 Access and Convenience

The results of the study showed most participants agreed that use of mobile technology would increase access and convenience of receiving mental health services. Figure 18 shows that 80.3% of respondents selected “Yes” to the question, “Would having the option to use a voice call to complete an appointment with a professional increase your access to mental health services?” Furthermore, 70.1% selected “Yes” when asked about video call, and 63.0% selected “Yes” when asked about a mobile app. Likewise, results revealed that 84.6% of respondents selected “Yes” to the question, “Would having the option to use a voice call to complete an appointment save you time traveling to a professional’s office?” Moreover, 79.5% selected “Yes” when asked about video call, and 69.6% selected “Yes” when asked about a mobile app. See Figure 19.

Approximately 70% of respondents selected “Yes” to the question, “Would having the option to use a voice call to complete an appointment with a professional be more convenient for you than an in-person appointment?” Furthermore, 69.9% selected “Yes” when asked about video call, and 54.4% selected “Yes” when asked about a mobile app. See Figure 20.

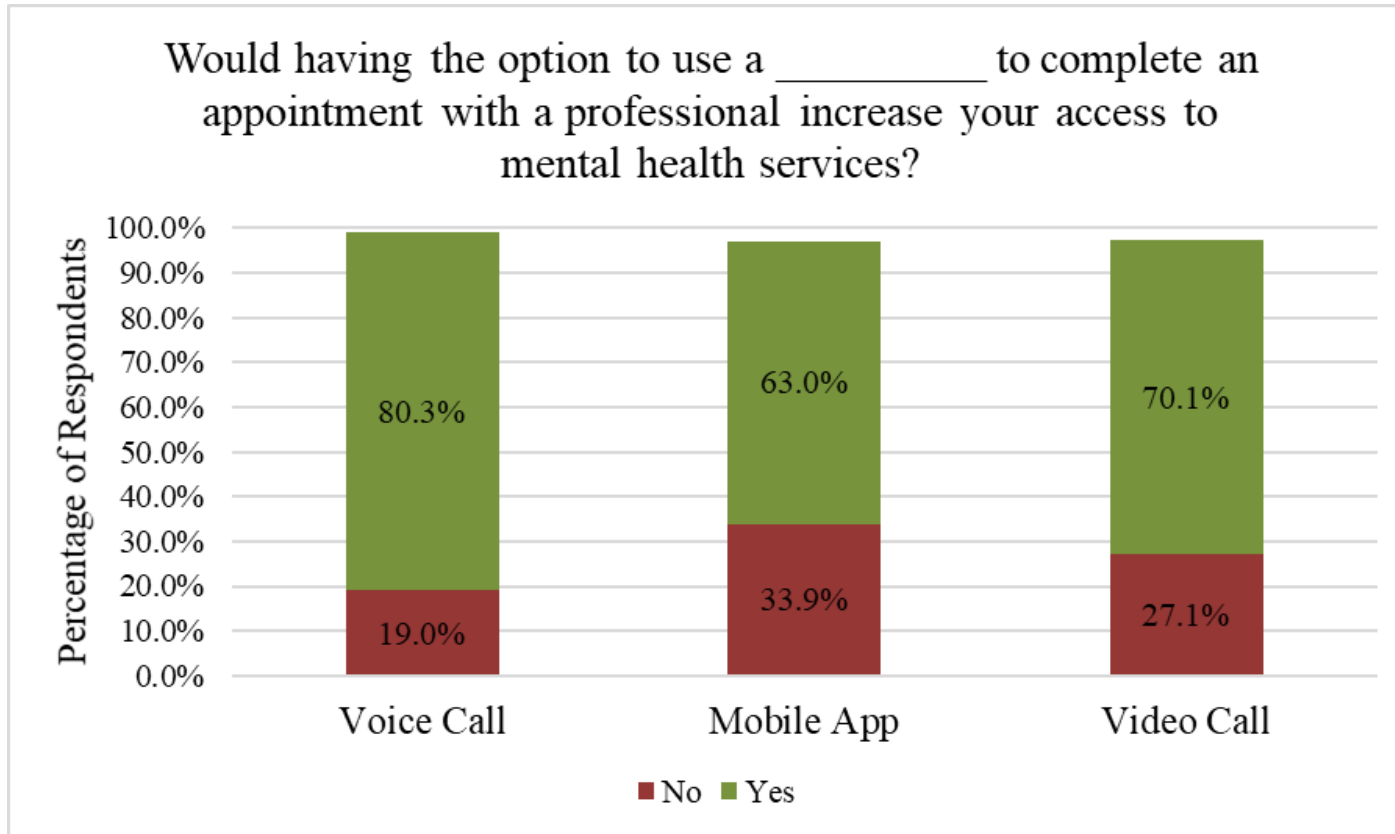


Figure 18. Sample percentages, by modality, for response to the statement, “Would having the option to use a [modality] to complete an appointment with a professional increase your access to mental health services?”

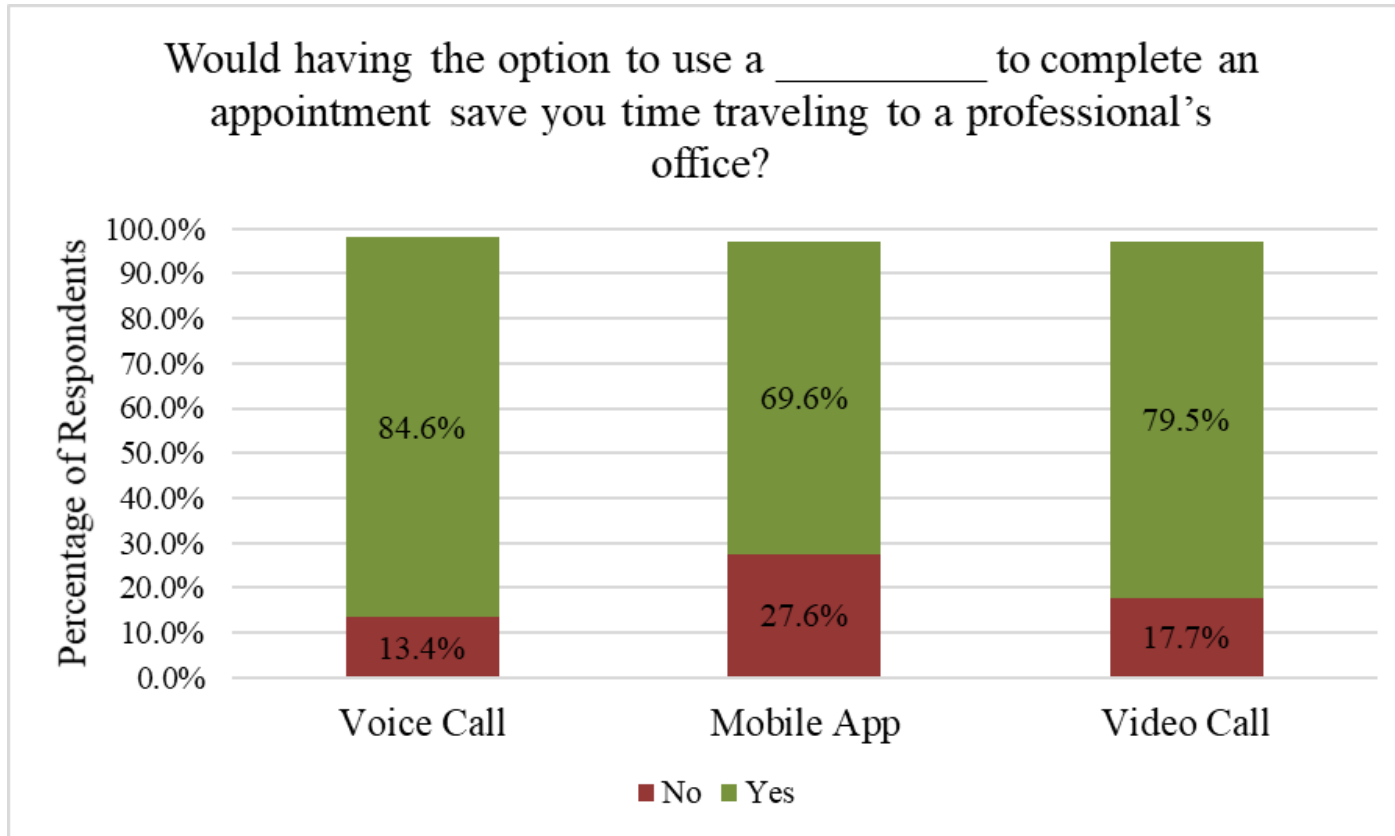


Figure 19. Sample percentages, by modality, for response to the statement, “Would having the option to use a [modality] to complete an appointment save you time traveling to a professional’s office?”

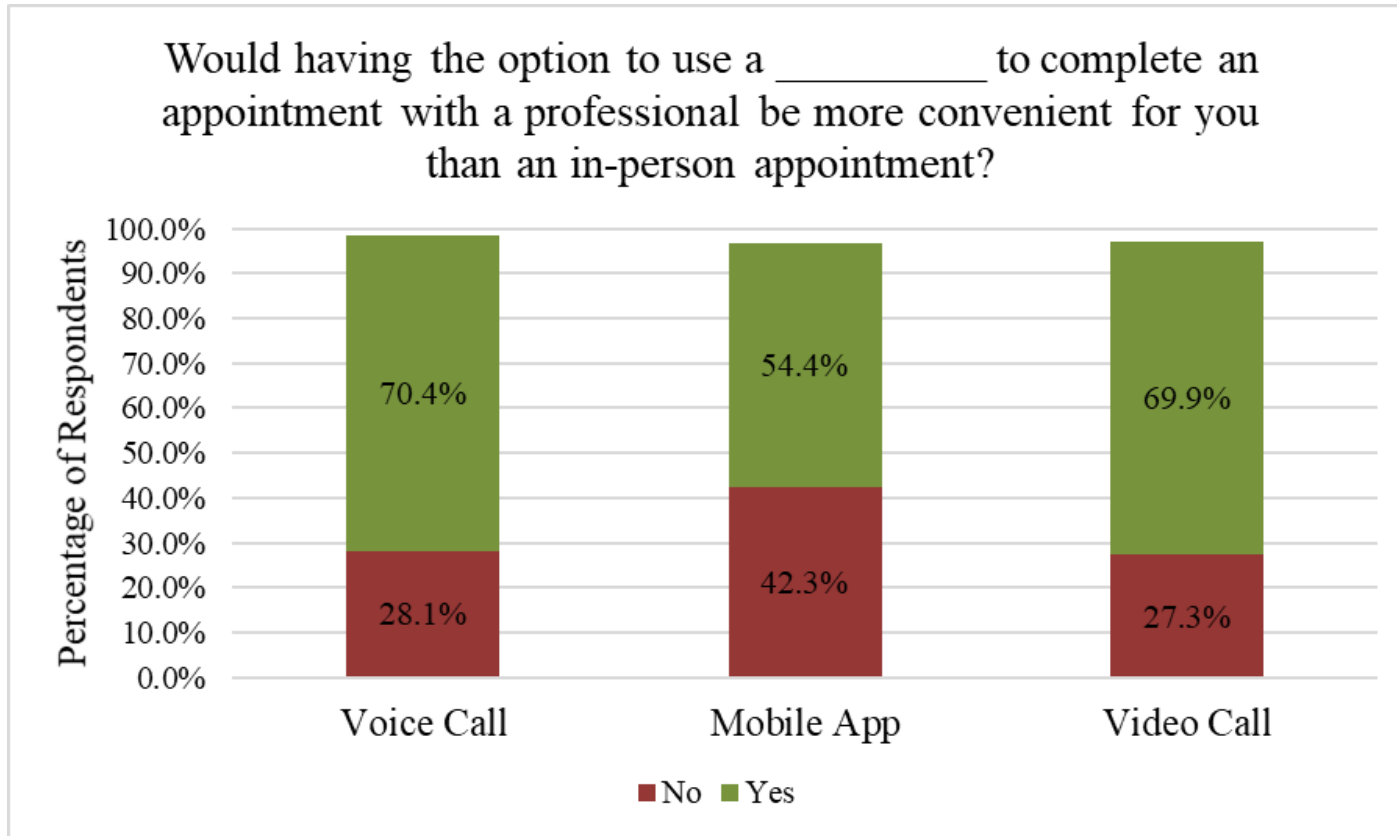


Figure 20. Sample percentages, by modality, for response to the statement, “Would having the option to use a [modality] to complete an appointment with a professional be more convenient for you than an in-person appointment?”

### 5.1.9 Concerns About Mobile Phone Use for Mental Health Care

More than half of the respondents (55.4%) indicated having concerns about using text messaging to communicate with a professional about their mental health. The results of the study showed that 41.3% of respondents selected “Yes” to the question, “Do you have any concerns about using a voice call to receive mental health treatment or counseling?” Furthermore, 32.7% selected “Yes” when asked about video call, and 61.0% selected “Yes” when asked about a mobile app.

The concerns for each modality were coded into themes and presented in Figures 21-24. Responses were assigned as many themes as were pertinent. In regards to text messaging, 232 responses were coded and revealed the following concerns: privacy and confidentiality (33%), communication issues (25%), the impersonal feel of communicating by text messaging (23%), belief that the mode is insufficient for treatment (6%), and doesn’t text often or doesn’t like to text (2%). See Figure 21. For voice call, 186 responses were coded and showed the following concerns: privacy and confidentiality (30%), the impersonal feel of communicating by voice call (29%), communication issues (21%), belief that the mode is insufficient for treatment (15%), doesn’t like talking on the phone (2%), connectivity issues (2%), and other concerns (1%). See Figure 22.

In regards to video call, 119 responses were coded and revealed the following concerns: privacy and confidentiality (35%), belief that the mode is insufficient for treatment (22%), the impersonal feel of communicating by video call (18%), technology issues (8%), doesn’t use video call often or doesn’t like video call (6%), concerns about being on camera (4%), communication issues (3%), and other concerns (3%). See Figure 23. For mobile app, 251 responses were coded and showed the following concerns: privacy and confidentiality (33%), the

impersonal feel of communicating by mobile app (22%), belief that the mode is insufficient for treatment (21%), technology issues (7%), communication issues (6%), doesn't use mobile app often or doesn't like using mobile app (4%), unfamiliar with process (3%), and other concerns (3%). See Figure 24.

Concerns about using text messaging to communicate with a professional about your mental health

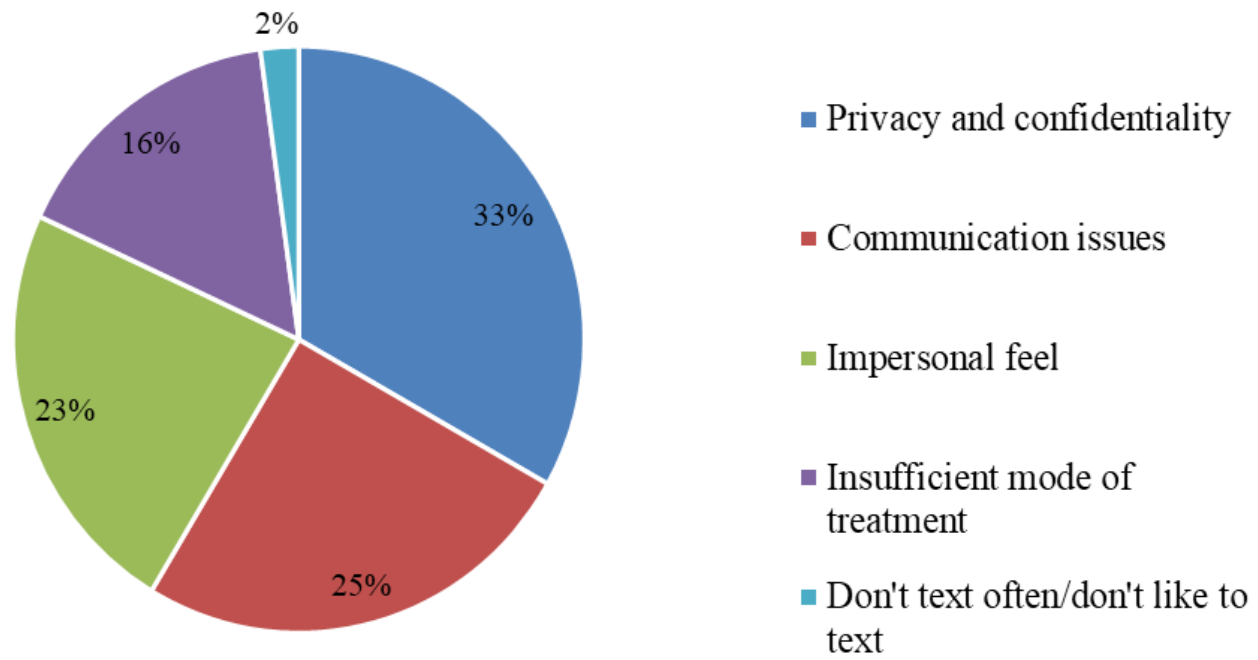


Figure 21. Concerns about using **text messaging** to communicate with a professional

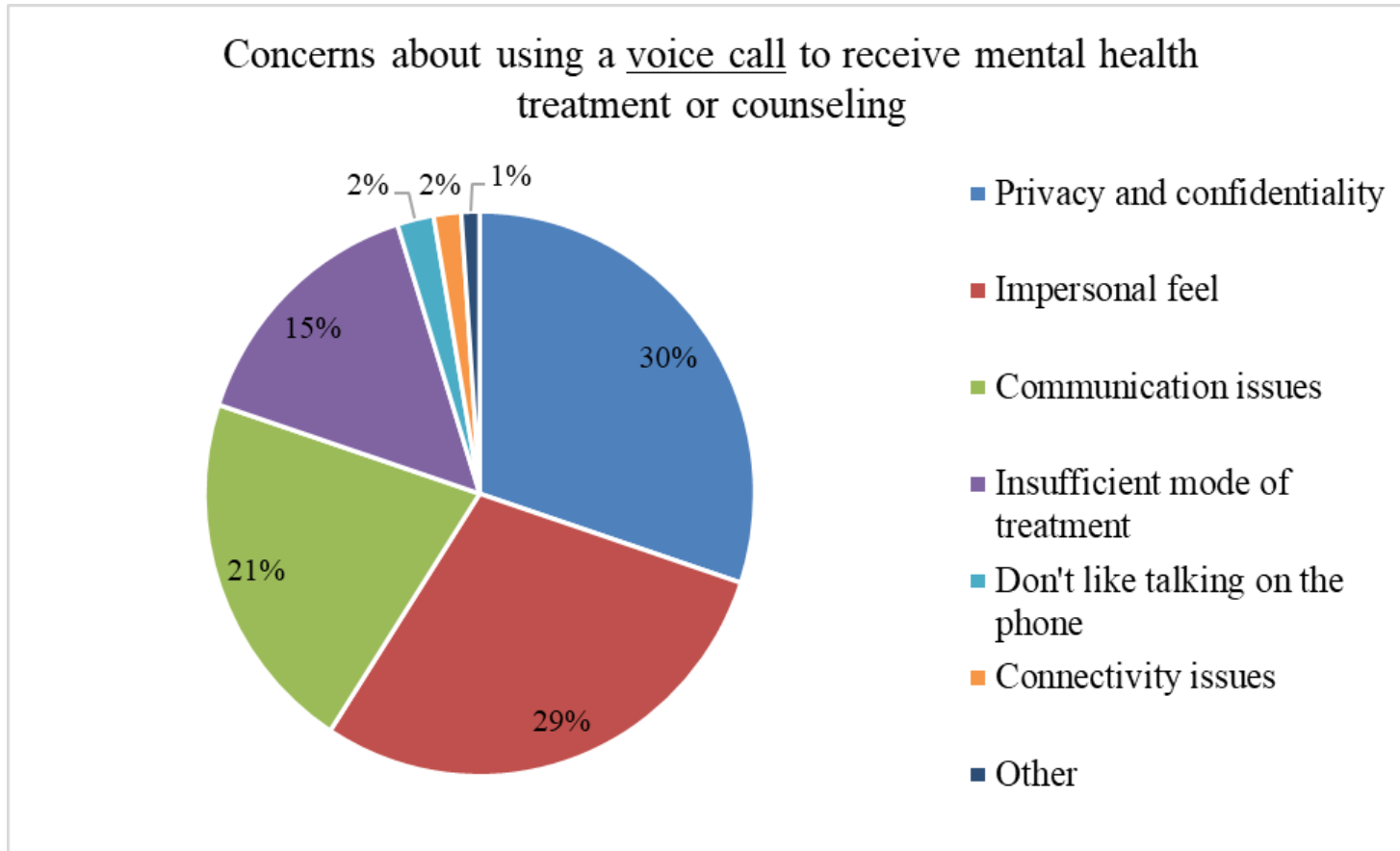


Figure 22. Concerns about using a **voice call** to receive mental health treatment or counseling



Concerns about using a video call to receive mental health treatment or counseling

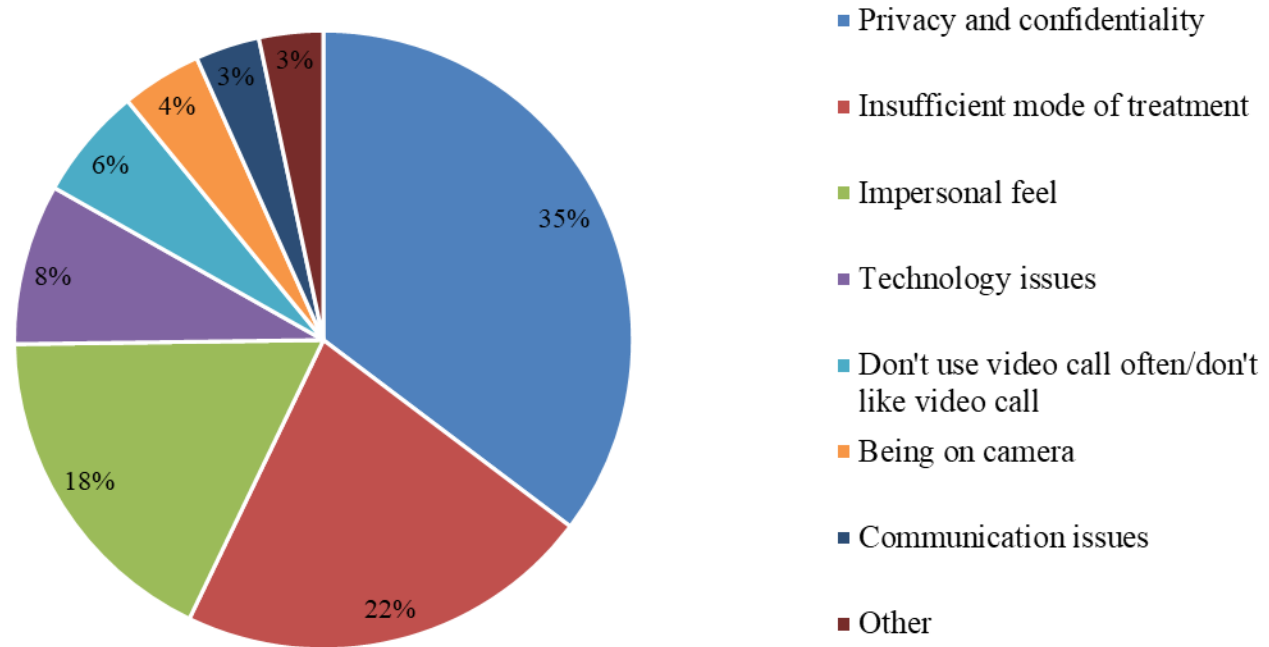


Figure 23. Concerns about using a **video call** to receive mental health treatment or counseling

Concerns about using a mobile app to receive mental health treatment or counseling

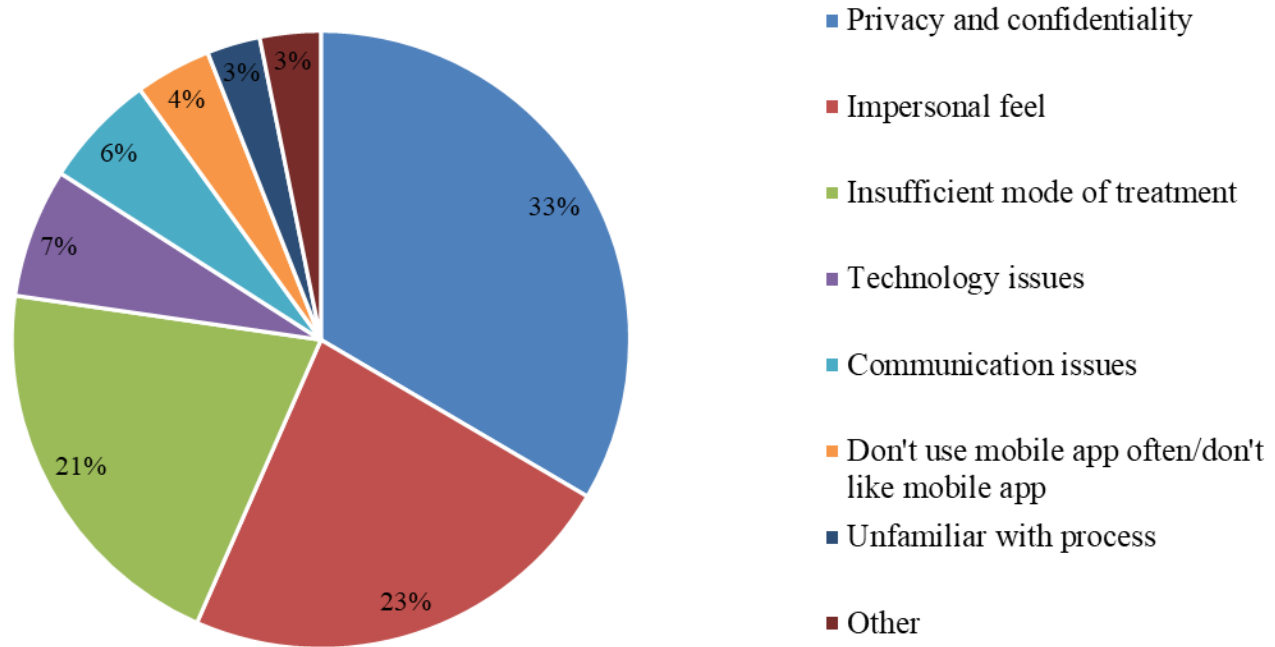


Figure 24. Concerns about using a **mobile app** to receive mental health treatment or counseling

## 5.2 Part II: Focus Groups

### 5.2.1 Sociodemographic Characteristics

Twenty participants attended the focus group sessions (n =4). Each focus group consisted of five participants. Participants could only attend one focus group session. Participants ranged in age from 21 to 79 years (mean age of 36.6 ± SD 17.8 years), and all identified as either Black/African American or multiracial (i.e., Black/African American and another race) and female.

### 5.2.2 Defining Mental Health

The discussion began by the session moderator (T.M.) asking the participants how they defined mental health. In general, participants shared similar thoughts on what defines good mental health. Good mental health was primarily viewed as being aware of one's triggers and emotions, and having the ability to control one's emotions and express how you feel. Focus groups 1 and 3 emphasized self-awareness. For example, one participant stated the importance of:

*Being aware of what triggers you and making provisions to either be away from those things or to have techniques to cope when they arise. [Speaker 2, Group 1, 36 years old]*

Focus groups 1, 3, and 4 acknowledged the importance of having good coping techniques or the ability to express how you feel. Regarding coping techniques, a participant stated:

*I think it also comes down to being able to have good coping mechanisms for when you are faced with challenging situations. [Speaker 2, Group 4, 23 years old]*

However, participants in focus group 2 voiced that good mental health was the absence of stress and negative emotions:

*No stress.* [Speaker 3, Group 2, 29 years old]

*Laughter, joy.* [Speaker 1, Group 2, 27 years old]

Bad mental health was manifested both internally (e.g., negative mood, avoidance of dealing with issues) and externally (e.g., using food or alcohol to cope). Group 2 focused on internal manifestations of bad mental health. For example, a participant stated that bad mental health is:

*A consistent negative mood.* [Speaker 5, Group 2, 25 years old]

Focus groups 1 and 3 acknowledged that avoiding dealing with your feelings, issues, or situations are signs of bad mental health. One participant stated the following regarding avoidance and coping:

*I think of like bad mental health as avoiding the things, but trying to compensate them with other things. So like for instance...eating or drinking or like just doing things to kind of make you feel like you've escaped but you haven't really actually dealt with the issues.*  
[Speaker 4, Group 3, 29 years old]

Participants in groups 1 and 4 voiced that lack of resilience contributes to bad mental health.

*Lack of resilience. So, normal kind of run-of-the-mill things can break you down that shouldn't.* [Speaker 2, Group 1, 36 years old]

### 5.2.3 Mental Health Maintenance and Protective Factors

The focus group participants shared that talking to their girlfriends and seeking solace in religion were the two most common ways that Black women maintain good mental health. For example, one participant stated:

*No, seriously, I think historically and to some degree having a girls' night out, or having at least one girlfriend to kinda talk to and decompress with helps, even if they're not saying nothing back. Just to know that somebody's listening. [Speaker 3, Group 2, 29 years old]*

This sentiment was consistent among all the groups. In addition, focus groups 2 and 4 acknowledged the importance of seeking solace in religion. The participants discussed that there is still denial and stigma in the Black community about mental illness. The thought is that prayer and going to church will solve your issues. A participant stated:

*Take it to Jesus. If you're feeling blue, you're not depressed, you're feeling blue. You're just down. You're just going through a rough patch, so I think seeking solace in religion has been a method of treatment. For previous generations, but I think nowadays were, newer generations are open to talking about mental health, or at least talking with friends and seeking solace in them. [Speaker 4, Group 2, 23 years old]*

Participants in groups 1 and 4 brought up the point that Black women historically have not prioritized maintaining good mental health. Instead, the role of caregiver has been the priority and mental health an afterthought.

*Some days [with] taking care of everybody you really don't have time to take care of yourself. [Speaker 4, Group 4, 62 years old]*

Furthermore, there was a generational difference observed in the attitude toward using social media as a tool to maintain good mental health. The younger focus group participants were more likely to use social media as an outlet and a tool by expressing how they felt, connecting with

others, and finding mental wellness resources (e.g., information about podcasts, encouraging or informative tweets). Whereas, the older participants were less likely to use social media or deemed it inappropriate to use as an outlet to express oneself. For example, one of the older participants stated:

*I'm not into all that social media stuff. So, I remember one time... Valentine's Day, [my daughter] called me her date and she had to tweet that, "Having Valentine's Day with my mother." And I don't know if that got something off her chest because she didn't have a boyfriend or what, but I just didn't understand. Why'd you tell everybody that? Who cares? So, I'm not into the social media thing. So, I don't know about people that are into social media, I guess, we sometimes think that what the young people put out there is not appropriate. [Speaker 3, Group 1, 63 years old]*

In response, two of the focus group members who are in their early 20's expressed that using social media can be helpful for maintaining good mental health.

*I will say that my perception of social media and mental health, I think it's helped a lot because it gives a lot of people access to other people's thoughts and feelings and understanding like, "Oh, I'm not the only one experiencing this." Or people who have resources already for people who don't have access to them elsewhere, that's a good place for them to access it. [Speaker 5, Group 1, 23 years old]*

*A lot of therapists or mental health workers have, I don't know about Twitter, but [have] Instagram accounts where they share videos or healthy coping mechanisms for certain things. And I know a lot of people find comfort in those types of things. I think they are more helpful than just stating a problem or something online. [Speaker 4, Group 1, 22 years old]*

Unanimously resiliency was stated as the top quality (i.e., protective factor) Black women have to help them to maintain good mental health. However, participants in focus groups 1 and 2 discussed the duality of resiliency, it can be both helpful and harmful.

One participant stated:

*As I said, historically we've had to be very resilient people but I know that resilience in itself can create a loop of being too resilient, I guess. And taking more than you can handle or depending on that resiliency to get you through everything when you actually do need help from other resources. [Speaker 5, Group 1, 23 years old]*

Likewise, another participant voiced:

*I also say resilience, though that could quickly become a double-edged sword or be a really tight rope to walk on, but I think Black people in general, Black women especially, you have to be resilient in order to survive all that previous generations have had to overcome and be put through, so I think it is built into our very foundation, resilience. But I think the idea of strong black woman has also hampered us from seeking solace and using other resources to better our mental health or to talk about our mental health in general, so I think it's a fine line, but I think resilience fundamentally has helped Black women be strong. [Speaker 4, Group 2, 23 years old]*

The strength of Black women was a recurring topic among the groups. In general, participants voiced that the strength is gained by personal experiencing as well as being taught how to cope. One participant stated:

*...we raise our daughters, we love ourselves, we raise our daughters. I feel like Black women are raised, right? As in we are literally, this is what this is, this is what you might face, and when this happens you need to do this. And so I feel we have a lot of those thoughts kind of going daily. [Speaker 2, Group 1, 36 years old]*

However, in focus group 4 one participant challenged the notion of knowing how to cope as a strength that Black women possess by stating:

*I don't necessarily know if there's anything different, because I don't think I'd been taught how to cope well. So, I don't know. Maybe my experience is different. I don't know if there's something just inherently stronger about Black women or that we've been taught to suppress. [Speaker 3, Group 4, 29 years old]*

The benefit of having shared lived experiences, which fosters solidarity between Black women, was also discussed. A participant stated:

*I think shared lived experiences also helps because that builds the empathy between people when you talk about what's going on. So, it can be a better soundboard to what you're talking about. [Speaker 5, Group 1, 23 years old]*

#### 5.2.4 Black + Woman

The participants were vocal about the things that Black women deal with that other groups might not have to deal with. The intersectionality of being Black and a woman was discussed by all groups. Participants voice that external stressors (e.g., racism, sexism, caregiver responsibilities) resulted in negative emotions that are deleterious to one's mental health (e.g., loneliness, increased stress, and feeling of constantly being policed). The compounding negative effects of having to continuously deal with microaggressions due to racism and sexism were discussed. For example, one participant stated the following about the workplace:

*I feel like it leads to us feeling isolated more often because because all the women are White and all the men are Black. Or all the Black people are men. Right? And so there's no consideration really of us. We're always at the fringe. And so even I find it like as I moved up in my career in my first director position, it was me at the table really, even amongst women, right? Not that there are many women. And so that was the first time I think I was able to get away from just racism. It was like, "Oh, this is like a whole thing. Y'all are saying that, microaggressing me race-wise, but also because I'm a woman. This is weird. What is happening here?" Whereas generally we're in more homogeneous groups, we're getting one or the other, so it's not so bad. But when we're in situations where we're just, where everything's compounded, it's like, "Whoa, who can I go to?" Which is why I think we end up leaning on each other much more than other folks. [Speaker 2, Group 1, 36 years old]*

Focus groups 2 and 3 expressed that Black women are constantly policed on everything from hairstyles to how they expressed themselves.



Regarding, navigating “white spaces” (i.e., places where White people are the majority) one participant voiced:

*The constant pressure of just what it means to be in those “white spaces,” and feel like you're in the spotlight to speak for your own group or to make yourself present, because you can quickly be swept aside if you're not vocal, but then that slippery slope if you're too vocal now you're the angry Black woman, instead of being passionate about what you feel. [Speaker 4, Group 2, 23 years old]*

Likewise, a participant in group 1 echoed the same sentiment:

*...I always said that Black women are hypervisible but also overlooked at the same time. So, it's just like people are like you're the only minority in the room. People are just looking at you for all your reactions and stuff. So any little thing you do is just exasperating and like, "Oh, you're dramatic." Or, "You're too woke," or something. And they just overlook everything that's very valid about what [you] say. [Speaker 5, Group 1, 23 years old]*

Caregiver responsibilities were also discussed. A participant stated the following about single parents:

*I think sometimes a lot of Black women are single parents. I think that takes a big toll on them because they have to do everything. They work and they have to take care of the child. They have to take care of themselves. And that can be taxing at times. [Speaker 4, Group 4, 62 years old]*

Overall, the participants felt that Black women were not given the same consideration or grace as their White counterparts. Fear of being labeled as angry, antisocial, too sensitive, etc. were highlighted as causes of stress and anxiety for Black women.

### 5.2.5 Factors Contributing to Anxiety and Depression

Most of the factors that contributed to anxiety and depression were school or work-related (e.g., imposter syndrome, performance expectations), however the focus group

participants also spoke about stressors in their homelife. Regarding dealing with imposter syndrome at school, one participant expressed:

*And I guess my experience with anxiety, I'll just, I guess, lump it into imposter syndrome, especially with like in undergrad. I feel like I was anxious just the whole time because of the idea of existing in spaces where nobody looks like you, you're hyper visible but people aren't paying attention to you and you feel like you don't belong. So, it's just like, what do they call it? Double consciousness or whatever. [Speaker 5, Group 1, 23 years old]*

In focus groups 3 and 4, work-related stress was one of the primary causes of depression. For example, a participant stated:

*For me, being in the health profession and working in a high level stress job and dealing with having to take on other individual's issues plus balance [my own] and just not having that support of a, you know, supportive supervisor or a good working team that took a toll on me. And so I'm learning to navigate that and learning to say, you know what, I need some help. [Speaker 3, Group 3, 34 years old]*

Managing caregiver responsibilities and expectations of family members were stated as causes of anxiety. Specifically, parenting and conversely dealing with expectations from one's parents were both identified as being anxiety inducing. One participant shared:

*My anxiety definitely comes from being the first person in my family to do a lot of things. And like you were saying the pressure is immense but it's more of like pressure I put on myself because I have a younger sister so it's like whatever I do I want to do it great, so that she has someone to look at. And then my parents are like pressuring me cause they're like, we want you to be better than us. But it's, it's a lot for like just one person to maintain. [Speaker 1, Group 3, 21 years old]*

Groups 1 and 3 discussed that financial stressors can cause depression. Furthermore, the harmful effects of compounding stressors were mentioned by another participant:

*I think all the stresses on top of each other because if there's just one thing you're worried about, then it's okay. But like when you're worried about your family, and finals,*

*you're worried about finances all at the same time, that's like very overwhelming.*  
[Speaker 4, Group 1, 22 years old]

### 5.2.6 Coping and Support

Discussion about coping behaviors revealed that the participants actively seek constructive outlets to help them deal with the things that caused them to be anxious or depressed. These activities include spending quality time with others, practicing hobbies, and introspection. For example, one participant stated:

*...I've learned to pick up hobbies, like distractions or things that I know would calm me.*  
[Speaker 1, Group 1, 29 years old]

Participants also disclosed that food and alcohol have helped them to cope in the past, whether it was eating or having a glass of wine alone or with a group. Specifically, focus groups 1 and 2 spoke about eating or drinking with friends to decompress and receive support:

*Wine. I usually, I mean, that's my thing to do with my friends. Wine Wednesday, just go and blow off steam for two, three hours.* [Speaker 2, Group 1, 36 years old]

*I think, for me, fortunately, I've had the...community, and that just provided so much joy, even though some of the topics we talked about were hard, but just to have that space to decompress with people, like this. It was low key group therapy, even though no one called it that. It was just like, "...we're about to go get some food and talk."* [Speaker 3, Group 2, 29 years old]

Groups 1 and 4 discussed that avoidance is used as a coping technique, and that ignoring issues can be harmful. A participant voiced:

*...I kind of just ignore [the issue]. I'm really good at compartmentalizing and acting like I don't feel a certain way, which isn't good.* [Speaker 5, Group 1, 29 years old]

Overall, participants were open about the coping behaviors they felt were helpful, and those they felt were potentially less beneficial to their mental or physical health. They also expressed their desire for support to manage anxiety and depression.

Regarding support for managing anxiety and depression, the majority of participants voiced that it would be helpful to have someone to talk to when they are anxious or depressed. Participants in groups 3 and 4 spoke positively about informal sources of support such as friends or mentors. However, one participant felt that confiding in a person that is close to you might not be a good idea.

*Sometimes you have friends and you call them and you say well look, such and such. [They say], "well you know you shouldn't have been there and you know you shouldn't have did that." You might not want to hear that right now. You just want somebody that's going to say, "Hey, what's going on? Tell me about it" and not pass judgment. Just listen. [Speaker 4, Group 4, 62 years old]*

Focus groups 1 and 2 expressed the need for professional sources for support (e.g., therapy, campus health services and resources). For example, one participant stated:

*I think having a space to talk about it, where it was known that it was a space to debrief...would have been helpful...Just thinking back to my younger years. Somebody naming what [anxiety and depression] were would be really helpful. It just seemed normal to be in class and so worried, and trying to be perfect and whatever sense, or feeling like blue, or something like that. If somebody had named it, and then I could have been like, "Okay, so there are support services for that?" [Speaker 1, Group 2, 27 years old]*

Participants in focus group 1 also discussed the use of apps to support their mental health (e.g., meditation, breathing apps). One participant shared:

*I know in undergrad my school had a Calm app subscription, that I didn't find out about until near graduation. But that's really helpful because they have meditations that range from five minutes to 30 or an hour or something. So, even if I only have five minutes, I*

*was walking to my next class or something, I think that that helped to calm me sometimes.*  
[Speaker 4, Group 1, 22 years old]

In response another participant stated the need for more culturally competent apps:

*I was going to say that but I guess my problem with the apps, maybe [the need for] more culturally competent meditation apps and stuff like that.* [Speaker 5, Group 1, 23 years old]

The sentiment that there is a need for more culturally competent mental health apps was also echoed later in the focus group discussions.

### 5.2.7 Attitudes Toward Using Mental Health Services

Most of the participants endorsed using mental health services, such as seeing a therapist. Every group expressed the preference for a Black female therapist. The emphasis on having someone that looks like them was due to bad experiences in the past, or the perceived burden of having to explain to the therapist what Black women, in general, deal with. Lack of cultural competency, mistrust, and lack of empathy were the main reasons for not initially seeing a therapist or discontinuing treatment. Regarding preference for a Black female therapist, one participant stated:

*I think it's excellent. If you can find somebody, I personally feel they have to look like me and know where I'm from. No disrespect to others. You have to know the person that you're getting ready to sit down and talk to and understand the culture and the background and the stigma to make them feel comfortable enough to open up. And I feel then we would open up to say yes to medication and because I think that's a healthy part of trying to relax the body and calm the brain and get you to focus...I don't feel that it would be a problem as long as everything is managed properly. So I'm in for seeing a therapist.* [Speaker 2, Group 3, 61 years old]

Furthermore, a participant shared that she has experienced a lack of culturally competency and empathy when interacting with providers in the past:

*I've literally had people telling me, "Oh, you should be way more messed up than you are." And I'm like what is that supposed to mean? Just because I can articulate what I'm feeling better than most, suddenly that means I don't need help. I don't see what that means. But I think basically the cultural competence is the biggest part because there's tons of resources. I don't think there's a lack. I think it's just a lack of people looking like us in those resources. [Speaker 5, Group 1, 23 years old]*

Focus group participants also identified cost, lack of time, and lack of transportation as additional barriers to seeking treatment.

Everyone agreed that there is still stigma in the Black community around using mental health services. Needing mental health care is seen as a weakness or lack of faith, and people are afraid of being judged and labeled as “crazy.” One participant voiced:

*I think a lot of people who go to therapy, not a lot of people know that they're in therapy because it's like, “Oh well if they know that I'm seeing somebody then what are they going to think about me?” So I think a lot of it has to do with just opening up the idea of going to a therapist, like you go to your PCP and then once that happens I think a lot more people will utilize those services cause they're just such a huge stigma in our community about going to see a therapist. It's like, “Why are you going to see the shrink? Like you need to be praying.” You know, and it's just not open. I think a lot of people would love to use those resources but they fear the judgment that's going to come behind that with seeking therapy. [Speaker 4, Group 3, 29 years old]*

Although there is still stigma around using mental health services, all of the participants agreed that the stigma has decreased in the past five years. However, the sentiment was that there is still work to be done to normalize therapy. Regarding the stigma around using mental health services changing in the last five years, one participant stated:

*I think it has [improved], but it's still some work need to be done. More people are talking about it now than they used to. [Speaker 4, Group 4, 62 years old]*

Focus groups 1 and 3 acknowledged that subgroups within the Black community (e.g., young adults, college graduates) have less stigma around mental health than others, and are acting as catalysts for change. For example, a participant voiced:

*I think a lot of, especially our younger generation, a lot of us are like, that's what we study. That's what I went to go study. So we're going back and having these conversations with our family and informing them about their own mental health and they're seeing us, I guess, unearthing the things that we need to talk about and it like inspires them to do the same thing. I've seen that with my own family and I know with my friends that's kind of been the same thing. So, I think we're on a cusp of some change.*  
[Speaker 5, Group 1, 23 years old]

In order to really see the destigmatizing of mental illness in the Black community participants stated the need for more education on mental illness and available resources (e.g., therapy), and increase in social support to discuss mental health needs and seeking care. Specifically, participants mentioned that churches should work on messaging to normalize mental illness and seeking treatment.

## 5.2.8 User-centered Design of a Mental Health App for Black Women

### 5.2.8.1 Past App Use

The focus group participants shared that they primarily used mental health and wellness apps that had the following features: meditation, mood tracking, calorie intake and activity monitoring, and deep breathing exercises. In addition, the use of music and podcast apps were popular (e.g., Therapy for Black Girls). Inspirational messages on social media apps were mentioned as being beneficial to mental wellness.

#### 5.2.8.2 Content

Many suggestions were given on the content that should be included in an app designed to help Black women manage anxiety and depression. Recommendations can be categorized as either informational or inspirational. For example, participants stated they would like information about Black female therapists in their area (including their background, services offered, and cost), how to deal with common stressors (e.g., imposter syndrome, microaggression, family), financial assistance, and events in the area to connect with other Black women.

Inspirational messages and encouraging stories about how others overcame adversity were also desired. Positive messages about self-esteem, as well as uplifting and supportive messages were recommended. Participants also mentioned including suggested readings that promote mental wellness. In summary, the focus group participants recommend the app be informative, encouraging, and facilitate connection with resources. This is further discussed in the Features section.

#### 5.2.8.3 Features

The recommended app features allowed users to monitor their progress, practice coping techniques, and connect with others. For example, participants suggested that the app have features to track anxiety, depression, and mood. In addition, they recommended guided meditation, deep breathing, and other coping techniques narrated by a Black woman. Participants stated that most meditation apps used a British or Australian voice to narrate, however they desired to hear what they described as a “Black auntie voice” (i.e., the caring voice of a middle-aged African American woman). Lastly, they recommended having group chat rooms to connect



with other users, and the ability to connect with therapists through the app via messaging or video call.

#### 5.2.8.4 Daily Active Use

Participants voiced that they would be more likely to use the app regularly if they found value in it and the app was easy to use. Specifically, participants emphasized the importance of feeling a sense of community when using the app, being able to connect with a therapist, and managing anxiety and depression through learning coping skills. The user interface should also be “clean” and the app must be intuitive and easy to use. Having an accountability feature was also recommended (e.g., daily mood check-in).

Gamification of the app was suggested to give the user a sense of accomplishment and make the app more “sticky.” Participants voiced that if the app is too cumbersome, there are too many notifications, or if the exercises take too long to complete it would discourage use of the app. Overall, the focus group participants were excited about the idea of an app tailored to help them manage anxiety and depression.

#### 5.2.8.5 Concerns

Most of the participants concerns were about security and privacy. There was concern that the app could be hacked and their data disclosed. Furthermore, participants had apprehension about who would own the app and their data sharing policies. There have been many data breaches in the news which concerned participants, and they were also aware that many apps sell user data. The primary concern was that the data would be used to harm them personally or Black women in general.

## **5.3 Part III: Mobile App Usability Testing**

### 5.3.1 Characteristics of Study Participants

Fifteen participants tested the usability of the app using the cognitive walkthrough think-aloud method. Participants ranged in age from 20 to 66 years (mean age of  $29.8 \pm SD 12.4$  years), and all identified as either Black/African American or multiracial (i.e., Black/African American and another race) and female. Furthermore, 86.7% obtained a bachelor's degree or higher. The majority of participants (93.3%) indicated that they use mobile apps four or more times per day, and 6.7% use mobile apps one to three times per day.

### 5.3.2 Cognitive Walkthrough

The participants were assigned one of two personas and scenarios. See Appendix H for the personas, scenarios, and tasks. The tasks that accompanied each scenario were related to the following app features: anxiety severity tracking; depression severity tracking; finding information on how to manage anxiety; finding information on how to overcome depression; completing a journal entry; creating a self-care plan; or finding a therapist. Most participants were able to fully complete each task with limited to no assistance. See Figure 25 for a screenshot of the app home screen.

The eye tracking software captured that participants primarily focused on the left side and middle of the screen when looking for information. For example, Figure 26 shows the heat map of the managing anxiety tips screen, and the title, left side and middle of screen are the areas of highest intensity (orange/red). Similarly, Figure 27 shows the heat map of the journal entry summary screen, and the titles, left side of the screen, and "Save" button are the areas of highest intensity (orange/red).

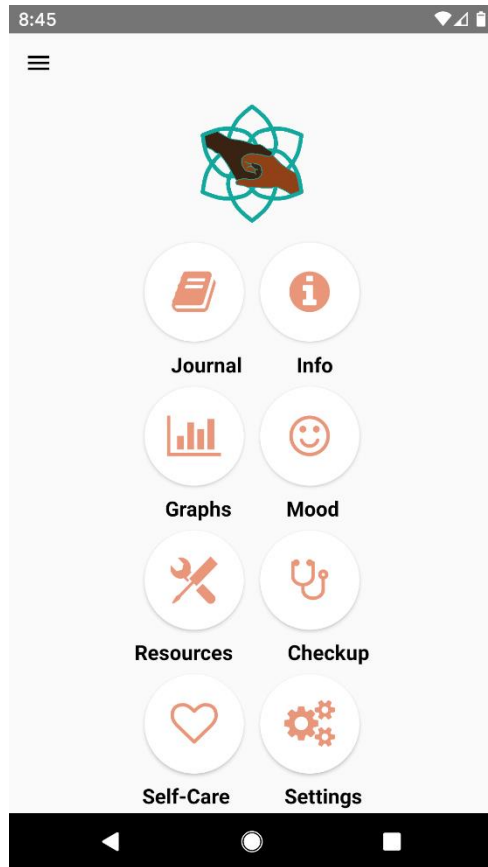


Figure 25. Screenshot of the app home screen



Figure 26. Heat map of the managing anxiety tips screen

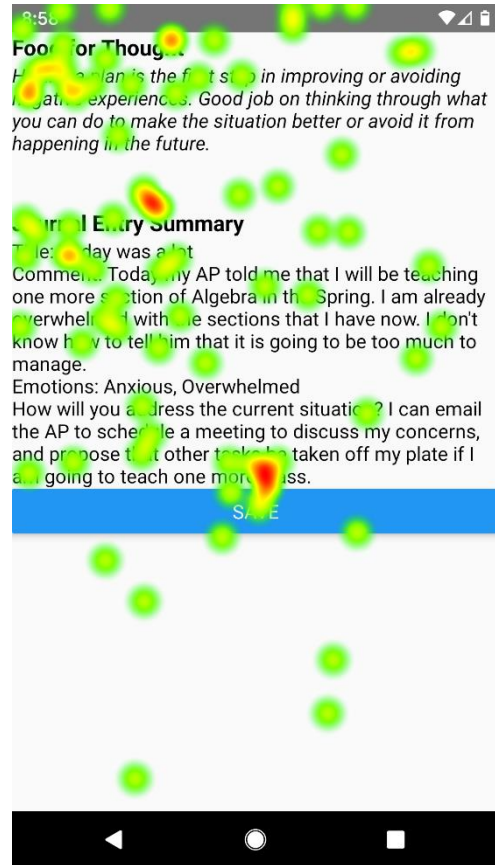


Figure 27. Heat map of the journal entry summary screen

### 5.3.2.1 Scenario #1 and Tasks

After the persona and scenario were read to the participants (n= 8), they were instructed to complete the four tasks and think-aloud as they completed them. The actions completed, number of taps, and the amount time spent on each task are recorded in Appendix O. For task 1, all eight of the participants performed every benchmark action to find out their levels of anxiety for the past 6 weeks, and reported the most recent level of anxiety recorded in the graph. The benchmark time and number of taps to complete the task is 13 seconds and 3 taps. All participants took longer than the benchmark time with a range in time from 20 seconds to 1 minute 41 seconds. Seven participants (88%) used 3 taps to complete the task, and one participant (12%) used 6 taps. A few participants were unsure if they needed to first record their level of anxiety in the app before locating it in the graph.

Five participants (63%) performed every benchmark action to find information on how to manage anxiety, and reported the first tip on managing anxiety to complete task 2. The benchmark time and number of taps to complete the task is 25 seconds and 6 taps. Most participants took more than twice the benchmark time to complete the task, with a range in time from 48 seconds to 4 minutes 24 seconds. Half of the participants used 6 taps to complete the task, and the other four participants (50%) used 12, 14, 18, and 37 taps, respectively. Some participants were confused about where to find information about anxiety, looking in the resources or self-care features of the app instead of the information feature. Participants expressed that they thought the information feature was the place to find information about the app, and not information about anxiety.

For task 3, three participants (38%) performed every benchmark action to add a new entry to the journal, and one participant (12%) beat the benchmark time by 22 seconds. The

benchmark time and number of taps to complete the task is 3 minutes 10 seconds and 15 taps. Three participants (38%) partially completed the task. Of those who fully completed the task (n= 5), the time to complete ranged from 2 minutes 48 seconds to 6 minutes 10 seconds. Two participants (25%) used 17 taps, two participants (25%) used 18 taps, and one participant (12%) used 19 taps to complete the task. The wide range in time was primarily due to the speed at which each participant could type in the journal. Only one participant (12%), who was 66 years old, used the voice-to-text feature. However, the participant was unable to fully complete the task. The reason for partial completions was primarily due to participants submitting the journal entry prior to completing each step in the task.

Three participants (38%) performed every benchmark action to locate a therapist, and reported whether the therapist is accepting new clients to complete task 4. This task involved use of a website that linked out from the app to search for the therapist. The benchmark time and number of taps to complete the task is 56 seconds and 8 taps. All participants took longer than the benchmark time to complete the task, with a range in time from 1 minute 42 seconds to 3 minutes 21 seconds. Two participants (25%) used 10 taps to complete the task, two participants (25%) used 11 taps, and the other four participants (50%) used 13, 14, 15, and 35 taps, respectively. While the majority of the participants had no problem finding the button within the mobile app that linked out to the website with the therapist directory, some participants voiced that the website itself was not mobile-friendly and required a lot of scrolling to find out if the therapist is accepting new clients.

#### 5.3.2.2 Scenario #2 and Tasks

Following protocol, the persona and scenario were read to the participants (n= 7). Next, they were instructed to complete the four tasks and think-aloud as they completed them. The

actions completed, number of taps, and the amount time spent on each task are recorded in Appendix P. For task 1, all seven of the participants performed every benchmark action to find out their levels of depression for the past 6 weeks, and reported the most recent level of depression recorded in the graph. The benchmark time and number of taps to complete the task is 14 seconds and 3 taps. All participants took longer than the benchmark time with a range in time from 27 seconds to 48 seconds. Five participants (71%) used 3 taps to complete the task, one participant (14%) used 5 taps, and one participant (14%) used 6 taps.

Three participants (43%) performed every benchmark action to find information on how to overcome depression, and reported the first tip on overcoming depression to complete task 2. The benchmark time and number of taps to complete the task is 20 seconds and 6 taps. Most participants took more than twice the benchmark time to complete the task, with a range in time from 28 seconds to 2 minutes 14 seconds. Three participants (43%) used 6 taps to complete the task, and the other four participants (57%) used 9, 11, 12, and 14 taps, respectively. Some participants were confused about where to find information about depression, looking in the resources or self-care features of the app instead of the information feature. Participants expressed that they thought the information feature was the place to find information about the app, and not information about depression.

For task 3, only two participants (29%) performed every benchmark action to create a self-care plan, and one participant (14%) matched the benchmark time at 1 minute 17 seconds. The benchmark time and number of taps to complete the task is 1 minutes 17 seconds and 15 taps. The time to complete the task ranged from 1 minute 17 seconds to 2 minutes 47 seconds. The seven participants used 16, 17, 19, 21, 21, 21, and 23 taps, respectively, to complete the task.

The wide range in time was primarily due to the speed at which each participant could type in the self-care plan.

Two participants (29%) performed every benchmark action to locate a therapist, and reported whether the therapist is accepting new clients to complete task 4. This task involved use of a website that linked out from the app to search for the therapist. The benchmark time and number of taps to complete the task is 49 seconds and 8 taps. All participants took longer than the benchmark time to complete the task, with a range in time from 1 minute 7 seconds to 2 minutes 9 seconds. Four participants (57%) used 9 taps to complete the task, and the other three participants (43%) used 7, 11, and 13 taps, respectively. While the majority of the participants had no problem finding the button within the mobile app that linked out to the website with the therapist directory, some participants voiced that the website itself was not mobile-friendly and required a lot of scrolling to find out if the therapist is accepting new clients.

### 5.3.3 Questionnaire for User Interface Satisfaction (QUIS)

The *Questionnaire for User Interface Satisfaction* (QUIS) focused on five domains to measure user interface satisfaction for the app. The domains were overall reactions to the software, screen, terminology and app information, learning, and app capabilities. All 27 questions were weighted equally, and collapsed into five mean scores, one for every domain, for each individual participant. The minimum mean score, maximum mean score, average of means, and standard deviation were calculated for each domain. The questionnaire also included two qualitative questions which asked participants to list the most positive and negative aspects of the app.



### 5.3.3.1 Scenario #1 and Tasks

Overall, the results showed that participants were mostly satisfied with the user interface of the app. Moreover, the average mean score for each domain ranged from 7.2 to 8.3 on a scale from 0 (low) to 9 (high). See Table 27. The average mean score and standard deviation for overall reactions to the software was 7.2 (SD 1.1), presentation of information on the screen was 7.3 (1.3), terminology used and app information was 7.6 (1.3), ease of learning to use the app was 8.0 (1.3), and app capabilities was 8.3 (0.9). Figure 28 displays a boxplot of the mean scores for the five domains of the QUIS for Scenario #1 and Tasks.

Participants were asked to list the three most positive and three most negative aspects of the app. The most common strengths were: (1) the app was easy to use; (2) the features were practical and helpful; and (3) quality content. The most common weaknesses reported were: (1) plain appearance/lack of color; (2) confusing labeling of information feature; and (3) app could be more intuitive.

Table 27. Summary of Mean Scores for the Five Domains of the Questionnaire for User Interface Satisfaction for Scenario #1 and Tasks (N= 8)

Domain	Minimum Mean Score	Maximum Mean Score	Average of Means (SD)
1. Overall Reactions to the Software	5.8	9.0	7.2 (1.1)
2. Screen	6.0	9.0	7.3 (1.3)
3. Terminology and App Information	5.8	9.0	7.6 (1.3)
4. Learning	5.0	9.0	8.0 (1.3)
5. App Capabilities	6.2	9.0	8.3 (0.9)

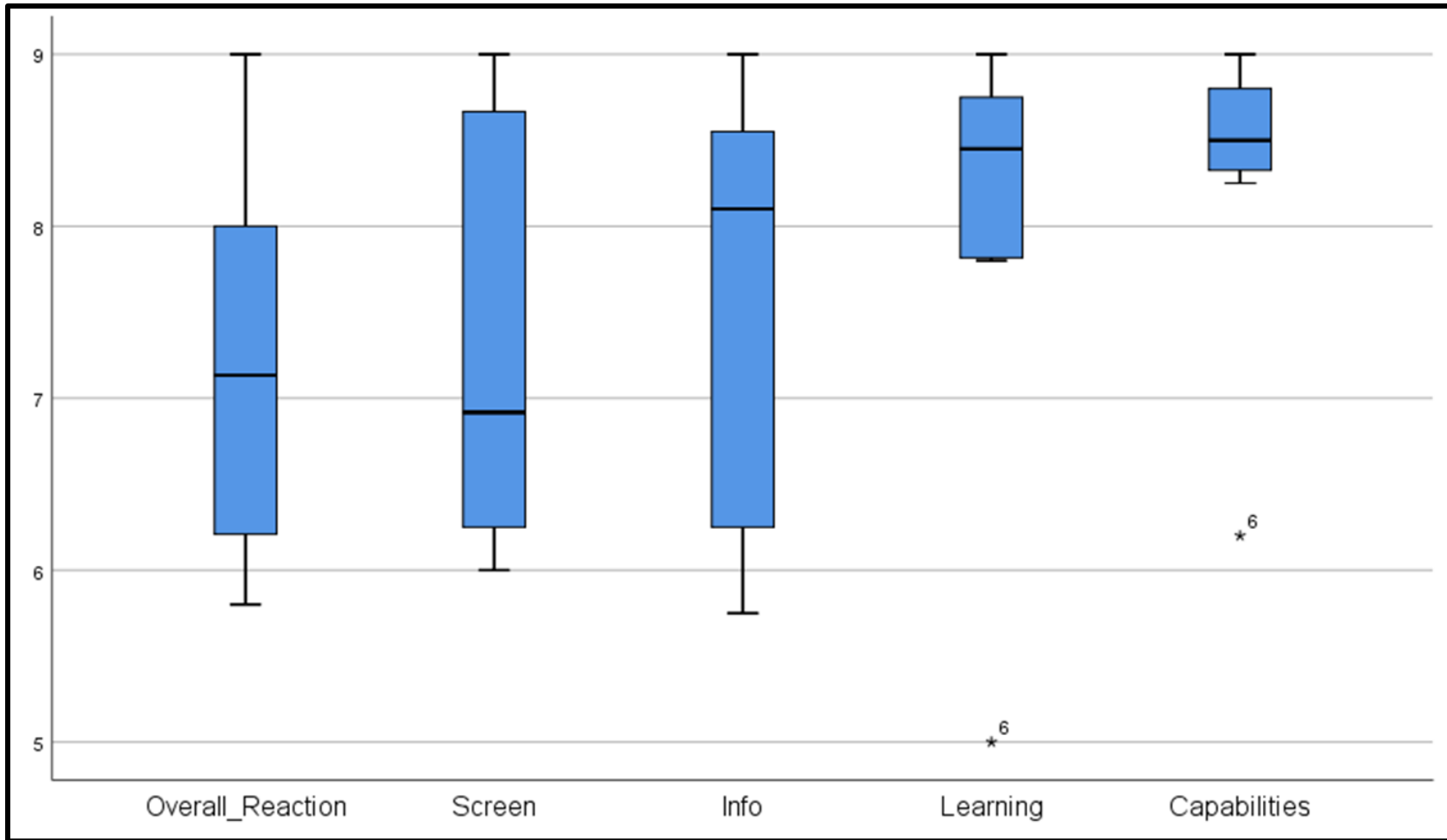


Figure 28. Boxplots for the Five Domains of the Questionnaire for User Interface Satisfaction for Scenario #1 and Tasks

### 5.3.3.2 Scenario #2 and Tasks

In general, the results showed that participants were mostly satisfied with the user interface of the app. Moreover, the average mean score for each domain ranged from 7.5 to 8.8 on a scale from 0 (low) to 9 (high). See Table 28. The average mean score and standard deviation for overall reactions to the software was 7.5 (SD 1.0), presentation of information on the screen was 8.0 (1.0), terminology used and app information was 8.4 (0.8), ease of learning to use the app was 8.2 (0.5), and app capabilities was 8.8 (0.3). Figure 29 displays a boxplot of the mean scores for the five domains of the QUIS for Scenario #2 and Tasks.

The three most positive and three most negative aspects of the app listed were similar to those reported by participants that were given scenario #1 and tasks. The most common strengths were: (1) the app was easy to use; (2) quantity and quality of resources; and (3) tracking features (e.g., depression severity monitoring, self-care plan). The most common weaknesses reported were: (1) plain appearance/lack of color; (2) confusing labeling of information feature; and (3) app could be more intuitive.

Table 28. Summary of Mean Scores for the Five Domains of the Questionnaire for User Interface Satisfaction for Scenario #2 and Tasks (N= 7)

Domain	Minimum Mean Score	Maximum Mean Score	Average of Means (SD)
1. Overall Reactions to the Software	6.0	8.7	7.5 (1.0)
2. Screen	6.3	9.0	8.0 (1.0)
3. Terminology and App Information	7.0	9.0	8.4 (0.8)
4. Learning	7.6	9.0	8.2 (0.5)
5. App Capabilities	8.3	9.0	8.8 (0.3)

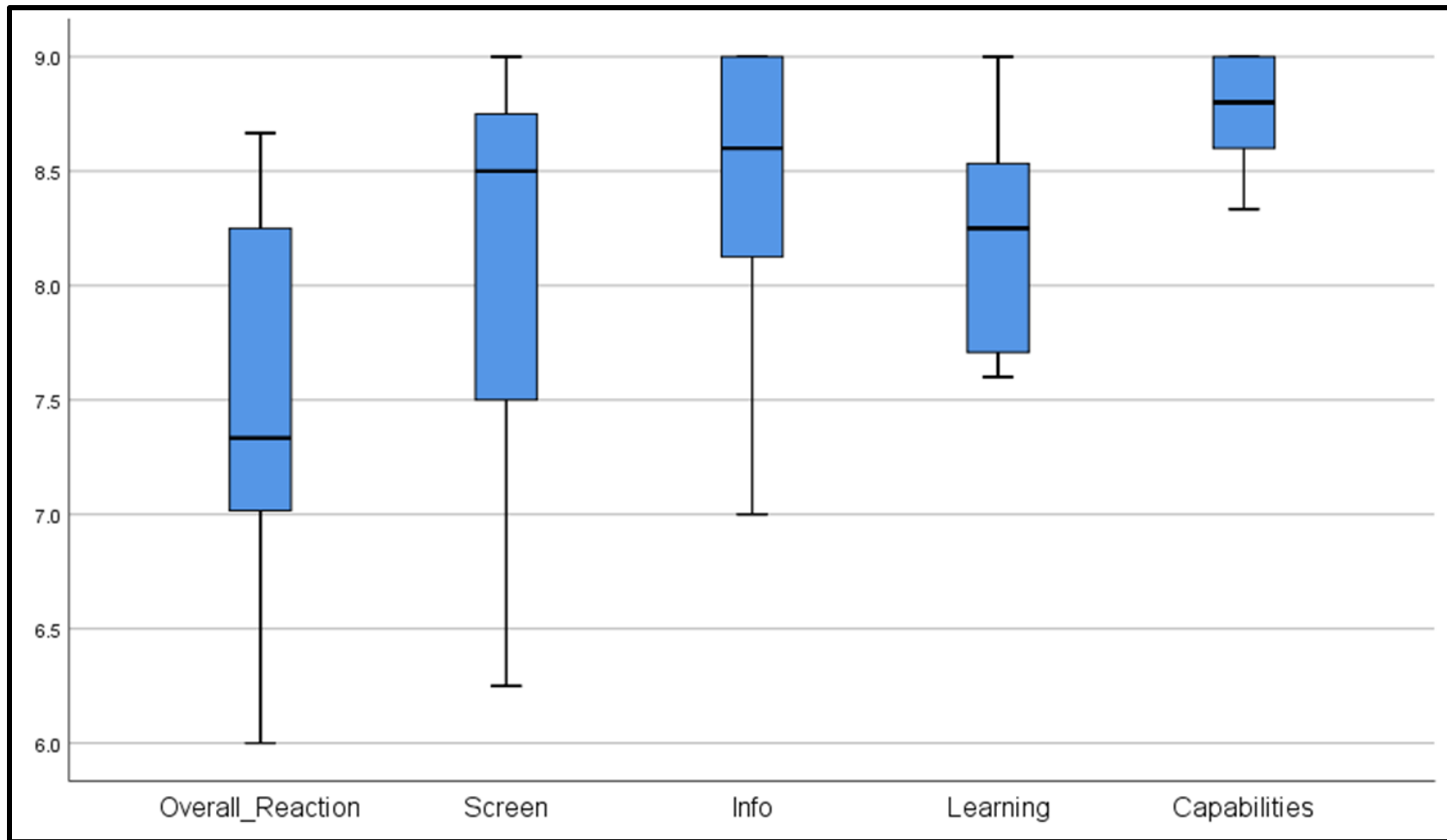


Figure 29. Boxplots for the Five Domains of the Questionnaire for User Interface Satisfaction for Scenario #2 and Tasks

## CHAPTER 6: DISCUSSION

### Introduction

The chapter begins with a discussion of the principal findings from the survey, focus groups, and usability testing in relation to the research aims and questions. Moreover, considerations for the development of mental health apps, or more broadly, health-focused apps with a mental health component, seeking to engage African American women are outlined. Next, ancillary principal findings are discussed, and the strengths and limitations of the research study are addressed. In conclusion, the significance of the study, its implications, and future directions are considered.

### 6.1 Discussion of Principal Findings Related to Research Aims and Questions

#### 6.1.1 Aim I

The first aim of the study is to gauge the attitudes and perceptions of African American women towards utilizing mental health services, and determine the acceptability of using mobile technology to help them manage anxiety and depression. There are four research questions under this aim:

- R1.** What are the attitudes and perceptions of African American women toward using mental health services?
- R2.** What are the barriers to utilization of mental health services?

**R3.** Is the use of mobile technology acceptable to African American women, in terms of delivering mental health services and resources, and helping them manage anxiety and depression?

**R4.** Which modalities are more acceptable than others (e.g., mobile app, video call, voice call, text messaging) to use to deliver mental health services and resources to African American women?

#### 6.1.1.1 Research Question 1

The results from the survey revealed that African American women have favorable views toward seeking mental health services, comparable with non-African American women. Higher scores indicated more positive attitudes toward seeking professional psychological help (range from 0 to 32). Respondents' reports of psychological openness (mean 23.53, SD 5.52) and help-seeking propensity (mean 25.91, SD 5.53) were comparable with both the respondents' scores for psychological openness (mean 23.95, SD 4.53) and help-seeking propensity (mean 26.11, SD 4.89) from the preliminary study (McCall, Schwartz, & Khairat, 2020), and the adult female normative scores for psychological openness (mean 23.19, SD 6.00) and help-seeking propensity (mean 24.95, SD 4.74) (Mackenzie et al., 2004). The indifference to stigma questions were adapted to collect data on indifference to stigma for anxiety and depression, respectively. The participants' scores on indifference to anxiety stigma (mean 25.27, SD 5.97) and indifference to depression stigma (mean 24.50, SD 6.56) were similar to respondents' scores for indifference to anxiety stigma (mean 24.34, SD 6.08) and depression stigma (mean 23.58, SD 6.43) from the preliminary study (McCall, Schwartz, & Khairat, 2020).

Interestingly, the dissertation study findings were contrary to the results of a previous study by Watson and Hunter (Watson & Hunter, 2015) which found that African American

women have less favorable attitudes toward professional help seeking than their non–African American counterparts. However, the differences in reported results between the studies may be because of significant differences in age and education level between the study samples. The mean age of the women in the study by Watson and Hunter (Watson & Hunter, 2015) was 20.9 years, and the majority of participants (92.6%) reported attending a 4-year university. In comparison, the mean age of the women in our study was 44.8 years, and the majority of participants (79.0%) had at least a bachelor’s degree. Therefore, the 24-year difference in mean age between the study samples and the difference in education level could contribute to the contrasting findings. Furthermore, time may also explain the difference in attitudes toward seeking mental health services. Use of mental health services may be less stigmatizing than in the past.

The results from the focus groups were supportive of the survey findings. Most of the participants endorsed using mental health services, such as seeing a therapist. However, every group expressed the preference for a Black female therapist. The emphasis on having someone that looks like them was due to negative experiences in the past, or the perceived burden of having to explain to the therapist what Black women, in general, deal with. Lack of cultural competency, mistrust, and lack of empathy were the main reasons for not initially seeing a therapist or discontinuing treatment. While some clients may have no preference, African Americans who indicate higher levels of mistrust of Whites are more likely to discontinue therapy before treatment goals are reached if they are seen by a White counselor (Terrell & Terrell, 1984).

### 6.1.1.2 Research Question 2

Although respondents had favorable views toward seeking mental health services, approximately 40% of respondents indicated that during the past 12 months there was a time when they needed mental health treatment or counseling but didn't get it. This finding reveals that lack of awareness of personal need for mental health care may not be the primary reason why African American women might not seek mental health care. Respondents identified many barriers to seeking treatment. Most of the barriers were related to cost, not knowing where to get services, lack of time, stigma, concern that they might be committed to a psychiatric hospital or might have to take medicine, difficulty finding a preferred provider (i.e., African American woman), and concerns about confidentiality.

Focus group participants also identified cost, lack of time, stigma, and lack of transportation as barriers to seeking treatment. These barriers are consistent with those documented in the literature (Hines-Martin et al., 2003; Merritt-Davis & Keshavan, 2006; Thompson et al., 2004). The use of mobile technology may help to eliminate or mitigate some of these barriers to receiving mental health care.

### 6.1.1.3 Research Questions 3 & 4

Findings from the study revealed that respondents were most comfortable with the use of a voice call or video call to communicate with a professional to receive help to manage anxiety and depression. Less than half of the respondents endorsed the use of a mobile app or text messaging to communicate with a professional to receive help to manage anxiety and depression. These findings were supportive of the results of the preliminary study that showed that African American women were more comfortable with the use of video call than text messaging to



communicate with a professional to receive help to manage anxiety and depression (insert citation). Furthermore, most of the respondents agreed that having the option to use voice call or video call to communicate with a professional if they are dealing with anxiety or depression would be helpful. However, less than 50% of the respondents agreed that having the option to use a mobile app or text messaging to communicate with a professional if they are dealing with anxiety or depression would be helpful.

Younger African American women (less than 50 years old) were significantly more likely to endorse use of text messaging, mobile app, and video call to communicate with a professional to receive help for managing anxiety than older African American women. In addition, younger women were significantly more likely to endorse use of text messaging, voice call, mobile app, and video call to communicate with a professional to receive help for managing depression. The results are consistent with the findings from the preliminary study and other published literature, in general, there is greater acceptance among younger adults of the use of technology as older adults generally have many concerns (McCall, Schwartz, & Khairat, 2019; Newlin, McCall, Ottmar, Welch, & Khairat, 2018; Peek et al., 2014).

One significant finding emerged in regards to education. Respondents who reported less than a Bachelors degree were more likely to endorse use of text messaging to communicate with a professional to receive help for managing depression than respondents with a Bachelors degree or higher. This finding may largely be due to age since undergraduates are primarily between the ages of 18 and 24, the adult age group that uses text messaging the most. Young adults are the most avid texters, with mobile phone users between the ages of 18 and 24 exchanging an average of 109.5 messages per day compared to an average of 41.5 text messages exchanged daily by the adult population as a whole (Pew Research Center, 2011).

The majority of respondents agreed that use of mobile technology would increase their access to mental health services. Furthermore, most respondents agreed that having the option to use a voice call, video call, or mobile app to complete an appointment with a professional would be more convenient than an in-person appointment. Additionally, they agreed that having the option to use a voice call, video call, or mobile app would save them time traveling to a professional's office.

### 6.1.2 Aim II

The second aim of the study consists of two parts. The first part (Aim II-a) is to design and develop a user-centered prototype that presents important content and preferred features for smartphone applications to help African American women manage anxiety and depression. The second part (Aim II-b) is to test and evaluate a user-centered prototype of a smartphone application tailored to help African American women manage anxiety and depression. There is one research question under this aim:

**R5.** What user-centered recommendations should be addressed in a smartphone application designed to help African American women manage anxiety and depression?

#### 6.1.2.1 Research Question 5

User-centered recommendations for the development of a smartphone app designed to help African American women manage anxiety and depression were compiled from the focus group discussions, and survey data on concerns about mobile app use. The recommendations focus on the type of content (e.g., information to find a Black female therapist, guidance on how to deal with common stressors) and features (e.g., mood tracking, group chat rooms to connect with others) that should be included in the app. Suggestions to increase app usage (e.g., ability to

connect with a preferred therapist through the app, ability to learn coping techniques) and establish trust (e.g., transparency on who created and owns the app, transparency on how user data is protected) with users are also presented in the table. See Table 29.

Table 29. User-Centered Recommendations for the Development of a Mental Health Application to Help African American Women Manage Anxiety and Depression

Content	Features	Daily Active Use	Trust
<ul style="list-style-type: none"> <li>• Information to find a Black female therapist</li> <li>• Guidance on how to deal with common stressors (e.g., microaggressions, imposter syndrome, relationships)</li> <li>• Upcoming events in the area to connect with other Black women</li> <li>• Inspirational messages and encouraging stories</li> <li>• Daily uplifting and supportive messages</li> <li>• Suggested readings that promote mental wellness</li> <li>• Information on financial assistance</li> </ul>	<ul style="list-style-type: none"> <li>• Anxiety, depression, and mood tracking</li> <li>• Guided meditation, deep breathing, and other coping techniques narrated by a Black woman</li> <li>• Group chat rooms to connect with other users</li> <li>• Ability to connect with a preferred therapist through the app via messaging or video call</li> </ul>	<ul style="list-style-type: none"> <li>• App must promote a sense of community</li> <li>• Ability to connect with a therapist</li> <li>• Guidance to learn coping skills to managing anxiety and depression</li> <li>• Short exercises to help manage anxiety and depression</li> <li>• Clean user interface</li> <li>• Intuitive and easy to use</li> <li>• Provide tutorial on how to use the app</li> <li>• Accountability features (e.g., daily mood check-in)</li> <li>• Gamification (e.g., earned stars for completing a task)</li> <li>• Limit notifications</li> </ul>	<ul style="list-style-type: none"> <li>• Transparency on who created and owns the app</li> <li>• Transparency on how user data is protected</li> <li>• Clearly stated policies on data ownership, use, and data sharing</li> <li>• Confidentiality and privacy concerns must be addressed about communicating with a mental health professional through the app</li> </ul>

After completing a cognitive walkthrough of the app, usability testing participants were asked to list the three most positive and three most negative aspects of the app. The strengths were that the app was easy to use, the features were practical and helpful (e.g., depression severity monitoring, self-care plan), and that the app had quality content (e.g., tips on how to manage anxiety, information to find a therapist). The weaknesses of the app were its plain appearance/lack of color, confusing labeling of the information feature, and that the app could be more intuitive.

Based on the feedback from the users, the smartphone application should be intuitive and easy to use, include helpful features that allow them to monitor their mental health (e.g., depression severity monitoring), learn coping skills (e.g., tips on how to overcome depression), connect with needed resources (e.g., therapist), and plan activities for self-care. In addition, the interface should be visually appealing, and have clear labelling. These recommendations are consistent with those found in the literature which highlight the need for educational, psychotherapy, and personal development components in a mental health app designed to help users manage anxiety and depression (Huguet et al., 2016; Topham, Caleb-Solly, Matthews, Farmer, & Mash, 2015). Having a tutorial on how to use the app features and find content would also help to improve user satisfaction and increase use.

## **6.2 Ancillary Principal Findings**

### **6.2.1 Part I: Survey**

The results of the study revealed higher prevalence of anxiety among the survey respondents (28.9%) than reported among non-Hispanic Black women in a large national survey (15.7%) (HRSA, 2010). This discrepancy may be due to underreporting or differences in the

study sample. However, similar prevalence of depression was observed among survey respondents (29.6%) compared to prevalence reported among non-Hispanic Black women in a large national survey (27.4%) (HRSA, 2010).

Moreover, study findings showed that younger African American women were more likely to have higher levels of anxiety than older African American women. The 25 to 34-year-old age group, followed by the 18 to 24-year-old age group, had the highest percentage of individuals with moderate or severe anxiety compared to the older age groups. The results revealed a trend of anxiety severity gradually decreasing among the older age groups. For example, the 35 to 44-year-old age group had lower levels of anxiety than the under 35-year-old groups, the 45 to 54-year-old age group had lower levels of anxiety than the 35 to 44-year-old age group, and so forth. This finding is consistent with previously reported statistics that revealed that younger Black women (less than 50 years old) had higher prevalence of lifetime anxiety disorders (e.g., generalized anxiety disorder) than older Black women (Lacey et al., 2015).

Similarly, the results revealed that younger African American women were more likely to have higher levels of depression than their older counterparts. The 25 to 34-year-old age group, followed by the 18 to 24-year-old age group, had the highest percentage of individuals with moderate, moderately severe, or severe depression compared to the older age groups. The results showed a trend of depression severity gradually decreasing among the older age groups. For example, the 35 to 44-year-old age group had lower levels of depression than the under 35-year-old groups, the 45 to 54-year-old age group had lower levels of depression than the 35 to 44-year-old age group, and so forth. This finding is consistent with past literature that reported that younger Black women (less than 50 years old) had higher prevalence of lifetime mood disorders (e.g., major depressive disorder) than older Black women (Lacey et al., 2015).

Furthermore, respondents who agreed with the use of text messaging to communicate with a professional to receive help to manage anxiety, as a group, were significantly more anxious and had less indifference to anxiety stigma (i.e., they were more concerned about what others might think should they find out that they were seeking professional help for psychological problems) than the group who disagreed with the use of text messaging. Likewise, respondents who agreed with the use of a mobile app to communicate with a professional to receive help to manage anxiety, as a group, were significantly more anxious than the group who disagreed with the use of a mobile app. This finding may be primarily because younger African American women were more likely to have higher levels of anxiety and more likely to endorse use of text messaging or a mobile app. Conversely, respondents who agreed with the use of voice call and video call, respectively, to communicate with a professional to receive help to manage anxiety were not significantly different on any of the measures than those who disagreed.

The study findings also revealed that respondents who agreed with the use of text messaging to communicate with a professional to receive help to manage depression, as a group, were significantly more depressed than the group who disagreed with the use of text messaging. Likewise, respondents who agreed with the use of a mobile app to communicate with a professional to receive help to manage depression, as a group, were significantly more depressed than the group who disagreed with the use of a mobile app. This finding may be primarily because younger African American women were more likely to have higher levels of depression and more likely to endorse use of text messaging or a mobile app. Respondents who agreed with the use of voice call to communicate with a professional to receive help to manage depression, as a group, had greater help-seeking propensity (i.e., they were more likely to believe they are willing and able to seek professional psychological help) and more favorable attitudes toward

seeking mental health services than the group who disagreed with the use of voice call. Furthermore, respondents who agreed with the use of video call to communicate with a professional to receive help to manage depression, as a group, had greater psychological openness (i.e., they were more open to acknowledging psychological problems and to the possibility of seeking professional help for them), greater indifference to depression stigma (i.e., they were less concerned about what others might think should they find out that they were seeking professional help for psychological problems), and more favorable attitudes toward seeking mental health services than the group who disagreed with the use of video call.

Privacy and confidentiality, communication issues (e.g., misinterpreting text), and the impersonal feel of communicating by mobile phone (via text messaging, voice call, mobile app, or video call) were the primary concerns that respondents had. In addition, the belief that use of the modalities are insufficient for treatment in comparison to in-person treatment, and possible technology issues (e.g., disconnection or poor connectivity) disrupting communication were also concerns. This presents a challenge to the adoption and sustained use of these modalities to help African American women manage anxiety and depression.

### 6.2.2 Part II: Focus Groups

Good mental health was primarily viewed as being aware of one's triggers and emotions, and having the ability to control one's emotions and express how you feel. Self-awareness and the importance of having good coping techniques was emphasized by the focus group participants. Conversely, bad mental health was manifested both internally (e.g., negative mood, avoidance of dealing with issues) and externally (e.g., using food or alcohol to cope). Lack of resilience was identified as a major contributor to bad mental health.



The focus group participants shared that talking to their girlfriends and seeking solace in religion were the two most common ways that Black women maintain good mental health. These findings are supportive of the results from a study published by Ward & Heidrich (2009) which found that African American women's preferred coping strategies included praying, using informal support networks (e.g., friends), and seeking treatment. However, the participants voiced that Black women historically have not prioritized maintaining good mental health. Instead, caregiving responsibilities has been the priority and mental health an afterthought.

There was a generational difference observed in attitudes toward using social media as a tool to maintain good mental health. The younger focus group participants were more likely to use social media as an outlet and a tool by expressing how they felt, connecting with others, and finding mental wellness resources (e.g., information about podcasts, encouraging or informative tweets). Whereas, the older participants were less likely to use social media or deemed it inappropriate to use as an outlet to express oneself. Younger African American women (less than 50 years old) are more likely to use social media than their older counterparts (The Nielsen Company, 2017). Use of social media can foster a sense of greater social connectedness, feelings of belonging, normalize challenges and facilitate sharing of coping strategies by sharing personal stories about dealing with mental illness (Naslund, Aschbrenner, Marsch, & Bartels, 2016).

Participants voiced that resiliency is the top quality (i.e., protective factor) Black women have to help them to maintain good mental health. Furthermore, the women espoused the idea of the Strong Black Woman/Superwoman role, a phenomenon that affects the experiences and stress reported by African American women (Woods-Giscombé, 2010). The Superwoman role is characterized by the "obligation to manifest strength, obligation to suppress emotions, resistance to being vulnerable or dependent, determination to succeed despite limited resources, and

obligation to help others” (Woods-Giscombé, 2010). However, participants discussed the duality of resiliency, it can be both helpful and harmful. One can depend on resiliency too much and delay seeking needed mental health care, which can have deleterious effects (Watson & Hunter, 2016).

The intersectionality of being a double-minority, both Black and a woman, was discussed by all groups. The term “intersectionality” was coined by Crenshaw (Crenshaw, 1989) to explain how the “intersectional experience [of being both Black and a woman] is greater than the sum of racism and sexism.” Participants voiced that the compounding effects of having to continuously deal with overt racism and sexism, as well as microaggressions, resulted in feeling negative emotions that are harmful to mental health (e.g., feelings of loneliness, increased stress, and feeling constantly “policed”). African American women are “policed” on everything from hairstyles to how they expressed themselves, and have to learn how to navigate “white spaces” (i.e., places where White people are the majority). The additional stressor of having to always be cognizant of how you present yourself was noted as anxiety inducing. Past studies have shown that African American women’s double-minority status contributes to increased stress (Greer, 2011; Thomas, Witherspoon, & Speight, 2008).

Although there is still stigma in the Black community around using mental health services, all of the participants agreed that the stigma has decreased in recent years. However, needing mental health care is still seen as a weakness or lack of faith, and people are afraid of being judged and labeled as “crazy.” There is still work to be done to normalize therapy in the Black community, however subgroups within the community (e.g., young adults, college graduates) have less stigma around mental health than others, and are acting as catalysts for

change. Partnering with churches and community organizations to promote mental wellness and normalize seeking treatment will help to destigmatize mental illness with the Black community.

### 6.2.3 Part III: Mobile App Usability Testing

Overall, the results showed that participants were mostly satisfied with the user interface of the app. Moreover, the average mean score for overall reactions to the software, screen, terminology and app information, learning, and app capabilities ranged from 7.2 to 8.3 on a scale from 0 (low) to 9 (high) for Scenario #1 and Tasks. Similarly, the average mean score for each domain ranged from 7.5 to 8.8 for Scenario #2 and Tasks.

Most participants were able to fully complete each task with limited to no assistance. The major difference between Scenario #1 and Tasks and Scenario #2 and Tasks was that the first scenario included a task to complete a journal entry, and the second scenario involved creating a self-care plan. Creating a journal entry proved to be the most time consuming and cumbersome task, resulting in three participants being unable to complete the task. The discrepancies in time to complete each task was primary due to differences in typing speed or using an alternate method to search (e.g., used a link from the hamburger menu instead of tapping the feature icon).

#### 6.2.3.1 Observations and Recommendations

The eye tracking software captured that participants primarily focused on the left side and middle of the screen when looking for information. Developers should consider placing important information on the left side or middle of the screen to make it easier for users to find. Sites that link out may not be mobile-friendly and may have a confusing interface, therefore consider only linking out to mobile-friendly sites or placing all important content within the app.

Make sure that buttons are large and spaced well so that users with long fingernails do not have difficulty tapping the buttons.

### **6.3 Strengths & Limitations**

The main strengths of the cross-sectional survey study were the large sample size and wide age distribution. Using a conservative scenario, a sample size of 385 respondents was needed to obtain a width for the 95% confidence interval of  $\pm 0.05$  for an expected proportion of 0.50. Through email and social media recruitment 395 respondents completed the survey. Each age group was sufficiently represented among the survey respondents. However, the main limitations are the mode used to administer the survey and the recruitment methods. Due to the sensitive nature of the questions and for convenience, the computer-assisted web interviewing (CAWI) data collection technique was used to administer the survey. Although this method may increase privacy and reduce respondent burden in completing the survey, women who do not have email access or a social media account may not be able to complete the survey by accessing the link. In regards to recruitment, participants were recruited through convenience sampling and encouraged to share the survey email or social media posts with their networks. Although no PII was collected in the survey and respondents accessed the survey through an anonymous link, social desirability bias could have resulted if the respondent personally knew the PI (T.M.). In addition, the sample consisted of mostly highly educated women (79% had at least a Bachelors degree) with health insurance (93.9% indicated that they had health insurance). This limits our ability to broadly generalize the findings to all African American women. However, African American women with health insurance are still less likely to use mental health services compared to their White counterparts (Padgett, Patrick, Burns, & Schlesinger, 1994).

The main strength of the focus groups was the sample size. Four focus groups were conducted with five participants each. However, a limitation was that most of the participants were under 50 years old so the sample skewed towards capturing the thoughts and opinions of younger African American women. This may limit the generalizability of the findings to older African American women. Also, given the stigma of mental illness in the African American community, participants may have felt peer pressure to give socially desirable answers to the moderator's questions.

The main strengths of the usability study were its rigorous design and use of the cognitive walkthrough think-aloud method, eye tracking glasses and software, and administration of the *Questionnaire for User Interface Satisfaction* to fully capture data on the usability of the mental health app. One of the main limitations of the study is that due to the geographical restriction in recruiting participants, the results may not reflect the opinions and perceptions of a nationally representative sample. In addition, personal preferences may also be revealed in the feedback, which may not actually be helpful in improving the usability of the app. Another limitation was that this study did not focus on the efficacy of the app to reduce anxiety and depressive symptoms, as this would require a randomized control trial and significant resources to be done properly. Despite these limitations, the proposed study design yielded useful data that will help researchers to understand the mental health needs of African American women, and provide a framework for designing a smartphone application to help this population to manage anxiety and depression.

#### **6.4 Significance**

This study adds to the literature by building on previous work from the preliminary study on the acceptability of video call (McCall, Schwartz, & Khairat, 2019) and text messaging

(McCall, Schwartz, & Khairat, 2020) to help African American women manage anxiety and depression. To my knowledge, this study is one of the first to explore the use of a culturally-tailored smartphone application (app) to deliver mental health information and resources to African American women. The findings from this study will help future researchers better understand the mHealth modalities (i.e., text messaging, voice call, app, video call) that African American women find acceptable for mental health interventions, and identify barriers to use of mobile technology for mental health care.

Moreover, the insights gained from the focus groups will help future researchers and clinicians identify key topics that should be covered when considering content to include in mental health interventions for African American women, regardless of mode of delivery. Preferred resources and app features were also identified to help researchers and developers create apps that are both useful and “sticky.” The results from usability testing will help to inform the design and functionality of mental health apps to increase user interface and user experience satisfaction. Furthermore, the findings will give researchers and clinicians a better understanding of the concerns and limitations of using mHealth modalities to deliver mental health services and resources to African American women.

## **6.5 Conclusions and Future Directions**

Most African American women own a smartphone (80%) (The Nielsen Company, 2017). Therefore, there is a great opportunity to use mobile technology to provide mental health resources and services. Mobile technology can be used to eliminate or mitigate many barriers identified by the study participants, such as lack of time, not knowing where to receive mental health services, and difficulty finding a preferred provider. However, a *one-size-fits-all* approach to designing mHealth interventions to help African American women manage anxiety or

depression should not be used, as it may lead to more options but continued disparity in receiving mental health care. A study by Sarkar *et al* (Sarkar et al., 2016), which included investigating the usability of commercially available mobile applications for depression, found that “while patients express interest in using technologies for self-management, current tools are not consistently usable for diverse patients.” User-centered design and testing should always be employed in order to truly address the needs of the population, and to increase the efficiency and effectiveness of mHealth interventions.

This study and past reviews on the use of telehealth to deliver mental health services have highlighted the need to address concerns of privacy, confidentiality, and connectivity for successful implementation (Deady et al., 2017; Firth et al., 2017; Hilty et al., 2013). The Health Insurance Portability and Accountability Act of 1996 (HIPAA) sets national standards to protect sensitive patient health information. Researchers, developers, and clinicians should ensure that the transmission and storage of PII and PHI are HIPAA compliant. In addition, clients should be advised to connect to Wi-Fi or ensure they have a strong cellular signal and sufficient mobile data to prevent connectivity issues. Cost issues for the clients, providers, and clinics should also be considered (Hilty et al., 2013). Furthermore, the clients’ ethnicity, language, and gender preferences for their provider should also be taken into account (Dorstyn, Saniotis, & Sobhanian, 2013).

One caveat is that the use of mobile technology to receive mental health support will not work for everyone. Clients should be screened to determine if use of a modality is appropriate for treatment (Hilty et al., 2013). In cases where in-person therapy is the primary mode of treatment, mHealth modalities may be used as an adjunct to treatment. For example, text

message-based mood ratings can be used as a proxy for the Patient Health Questionnaire-9 (Aguilera et al., 2015).

Currently, the world is being affected by the coronavirus (COVID-19) pandemic. As of May 9, 2020, over 200 countries, areas or territories have reported a total of 3,884,434 cases, and 272,859 confirmed deaths (World Health Organization, 2020). Over 1.2 million cases and 77,034 deaths have been reported in the U.S. (Centers for Disease Control and Prevention, 2020). People are grieving the loss of loved ones, cancelled plans (e.g., graduation commencement), and the loss of normalcy. Telemental health options are needed now more than ever, as people are implored to social distance and shelter at home. COVID-19 is the visible pandemic, however the invisible pandemic that is occurring is the increase in mental illness due to high anxiety, depression, and isolation.

The findings of this study demonstrated the need for additional research into the use of mobile technology to provide African American women with more accessible and convenient options for mental health care. Future research endeavors should include study of how the COVID-19 pandemic has affected mental health globally, within the U.S., and within minority groups. Personally, I intend to explore the affect that the pandemic has had on the mental health of African American women in future research. Has the situation changed their attitudes toward using telemental health modalities to receive mental health services? If so, to what extent? Have they utilized telemental health services since COVID-19? What has been their experience? My hope is that despite all the tragedy that has resulted from this pandemic, increased awareness of telemental health services will occur.



## APPENDIX A: SURVEY RECRUITMENT MATERIALS

### **Email/Listserv Recruitment**

Greetings,

I am a PhD Candidate in the Health Informatics Program at the University of North Carolina at Chapel Hill. I would like to invite you to take part in my dissertation research study to gauge the attitudes and perceptions of Black women toward using mental health services, and the use of mobile technology to manage anxiety and depression. The invitation to participate in this study is in no way based on your mental health history. You are eligible to take the survey regardless of whether you have been diagnosed with anxiety or depression in the past.

After completing the survey, you will be asked to provide your contact information to be entered into a drawing based on chance in which each participant has equal odds of receiving one of five \$100 Amazon gift cards. It will take you about 15-20 minutes to complete the survey. You can complete the survey now by clicking this link: <insert survey hyperlink>

You can also copy and paste the entire link into your web browser. Information you share will be kept confidential, your participation is completely voluntary, and you may choose to skip questions or stop at any time. If you have any questions about this research, contact Terika McCall at [tmccall@unc.edu](mailto:tmccall@unc.edu). If you have questions or concerns about your rights as a research subject, you may contact the UNC Institutional Review Board at 919-966-3113 or by email at [IRB\\_subjects@unc.edu](mailto:IRB_subjects@unc.edu). Thank you for your contribution to this important research.

Sincerely,



Terika McCall, MPH, MBA  
Principal Investigator

### **Social Media Posts**

#### ***Facebook/ Twitter***

Black women: We want to hear from you! Participate in a research study about the attitudes of Black women toward using mental health services. Participants can enter into a drawing to receive one of five \$100 Amazon gift cards. Survey link: <survey\_hyperlink>

## **APPENDIX B: ATTITUDES TOWARD SEEKING MENTAL HEALTH SERVICES AND USE OF MOBILE TECHNOLOGY SURVEY**

### **IRB Study #19-2548**

Greetings,

I would like to invite you to take part in a research study to gauge the attitudes and perceptions of Black women toward using mental health services, and the use of mobile technology to manage anxiety and depression. The invitation to participate in this study is in no way based on your mental health history. You are eligible to take the survey regardless of whether you have been diagnosed with anxiety or depression in the past.

Your survey responses will be used to help researchers and clinicians better understand the attitudes and perceptions of Black women toward using mental health services, and willingness to use mobile technology to receive help in managing anxiety and depression. This information may be used to customize and increase treatment options. Taking the survey is completely voluntary. You can choose not to be in this research study. If you receive medical care at the University of North Carolina at Chapel Hill (UNC), deciding not to be in the research study, now or later, will not affect your ability to receive medical care at UNC.

If you agree to take part in this research, you will be asked to complete this survey. You must be at least 18 years old to participate. After completing the survey, you will be asked to provide your contact information to be entered into a drawing based on chance in which each participant has equal odds of receiving one of five \$100 Amazon gift cards. Participation in the drawing is optional. All personally identifiable information (PII) collected will be kept separate from survey responses. It will take you about 15-20 minutes to complete the survey. Information you share will be kept confidential, your participation is completely voluntary, and you may choose to skip questions or stop at any time.

To protect your identity as a research participant, your research data will not be stored with any information that can be used to identify you. In any publication about this research, your name or other private information will not be used. If you have any questions about this research, please contact Terika McCall at [tmccall@unc.edu](mailto:tmccall@unc.edu). If you have questions or concerns about your rights as a research subject, you may contact the UNC Institutional Review Board at 919-966-3113 or by email at [IRB\\_subjects@unc.edu](mailto:IRB_subjects@unc.edu). If you agree to participate in the study, please click the arrow below to proceed to the survey. Thank you for your contribution to this important research.

Sincerely,

*Terika McCall, MPH, MBA*  
*Principal Investigator*

**Survey Instructions: This survey was designed to gauge the attitudes and perceptions of Black women towards using mental health services, and use of mobile technology to deliver information and services. Please answer all questions to the best of your ability. There are no right or wrong answers. You may choose to skip a question you don't want to answer.**

### **Demographic Information**

1. Do you consider yourself Hispanic or Latino?

Yes

No

2. Which of the following describe you? *Select all that apply*

American Indian or Alaskan Native

Asian

Black or African American

Native Hawaiian or Other Pacific Islander

White

Prefer Not to Answer

3. What is your age?

---

4. Which best describes your gender?

Female

Male

Gender Variant/ Non-Conforming

Not Listed, please specify \_\_\_\_\_

5. What is the highest level of education that you have completed?

Less than a high school diploma

High school diploma or GED

Some college, less than 4-year degree

Bachelor's degree or higher

6. Which category best describes your current annual household income (i.e., per year)? Be sure to include income from all sources, such as salary and wages, child support, interest, public assistance, and pensions.

- Less than \$10,000
- \$10,000 – 24,999
- \$25,000 – 49,999
- \$50,000 – 100,000
- More than \$100,000

## Your Feelings

7. Over the last 2 weeks, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days	Nearly every day
a. Little interest or pleasure in doing things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Feeling down, depressed, or hopeless.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Trouble falling or staying asleep, sleeping too much.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Feeling tired or having little energy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Poor appetite or overeating.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Feeling bad about yourself or that you are a failure or have let yourself or your family down.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Trouble concentrating on things, such as reading the newspaper or watching television.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

h. Moving or speaking so slowly that other people could have noticed. Or the opposite; being so fidgety or restless that you have been moving around a lot more than usual.

i. Thoughts that you would be better off dead or of hurting yourself in some way.

8. If you selected any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

- Not difficult at all
- Somewhat difficult
- Very difficult
- Extremely difficult

9. Over the last 2 weeks, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days	Nearly every day
a. Feeling nervous, anxious or on edge.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Not being able to stop or control worrying.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Worrying too much about different things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Trouble relaxing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Being so restless that it is hard to sit still.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Becoming easily annoyed or irritable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Feeling afraid as if something awful might happen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

---



10. If you selected any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

- Not difficult at all
- Somewhat difficult
- Very difficult
- Extremely difficult

### **Attitudes Toward Seeking Mental Health Services**

#### **Definition of terms**

The term **professional** refers to individuals who have been trained to deal with mental health problems (e.g., psychologists, psychiatrists, social workers, and family physicians). The term **psychological problems** refers to reasons one might visit a professional. Similar terms include mental health concerns, emotional problems, mental troubles, and personal difficulties.

The term **anxiety** is defined as an emotion characterized by feelings of tension, worried thoughts and physical changes like increased blood pressure. The term **depression** is defined as a mood disorder that causes a persistent feeling of sadness and loss of interest.

**Instructions:** For each item, indicate whether you *Disagree*, *Somewhat Disagree*, are *Undecided*, *Somewhat Agree*, or *Agree*:

11. There are certain problems which should not be discussed outside of one's immediate family.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

12. I would have a very good idea of what to do and who to talk to if I decided to seek professional help for psychological problems.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

13. I would not want my significant other (spouse, partner, etc.) to know if I were suffering from **anxiety**.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

14. I would not want my significant other (spouse, partner, etc.) to know if I were suffering from **depression**.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

15. Keeping one's mind on a job is a good solution for avoiding personal worries and concerns.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

16. If good friends asked my advice about a psychological problem, I might recommend that they see a professional.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

17. Having **anxiety** carries with it a burden of shame.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

18. Having **depression** carries with it a burden of shame.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

19. It is probably best not to know *everything* about oneself.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

20. If I were experiencing a serious psychological problem at this point in my life, I would be confident that I could find relief in psychotherapy.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

21. People should work out their own problems; getting professional help should be a last resort.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

22. If I were to experience psychological problems, I could get professional help if I wanted to.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

23. Important people in my life would think less of me if they were to find out that I was dealing with **anxiety**.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

24. Important people in my life would think less of me if they were to find out that I was dealing with **depression**.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

25. Psychological problems, like many things, tend to work out by themselves.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

26. It would be relatively easy for me to find the time to see a professional for psychological problems.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

27. There are experiences in my life I would not discuss with anyone.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

28. I would want to get professional help if I were worried or upset for a long period of time.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

29. I would be uncomfortable seeking professional help for **anxiety** because people in my social or business circles might find out about it.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

30. I would be uncomfortable seeking professional help for **depression** because people in my social or business circles might find out about it.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree



31. Having been diagnosed with **anxiety** is a blot on a person's life.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

32. Having been diagnosed with **depression** is a blot on a person's life.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

33. There is something admirable in the attitude of people who are willing to cope with their conflicts and fears *without* resorting to professional help.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

34. If I believed I were having a mental breakdown, my first inclination would be to get professional attention.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

35. I would feel uneasy going to a professional because of what some people would think.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

36. People with strong characters can get over psychological problems by themselves and would have little need for professional help.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

37. I would willingly confide intimate matters to an appropriate person if I thought it might help me or a member of my family.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

38. Had I received treatment for **anxiety**, I would not feel that it ought to be “covered up.”

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

39. Had I received treatment for **depression**, I would not feel that it ought to be “covered up.”

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

40. I would be embarrassed if my neighbor saw me going into the office of a professional who deals with psychological problems.

- Disagree
- Somewhat Disagree
- Undecided
- Somewhat Agree
- Agree

### **Mental Health Service Use**

These next questions are about treatment and counseling for problems with emotions, nerves or mental health. Please do not include treatment for alcohol or drug use. The answers that you give us about mental health treatment are important to this study’s success, and will be used to help researchers and clinicians better understand the mental health service needs of Black women. We know that this information is personal, but remember your answers will be kept confidential.

41. The list below includes some of the places where people can get treatment or counseling for problems with their emotions, nerves, or mental health. During the past 12 months, did you receive any treatment or counseling for any problem you were having with your emotions, nerves, or mental health at any of the places listed below?

- An outpatient mental health clinic or center
  - The office of a private therapist, psychologist, psychiatrist, social worker, or counselor that was not part of a clinic
  - A doctor's office that was not part of a clinic
  - An outpatient medical clinic
  - A partial day hospital or day treatment program
  - Some other place
- Yes
- No
- Don't Know
- Refused

42. Where did you receive mental health treatment or counseling during the past 12 months?  
*Select all that apply*

- An outpatient mental health clinic or center
- The office of a private therapist, psychologist, psychiatrist, social worker, or counselor that was not part of a clinic
- A doctor's office that was not part of a clinic
- An outpatient medical clinic
- A partial day hospital or day treatment program
- Some other place, please specify
-

43. During the past 12 months, was there any time when you needed mental health treatment or counseling for yourself but didn't get it?

- Yes
- No
- Don't Know
- Refused

44. Which of these statements explain why you did not get the mental health treatment or counseling you needed? *Select all that apply*

- You couldn't afford the cost.
  - You were concerned that getting mental health treatment or counseling might cause your neighbors or community to have a negative opinion of you.
  - You were concerned that getting mental health treatment or counseling might have a negative effect on your job.
  - Your health insurance does not cover any mental health treatment or counseling.
  - Your health insurance does not pay enough for mental health treatment or counseling.
  - You did not know where to go to get services.
  - You were concerned that the information you gave the counselor might not be kept confidential.
  - You were concerned that you might be committed to a psychiatric hospital or might have to take medicine.
  - Some other reason or reasons, please specify
- 

45. Earlier, we asked did you receive any treatment or counseling for any problem you were having with your emotions, nerves, or mental health. The response options below contain possible sources of treatment, counseling or support that were not mentioned before. During the past 12 months, did you receive any treatment or counseling for any problem you were having with your emotions, nerves, or mental health at any of the places listed below?

- Spiritual or religious advisor, such as a pastor, priest, rabbi
- Acupuncturist or acupressurist
- Chiropractor
- Herbalist
- In-person support group or self-help group
- Online counseling (e.g., video call with therapist)
- Internet support group or chat room
- Telephone hotline
- Massage therapist
- Some other place

Yes

No

Don't Know

Refused

46. Where did you receive mental health treatment or counseling during the past 12 months?

*Select all that apply*

- Spiritual or religious advisor, such as a pastor, priest, rabbi
- Acupuncturist or acupressurist
- Chiropractor
- Herbalist
- In-person support group or self-help group
- Online counseling (e.g., video call with therapist)
- Internet support group or chat room
- Telephone hotline



Massage therapist

Some other place, please specify

---

### **Mobile Phone Use**

47. Do you currently own a mobile phone?

Yes

No

48. On average, how often do you use your phone to send text messages?

- Never
- Less than 1 time per week
- 1-6 times per week
- 1-3 times per day
- 4 or more times per day

49. On average, how often do you use your phone to access mobile applications (e.g., social media apps, news apps, navigation apps, etc.)?

- Never
- Less than 1 time per week
- 1-6 times per week
- 1-3 times per day
- 4 or more times per day

50. Are you able to complete video calls on your phone (e.g., FaceTime, Skype, WhatsApp, etc.)?

- Yes
- No

51. On average, how often do you use your phone to complete video calls?

- Never
- Less than 1 time per week
- 1-6 times per week
- 1-3 times per day
- 4 or more times per day

### **Use of Mobile Phone to Receive Mental Health Services**

#### Definition of terms

The term professional refers to individuals who have been trained to deal with mental health problems (e.g., psychologists, psychiatrists, social workers, and family physicians). The term anxiety is defined as an emotion characterized by feelings of tension, worried thoughts and physical changes like increased blood pressure. The term depression is defined as a mood disorder that causes a persistent feeling of sadness and loss of interest.

Instructions: For the following statements, please read each sentence replacing the blank space with the listed options for each statement (e.g., text messaging, voice call, mobile app, or video call). For example, "I would feel comfortable communicating with a professional through text messaging to receive help for managing anxiety." Then select your response for each statement.

52. I would feel comfortable communicating with a professional through \_\_\_\_\_ to receive help for managing anxiety.

	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree
a. text messaging	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. voice call	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. mobile app	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. video call	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

53. I would feel comfortable communicating with a professional through \_\_\_\_\_ to receive help for managing **depression**.

	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree
a. text messaging	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. voice call	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. mobile app	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. video call	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

54. Having the option to use \_\_\_\_\_ to communicate with a professional if I am dealing with anxiety would be helpful for me.

	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree
a. text messaging	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. voice call	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. mobile app	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. video call	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

55. Having the option to use \_\_\_\_\_ to communicate with a professional if I am dealing with **depression** would be helpful for me.

	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree
a. text messaging	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. voice call	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. mobile app	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. video call	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

56. Would having the option to use a \_\_\_\_\_ to complete an appointment with a professional increase your access to mental health services?

	Yes	No
a. voice call	<input type="radio"/>	<input type="radio"/>
b. mobile app	<input type="radio"/>	<input type="radio"/>
c. video call	<input type="radio"/>	<input type="radio"/>

57. Would having the option to use a \_\_\_\_\_ to complete an appointment save you time traveling to a professional's office?

	Yes	No
a. voice call	<input type="radio"/>	<input type="radio"/>
b. mobile app	<input type="radio"/>	<input type="radio"/>
c. video call	<input type="radio"/>	<input type="radio"/>

58. Would having the option to use a \_\_\_\_\_ to complete an appointment with a professional be more convenient for you than an in-person appointment?

	Yes	No
a. voice call	<input type="radio"/>	<input type="radio"/>
b. mobile app	<input type="radio"/>	<input type="radio"/>
c. video call	<input type="radio"/>	<input type="radio"/>

59. Do you have any concerns about using a voice call to receive mental health treatment or counseling?

Yes

No

60. What are your concerns about using a voice call to receive mental health treatment or counseling?

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61. Do you have any concerns about using a mobile app to receive mental health treatment or counseling?

Yes

No

62. What are your concerns about using a mobile app to receive mental health treatment or counseling?

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---

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63. Do you have any concerns about using a video call to receive mental health treatment or counseling?

Yes

No

64. What are your concerns about using a video call to receive mental health treatment or counseling?

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---

65. Do you have any concerns about using text messaging to communicate with a professional about your mental health?

Yes

No

66. What are your concerns about using text messaging to communicate with a professional about your mental health?

---

---

---

---

---

67. Have you ever been diagnosed with **anxiety**?

- Yes
- No
- Don't Know
- Refused

68. Have you ever been diagnosed with **depression**?

- Yes
- No
- Don't Know
- Refused

69. Do you currently have health insurance?

- Yes
- No
- Don't Know

70. Does your health insurance pay for any type of mental health treatment or counseling services?

- Yes
- No
- Don't Know

71. Comments (Optional)

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**Thank you for completing the survey, and contributing to this important research! Please click the arrow below to submit your survey and enter your information for the drawing to receiving one of five \$100 Amazon gift cards.**

## APPENDIX C: FOCUS GROUP RECRUITMENT MATERIALS



### ARE YOU A BLACK WOMAN THAT HAS EXPERIENCED ANXIETY OR DEPRESSION?

Participate in a research study about the attitudes of Black women towards using mental health services, and the acceptability of using mobile technology to deliver mental health services and resources. Focus group participants will receive a \$25 Amazon gift card.

You may be ELIGIBLE if:

- You are a Black/African American woman (18 years or older)
- You are able to attend a focus group at UNC Chapel Hill or a Durham County library

A clinical diagnosis of anxiety or depression is NOT required to participate in the study. Your participation is completely voluntary. For more information about the study, or to find out if you are eligible to participate, please contact Terika at [tmccalleunc.edu](mailto:tmccalleunc.edu)



THE UNIVERSITY  
of NORTH CAROLINA  
at CHAPEL HILL

IRB STUDY # 19-2548



## ARE YOU A BLACK WOMAN THAT HAS EXPERIENCED ANXIETY OR DEPRESSION?

Participate in a research study about the attitudes of Black women towards using mental health services, and the acceptability of using mobile technology to deliver mental health services and resources. Focus group participants will receive a \$25 Amazon gift card.

You may be ELIGIBLE if:

- You are a Black/African American woman (18 years or older)
- You are able to attend a focus group at UNC Chapel Hill or a Durham County library

A clinical diagnosis of anxiety or depression is NOT required to participate in the study. Your participation is completely voluntary. For more information about the study, or to find out if you are eligible to participate, please contact Terika at [tmccall@unc.edu](mailto:tmccall@unc.edu)



THE UNIVERSITY  
of NORTH CAROLINA  
at CHAPEL HILL

IRB STUDY # 19-2548

## APPENDIX D: FOCUS GROUP CONSENT FORM

IRB TEMPLATE  
Version 2.0-12/5/2018

\*\*DO NOT CHANGE THIS FIELD-IRB USE ONLY\*\*

### University of North Carolina at Chapel Hill Consent to Participate in a Research Study Focus Group for Adult Participants

Consent Form Version Date: 09/21/2019

IRB Study # 19-2548

Title of Study: mHealth for Mental Health: Culturally-tailored Interventions for Managing Anxiety and Depression in African American Women

Principal Investigator: Terika McCall

Principal Investigator Department: School of Information and Library Science

Principal Investigator Email Address: tmccall@unc.edu

Faculty Advisor: Saif Khairat

Faculty Advisor Contact Information: saif@unc.edu/ 919-843-5413

Funding Source and/or Sponsor: School of Information and Library Science

#### CONCISE SUMMARY

The purpose of this research study is to learn more about the attitudes and perceptions of African American women towards mental health and using mental health services, and the acceptability of using mobile technology to deliver mental health services and resources. Participants will be placed in a focus group of 4 – 8 women, and a moderator will ask you several questions while facilitating the discussion. No questions will be directed to you individually, but instead will be posed to the group. Participation in this focus group will last approximately 1 hour to 1 hour 15 minutes. We do not anticipate any risks or discomfort to you from being in this study. Your thoughts and opinions may be used in the future to help customize and increase mental health treatment options for African American women, and inform the design of a mobile application (app) tailored to help African American women manage anxiety and depression. If you are interested in learning more about this study, please continue to read below.

#### **What are some general things you should know about research studies?**

You are being asked to take part in a research study. To join the study is voluntary. You may choose not to participate, or you may withdraw your consent to be in the study, for any reason, without penalty.



Research studies are designed to obtain new knowledge. This new information may help people in the future. You may not receive any direct benefit from being in the research study. There also may be risks to being in research studies.

Details about this study are discussed below. It is important that you understand this information so that you can make an informed choice about being in this research study.

You will be given a copy of this consent form. You should ask the researchers named above, or staff members who may assist them, any questions you have about this study at any time.

**What is the purpose of this study?**

You have been invited to participate in a focus group. The purpose of this focus group is to understand the attitudes and perceptions of African American women towards mental health and using mental health services, and the acceptability of using mobile technology to deliver mental health services and resources. The information learned in this focus group will be used to help researchers and clinicians better understand the attitudes and perceptions of African American women toward using mental health services, and inform the design of a mobile application (app) tailored to help African American women manage anxiety and depression.

You are being asked to be in the study because you are an African American woman (18 years of age or older). The invitation to participate in this study is in no way based on your mental health history. You are eligible to participate regardless of whether you have been diagnosed with anxiety or depression in the past.

**How many people will take part in this study?**

A total of approximately 40 women will take part in this study.

**How long will your part in this study last?**

Your participation in this focus group will last approximately 1 hour to 1 hour 15 minutes.

**What will happen if you take part in the study?**

As part of this study, you will be placed in a group of 4 – 8 women. A moderator will ask you several questions while facilitating the discussion. No questions will be directed to you individually, but instead will be posed to the group. You may choose to respond or not respond at any point during the discussion. A note-taker will be present, and the focus group discussion will be audio recorded so we can capture comments in a transcript for analysis.

**What are the possible benefits from being in this study?**

Research is designed to benefit society by gaining new knowledge. You may not benefit personally by participating in the focus group. However, your thoughts and opinions may be used in the future to help customize and increase mental health treatment options for African American women, and to inform the design of a mobile app tailored to help African American women manage anxiety and depression.

**What are the possible risks or discomforts involved from being in this study?**

We do not anticipate any risks or discomfort to you from being in this study. Even though we

will emphasize to all participants that comments made during the focus group session should be kept confidential, it is possible that participants may repeat comments outside of the group at some time in the future. Therefore, we encourage you to be as honest and open as you can, but remain aware of our limits in protecting confidentiality.

**How will information about you be protected?**

Every effort will be taken to protect your identity as a participant in this study. You will not be identified in any report or publication of this study or its results. Your name will not appear on any transcripts; instead, you will be given a study ID number. The list which matches names and study ID numbers will be kept in a locked file cabinet. After the focus group audio recording has been transcribed, the recording will be deleted, and the list of names and numbers will also be destroyed.

We may use de-identified data from this study in future research without additional consent.

**What if you want to stop before your part in the study is complete?**

You can withdraw from this study at any time, without penalty. The investigators also have the right to stop your participation at any time. This could be because you have had an unexpected reaction to the topic(s) of discussion, or have failed to follow instructions, or because the entire study has been stopped.

**Will you receive anything for being in this study?**

You will receive a \$25 Amazon gift card for taking part in this study.

**Will it cost you anything to be in this study?**

It will not cost you anything to be in this study.

**What if you are a UNC student?**

You may choose not to be in the study or to stop being in the study before it is over at any time. This will not affect your class standing or grades at UNC-Chapel Hill. You will not be offered or receive any special consideration if you take part in this research.

**What if you are a UNC employee?**

Taking part in this research is not a part of your University duties, and refusing will not affect your job. You will not be offered or receive any special job-related consideration if you take part in this research.

**Who is sponsoring this study?**

The research study is funded by the University of North Carolina at Chapel Hill's School of Information and Library Science. This means that the sponsor is providing funding to compensate research participants.

**What if you have questions about this study?**

You have the right to ask, and have answered, any questions you may have about this research. If you have questions about the study (including payments), complaints, concerns, or if a research-

related injury occurs, you should contact the researchers listed on the first page of this form.

**What if you have questions about your rights as a research participant?**

All research on human volunteers is reviewed by a committee that works to protect your rights and welfare. If you have questions or concerns about your rights as a research subject, or if you would like to obtain information or offer input, you may contact the Institutional Review Board at 919-966-3113 or by email to IRB\_subjects@unc.edu.

**Participant's Agreement:**

I have read the information provided above. I have asked all the questions I have at this time. I voluntarily agree to participate in this research study.

---

Signature of Research Participant Date

---

Printed Name of Research Participant

---

Signature of Research Team Member Obtaining Consent Date

---

Printed Name of Research Team Member Obtaining Consent

## APPENDIX E: FOCUS GROUP INTERVIEW GUIDE

**Supplies:** List of participants; tents or name tags and markers; consent forms (2 per participant); paper and pens for participants and moderator; audio recording equipment; \$25 Amazon gift cards; receipts; focus group interview guide for moderator and notetaker; refreshments (drinks and snacks, napkins, cups, paper plates, serving containers).

Consent forms for focus group participants are completed before the discussion starts. Below is the introduction, including a summary of the information that the moderator should state to make sure participants understand the information in the consent form.

### **Introduction**

*Good [morning/afternoon/evening]! Thank you for agreeing to participate in the focus group today. My name is Terika, and I am a PhD Candidate in the Health Informatics Program at UNC – Chapel Hill. I would also like to introduce [Notetaker name], who will be helping me today by taking notes for our session.*

*This focus group is a part of my doctoral dissertation research study. The purpose of the study is to understand the attitudes and perceptions of Black women towards using mental health services, and the acceptability of using mobile technology to deliver mental health services and resources. We are very interested to hear about your perception of mental health, and ideas about developing a smartphone app. There are just a few things I would like to mention about our session today...*

- *The information you share is completely confidential, and we will not associate your name with anything you say in the focus group.*
- *No questions will be directed to you individually, but instead will be posed to the group. You may choose to respond or not respond at any point during the discussion.*
- *We would like to record the focus groups so that we can make sure to capture the thoughts, opinions, and ideas we hear from the group. You will not be identified in any report or publication of this study or its results. Your name will not appear on any transcripts; instead, you will be given a study ID number. The audio recording will be destroyed as soon as it is transcribed.*
- *We understand how important it is that your information is kept private and confidential. Therefore, we ask that comments made during the focus group session, not be repeated outside of the group by any participants.*
- *Your participation is voluntary, and you may refuse to answer any question or withdraw from the study at any time.*

- *If you have any questions about the study after you leave this session, you can contact me or my advisor using the contact information listed in your consent form.*

*Are there any questions before we get started?*

*Okay, let's start with going around the table and introducing ourselves. Can you say your name and ID number before we begin the discussion?*

## **Questions**

Part I (25 minutes)

Let's start the discussion by talking about how you define mental health.

1. When you think about "good mental health," what goes through your mind?
2. When you think about "bad mental health," what goes through your mind?
3. What, if anything, do Black women do to maintain good mental health?
4. Are there certain qualities that Black women have that help us maintain "good" mental health? If so, what are they?
5. Are there things that Black women deal with that other groups might not have to deal with?
  - a. How do you think that affects our mental health? Can you talk more about that?
6. What are some of the things in the past that have caused you to feel anxious?
  - a. How did you deal with them?
  - b. What type of support or resources would have been helpful to have access to during that time?
7. What are some of the things in the past that have caused you to feel depressed?
  - a. How did you deal with them?
  - b. What type of support or resources would have been helpful to have access to during that time?
8. How do you feel about using mental health services, such as seeing a therapist?
  - a. Do you think that there's a stigma around using this kind of care? Can you tell me more about that?
  - b. Do you feel that the stigma around using mental health services has changed in the last five years? Can you tell me more about that?
9. Before we switch gears to talk about the app, is there something else you'd like to discuss that I haven't asked you?

Part II (40 minutes)

The last half of our session will be used to ask questions about your use of mobile apps, and what information, resources, and features you would like in a smartphone app designed to help Black women manage anxiety and depression.

1. Do you currently use mental health and wellness apps?
  - a. Which apps do you use?
  - b. Which features do you like most?
  - c. Which features do you like least?
2. What topics would you like to see addressed in the app? *Example, if needed: coping with discrimination.*
  - a. Are there any topics that you think would be particularly helpful for Black women?
3. If you could design an app to help Black women manage anxiety and depression, what kinds of features would it have?
  - a. Are there any specific activities you would like to be able to complete in the app? *Example, if needed: a thought journal*
  - b. Would you like to be able to track your emotions? Can you tell me more about that?
  - c. What types of notifications would be helpful? *Example, if needed: reminders about scheduling self-care activities*
    - i. How often would you like to receive them?
  - d. Would you like to be able to connect with a mental health professional through the app?
    - i. How would you like to connect with them? *Example, if needed: through messaging or video call.*
4. What type of support or resources would be helpful to have information about in the app? *Example, if needed: how to find a therapist*
5. What, if anything, would make you want to use it regularly?
6. What would get in the way of you using it regularly?
7. Do you have any concerns about using a mental health app? *Example, if needed: privacy concerns*
8. If you were designing the app, how would you get the word out about the app?

Wrap-up (10 minutes)

*As we wrap-up our discussion today, I just want to check-in with [Notetaker name] to see if she has any comments or questions for the group.*

*Does anyone have any last thoughts or questions about any of the topics we discussed today? If there is anything you would like to mention, but feel uncomfortable saying in front of the group, feel free to write it on one of the comment cards and give it to me before you leave.*

*Thank you for participating in this focus group! Your opinions will help us to better understand the attitudes and perceptions of Black women towards mental health and mental health care. As well, as to design an app that incorporates useful information and features to helping Black women manage anxiety and depression. Thank you for your time. Please see me on your way out to receive your Amazon gift card. I would also like to give you an information sheet with mental health resources (e.g., therapist directory, Therapy for Black Girls podcast) to use personally or share with others.*

After Focus Group Tasks:

- Moderator and notetaker meet to debrief
- Clean up room
- Make sure all consents have been filed

## APPENDIX F: USABILITY TESTING RECRUITMENT MATERIALS



**ARE YOU A  
BLACK WOMAN  
THAT HAS  
EXPERIENCED  
ANXIETY OR  
DEPRESSION?**

Participate in a research study testing a mobile app that is being designed to help African American women manage anxiety and depression. Study participants will receive a \$25 Amazon gift card.

You may be **ELIGIBLE** if:

- You are a Black/African American woman (18 years or older)
- You are able to attend a session to test the app at UNC School of Nursing

A clinical diagnosis of anxiety or depression is **NOT** required to participate in the study. Your participation is completely voluntary. For more information about the study, or to find out if you are eligible to participate, please contact the study team at [mhealth4mentalhealth@unc.edu](mailto:mhealth4mentalhealth@unc.edu) or 919-636-9198.



THE UNIVERSITY  
of NORTH CAROLINA  
at CHAPEL HILL

IRB STUDY # 19-2548



## APPENDIX G: APP USABILITY TESTING CONSENT FORM

IRB TEMPLATE  
Version 2.0-12/5/2018

\*\*DO NOT CHANGE THIS FIELD-IRB USE ONLY\*\*

### University of North Carolina at Chapel Hill Consent to Participate in a Research Study – mHealth App Usability Testing Adult Participants

Consent Form Version Date: 12/24/2019

IRB Study # 19-2548

Title of Study: mHealth for Mental Health: Culturally-tailored Interventions for Managing Anxiety and Depression in African American Women

Principal Investigator: Terika McCall

Principal Investigator Department: School of Information and Library Science

Principal Investigator Email Address: tmccall@unc.edu

Faculty Advisor: Saif Khairat

Faculty Advisor Contact Information: saif@unc.edu/ 919-843-5413

Funding Source and/or Sponsor: Carolina Health Informatics Program

#### CONCISE SUMMARY

The purpose of this research study is to test and evaluate a mobile application (app) that is being designed to help African American women manage anxiety and depression. Approximately 20 participants will be enrolled in this study, which is being conducted in the Biobehavioral Lab (BBL) in the UNC School of Nursing. You will be asked to perform a series of tasks in the app and think aloud as you complete them. You will also be asked to complete a questionnaire after finishing the tasks so that we may collect information on how well the app worked, and the content and features you found most and least useful in the app. The session will last approximately 1 hour. We do not anticipate any risks or discomfort to you from being in this study. Your thoughts and opinions may be used in the future to provide insights on design preferences for a mobile app tailored to help African American women manage anxiety and depression. If you are interested in learning more about this study, please continue to read below.

#### **What are some general things you should know about research studies?**

You are being asked to take part in a research study. To join the study is voluntary. You may

choose not to participate, or you may withdraw your consent to be in the study, for any reason, without penalty.

Research studies are designed to obtain new knowledge. This new information may help people in the future. You may not receive any direct benefit from being in the research study. There also may be risks to being in research studies. Deciding not to be in the study or leaving the study before it is done will not affect your relationship with the researcher, your health care provider, or the University of North Carolina-Chapel Hill. If you are a patient with an illness, you do not have to be in the research study in order to receive health care.

Details about this study are discussed below. It is important that you understand this information so that you can make an informed choice about being in this research study.

You will be given a copy of this consent form. You should ask the researchers named above, or staff members who may assist them, any questions you have about this study at any time.

**What is the purpose of this study?**

The purpose of this research study is to test and evaluate a mobile application (app) that is being designed to help African American women manage anxiety and depression. Your thoughts and opinions may be used in the future to provide insights on design preferences for a mobile app tailored to help African American women manage anxiety and depression.

You are being asked to be in the study because you are an African American woman (18 years of age or older). The invitation to participate in this study is in no way based on your mental health history. You are eligible to participate regardless of whether you have been diagnosed with anxiety or depression in the past.

**How many people will take part in this study?**

A total of approximately 20 women will take part in this study.

**How long will your part in this study last?**

Your participation in the study will last approximately 1 hour; this includes testing the app and completing the questionnaire.

**What will happen if you take part in the study?**

This study will occur in the Biobehavioral Lab in the School of Nursing at UNC. First, you will receive a brief overview of the study aims and a description of the software and eye tracking glasses you will be using. Then, we will provide you with a mobile phone (Android or iPhone) and ask you to perform a series of tasks in the app and think aloud as you complete them. You will be given instructions to read the persona and scenario and then begin the tasks. You will not enter any of your personal information into the app. The instructions for each task include dummy information for you to enter to complete the task. The Principal Investigator will be present and will observe while you complete the tasks. One or more graduate research assistants may be present to assist with study activities and observe.

In the background, the software will record your taps on the phone screen, eye movements, the amount of time you spend on each screen, and the amount of time you spend on each task. Once you complete all of the tasks, you will be asked to complete a questionnaire so that we may collect information on how well the app worked, and the content and features you found most and least useful in the app. **Note: You cannot wear prescription glasses during the study because it will interfere with use of the eye tracking glasses.**

**What are the possible benefits from being in this study?**

Research is designed to benefit society by gaining new knowledge. You may not benefit personally by participating. However, your thoughts and opinions may be used in the future to provide insights on design preferences for a mobile app tailored to help African American women manage anxiety and depression.

**What are the possible risks or discomforts involved from being in this study?**

We do not anticipate any risks or discomfort to you from being in this study. In the case of unanticipated discomfort from the eye tracking glasses, participants may take off the glasses and continue the study.

**How will information about you be protected?**

Every effort will be taken to protect your identity as a participant in this study. You will not be identified in any report or publication of this study or its results. Your name will not appear on any transcripts; instead, you will be given a study ID number. The list which matches names and study ID numbers will be kept in a locked file cabinet. Images and video of your face or eyes from the eye tracking software will be destroyed after data about your pupil movements is analyzed. We may use de-identified data from this study in future research without additional consent.

**What if you want to stop before your part in the study is complete?**

You can withdraw from this study at any time, without penalty. The investigators also have the right to stop your participation at any time. This could be because you have had an unexpected reaction, or have failed to follow instructions, or because the entire study has been stopped.

**Will you receive anything for being in this study?**

You will receive a \$25 Amazon gift card for taking part in this study.

**Will it cost you anything to be in this study?**

It will not cost you anything to be in this study.

**What if you are a UNC student?**

You may choose not to be in the study or to stop being in the study before it is over at any time. This will not affect your class standing or grades at UNC-Chapel Hill. You will not be offered or receive any special consideration if you take part in this research.

**What if you are a UNC employee?**

Taking part in this research is not a part of your University duties, and refusing will not affect your job. You will not be offered or receive any special job-related consideration if you take part

in this research.

**Who is sponsoring this study?**

The research study is funded by the Carolina Health Informatics Program. This means that the sponsor is providing funding to compensate research participants.

**What if you have questions about this study?**

You have the right to ask, and have answered, any questions you may have about this research. If you have questions about the study (including payments), complaints, concerns, or if a research-related injury occurs, you should contact the researchers listed on the first page of this form.

**What if you have questions about your rights as a research participant?**

All research on human volunteers is reviewed by a committee that works to protect your rights and welfare. If you have questions or concerns about your rights as a research subject, or if you would like to obtain information or offer input, you may contact the Institutional Review Board at 919-966-3113 or by email to [IRB\\_subjects@unc.edu](mailto:IRB_subjects@unc.edu).

**Participant's Agreement:**

I have read the information provided above. I have asked all the questions I have at this time. I voluntarily agree to participate in this research study.

---

Signature of Research Participant

---

Date

---

Printed Name of Research Participant

---

Signature of Legally Authorized Representative

---

Date

---

Printed Name of Legally Authorized Representative

---

Signature of Research Team Member Obtaining Consent

---

Date

---

Printed Name of Research Team Member Obtaining Consent

## APPENDIX H: USABILITY TESTING SCENARIO AND TASKS

### Scenario #1 and Tasks

You are Betty Jackson a teacher at Miami Lakes Middle School in South Florida. You have been stressed out for the past 2 months due to demands at work and home. In the past, your doctor has recommended that you speak to a therapist, however you have been reluctant to schedule an appointment with the therapist you were referred to. You recently saw an advertisement for a new mental health app on Facebook and decided to download it on your mobile phone. You have been using the app for 6 weeks now, and you would like to review your anxiety severity over the last 6 weeks. You review the anxiety checkup graph to see your progress and discover that your anxiety has become progressively worse. This leads you to use the app to find information about managing anxiety, and locate a therapist in your area to schedule an appointment.

**Task 1: Find out your levels of anxiety for the past 6 weeks. Let me know when you're done.**

1. Open the app
2. Find the graphs feature
3. Find the anxiety checkup graph
4. Report your most recent level of anxiety recorded in the graph (severity and date)

**Task 2: Find information on how to manage anxiety. Let me know when you're done.**

1. Find the information feature
2. Find the anxiety information
3. Find the information on how to manage anxiety
4. Report the first tip on managing anxiety

**Task 3: Add a new entry to your Journal. Let me know when you're done.**

1. Find the journal feature
2. Create a new journal entry.
  - a. **Title.** Enter the following title for the journal entry: "Today was a lot"
  - b. **Describe your thoughts and how you felt.** Enter manually or use the voice-to-text feature to enter the following information:

"Today my AP told me that I will be teaching one more section of Algebra in the Spring. I am already overwhelmed with the sections that I have now. I don't know how to tell him that it is going to be too much to manage."
  - c. Choose "anxious" and "overwhelmed" as your options to report your feelings

- d. **Is there anything you can do to make the situation better, or avoid it from happening in the future?** Select “Yes”
- e. **What do you think can be done to make the situation better?** Enter manually or use the voice-to-text feature to enter the following information:  
“I can email the AP to schedule a meeting to discuss my concerns, and propose that other tasks be taken off my plate if I am going to teach one more class.”

**Task 4: Locate a therapist to schedule an appointment. Let me know when you’re done.**

- 1. Find the resources feature
- 2. Find a therapist in your area from the Therapy for Black Girls Therapist Directory
  - a. Search by zip code “33015”
  - b. Find “Nakita Charles” and report whether she is accepting new clients

## Scenario #2 and Tasks

You are Candace Smith a student at Big State University in North Carolina. You have been feeling depressed for the past 2 months due to demands at school. In the past, your doctor has recommended that you speak to a therapist, however you have been reluctant to schedule an appointment with the therapist you were referred to. You recently saw an advertisement for a new mental health app on Twitter and decided to download it on your mobile phone. You have been using the app for 6 weeks now, and you would like to review your depression severity over the last 6 weeks. You review the depression checkup graph to see your progress and discover that your depression has become progressively worse. This leads you to use the app to find information about managing depression, and locate a therapist in your area to schedule an appointment.

**Task 1: Find out your levels of depression for the past 6 weeks. Let me know when you're done.**

1. Open the app
2. Find the graphs feature
3. Find the depression checkup graph
4. Report your most recent level of depression recorded in the graph (severity and date)

**Task 2: Find information on how to overcome depression. Let me know when you're done.**

1. Find the information feature
2. Find the depression information
3. Find the information on how to overcome depression
4. Report the first tip on overcoming depression

**Task 3: Create a self-care plan. Let me know when you're done.**

1. Find the self-care plan feature
2. Create a new self-care plan for the week of March 23, 2020 to March 29, 2020.
  - a. Enter the following activities into the plan.
    - i. "Go to yoga class"
    - ii. "Have lunch with Ashley"
    - iii. "Read one chapter of the new book I purchased"
  - b. Save the plan

**Task 4: Locate a therapist to schedule an appointment. Let me know when you're done.**

1. Find the resources feature
2. Find a therapist in your area from the Therapy for Black Girls Therapist Directory
  - a. Search by zip code "28202"



- b. Find “Montina Myers-Galloway” and report whether she is accepting new clients

## APPENDIX I: COGNITIVE WALKTHROUGH BENCHMARKS

### Scenario #1 and Tasks

Participant Performance vs Benchmark		
Task 1: Find out your levels of anxiety for the past 6 weeks		
Steps	Correct Action	Benchmark
Step 1: Open the app.	Tap the <b>TherapyLink</b> icon	X
Step 2: Find the graphs feature.	Tap the <b>Graphs</b> icon	X
Step 3: Find the anxiety checkup graph.	Tap the <b>Anxiety Checkup History</b> link	X
Step 4: Report your most recent level of anxiety recorded in the graph (severity and date).	Find and report anxiety severity for February 12	X
Taps to Complete Task:		<b>3</b>
Time to Complete Task (MM:SS):		<b>0:13</b>
Task 2: Find information on how to manage anxiety		
Steps	Correct Action	Benchmark
Step 1: Find the information feature.	Use the menu to navigate back to the information feature by tapping the hamburger icon or slide right to show menu	X
	Tap the <b>Back</b> button in the menu	X
	Tap the <b>Information</b> link in the menu	X
Step 2: Find the anxiety information.	Tap the <b>Anxiety Info</b> button	X
Step 3: Find the information on how to manage anxiety.	Tap the <b>Managing Anxiety</b> tab	X
Step 4: Report the first tip on managing anxiety.	Tap the <b>Tips</b> link and report the first tip	X
Taps to Complete Task:		<b>6</b>
Time to Complete Task (MM:SS):		<b>0:25</b>

Participant Performance vs Benchmark		
Task 3: Add a new entry to your journal		
Steps	Correct Action	Benchmark
Step 1: Find the journal feature.	Use the menu to navigate back to the information feature by tapping the hamburger icon or slide right to show menu	X
	Tap the <b>Back</b> button in the menu	X
	Tap the <b>Journal</b> link in the menu	X
Step 2: Create a new journal entry.	Tap the (+) button to add a new entry	X
	Tap in the <b>Title</b> field and enter "Today was a lot"	X
	Tap in the <b>Thoughts</b> field and manually or use the voice-to-text feature to enter, "Today my AP told me that I will be teaching one more section of Algebra in the Spring. I am already overwhelmed with the sections that I have now. I don't know how to tell him that it is going to be too much to manage."	X
	Tap the <b>Next</b> button	X
Step 3: Report your feelings.	Tap <b>Pick Items</b> to open the dropdown list of feelings	X
	Tap "anxious" and "overwhelmed" as your options to report your feelings	X
	Tap the <b>Save</b> button	X
Step 4: Indicate that there is something you can do to make the situation better, or avoid it from happening in the future.	Tap the <b>Yes</b> button to answer the question, "Is there anything you can do to make the situation better, or avoid it from happening in the future?"	X
Step 5: Report on what you think can be done to make the situation better.	Tap in the field to write out your thoughts and manually or use the voice-to-text feature to enter, "I can email the AP to schedule a meeting to discuss my concerns, and propose that other tasks be taken off my plate if I am going to teach one more class."	X
	Tap the <b>Next</b> button	X
Step 6: Save the journal entry.	Review the <b>Journal Entry Summary</b> and tap the <b>Save</b> button	X
Taps to Complete Task:		<b>15</b>
Time to Complete Task (MM:SS):		<b>3:10</b>

<b>Participant Performance vs Benchmark</b>		
<b>Task 4: Locate a therapist to schedule an appointment</b>		
<b>Steps</b>	<b>Correct Action</b>	<b>Benchmark</b>
Step 1: Find the resources feature	Use the menu to navigate back to the information feature by taping the hamburger icon or slide right to show menu	X
	Tap the <b>Back</b> button in the menu	X
	Tap the <b>Resources</b> link in the menu	X
Step 2: Find a therapist in your area from the Therapy for Black Girls Therapist Directory	Tap the <b>Find A Therapist</b> button	X
	Tap the <b>Therapy for Black Girls Therapist Directory</b> button	X
	Tap in the <b>Your Location</b> field and enter zip code “33015”	X
	Tap the <b>Search</b> button	X
	Scroll down the screen to find “Nakita Charles” and tap the profile	X
	Scroll down the screen and report whether she is accepting new clients	X
Taps to Complete Task:		<b>8</b>
Time to Complete Task (MM:SS):		<b>0:56</b>

## Scenario #2 and Tasks

<b>Participant Performance vs Benchmark</b>		
<b>Task 1: Find out your levels of depression for the past 6 weeks</b>		
Steps	Correct Action	Benchmark
Step 1: Open the app.	Tap the <b>TherapyLink</b> icon	X
Step 2: Find the graphs feature.	Tap the <b>Graphs</b> icon	X
Step 3: Find the depression checkup graph.	Tap the <b>Depression Checkup History</b> link	X
Step 4: Report your most recent level of depression recorded in the graph (severity and date).	Find and report depression severity for February 12	X
Taps to Complete Task:		<b>3</b>
Time to Complete Task (MM:SS):		<b>0:14</b>
<b>Task 2: Find information on how to overcome depression</b>		
Steps	Correct Action	Benchmark
Step 1: Find the information feature.	Use the menu to navigate back to the information feature by tapping the hamburger icon or slide right to show menu	X
	Tap the <b>Back</b> button in the menu	X
	Tap the <b>Information</b> link in the menu	X
Step 2: Find the depression information.	Tap the <b>Depression Info</b> button	X
Step 3: Find the information on how to overcome depression.	Tap the <b>Overcome Depression</b> tab	X
Step 4: Report the first tip on overcoming depression.	Tap the <b>Tips</b> link and report the first tip	X
Taps to Complete Task:		<b>6</b>
Time to Complete Task (MM:SS):		<b>0:20</b>

<b>Participant Performance vs Benchmark</b>		
<b>Task 3: Create a self-care plan</b>		
<b>Steps</b>	<b>Correct Action</b>	<b>Benchmark</b>
Step 1: Find the self-care plan feature.	Use the menu to navigate back to the information feature by tapping the hamburger icon or slide right to show menu	X
	Tap the <b>Back</b> button in the menu	X
	Tap the <b>Home</b> link in the menu	X
	Tap the <b>Self-Care</b> icon	X
Step 2: Create a new self-care plan	Tap the <b>Create Plan</b> button	X
	Tap the <b>Start Date</b> button	X
	Select "March 23, 2020" from the calendar	X
	Tap <b>OK</b>	X
	Tap the <b>End Date</b> button	X
	Select "March 29, 2020" from the calendar	X
	Tap <b>OK</b>	X
	Tap in the first text entry field and enter "Go to yoga class"	X
	Tap in the second text entry field and enter "Have lunch with Ashley"	X
	Tap in the third text entry field and enter "Read one chapter of the new book I purchased"	X
Step 3: Save the self-care plan.	Tap the <b>Save</b> button	X
Taps to Complete Task:		<b>15</b>
Time to Complete Task (MM:SS):		<b>1:17</b>

<b>Participant Performance vs Benchmark</b>		
<b>Task 4: Locate a therapist to schedule an appointment</b>		
<b>Steps</b>	<b>Correct Action</b>	<b>Benchmark</b>
Step 1: Find the resources feature	Use the menu to navigate back to the information feature by tapping the hamburger icon or slide right to show menu	X
	Tap the <b>Back</b> button in the menu	X
	Tap the <b>Resources</b> link in the menu	X
Step 2: Find a therapist in your area from the Therapy for Black Girls Therapist Directory	Tap the <b>Find A Therapist</b> button	X
	Tap the <b>Therapy for Black Grils Therapist Directory</b> button	X
	Tap in the <b>Your Location</b> field and enter zipcode “28202”	X
	Tap the <b>Search</b> button	X
	Scroll down the screen to find “Montina Myers-Galloway” and tap the profile	X
	Scroll down the screen and report whether she is accepting new clients	X
Taps to Complete Task:		<b>8</b>
Time to Complete Task (MM:SS):		<b>0:49</b>

## APPENDIX J: QUESTIONNAIRE FOR USER INTERFACE SATISFACTION

### Survey Instructions

Please answer each question to the best of your ability. Where given the option, please circle 'N/A' for questions that are not applicable to your experience.

OVERALL REACTIONS TO THE SOFTWARE		0 1 2 3 4 5 6 7 8 9													
1.	terrible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	wonderful	N/A
2.	difficult	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	easy	N/A
3.	frustrating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	satisfying	N/A
4.	inadequate power	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	adequate power	N/A
5.	dull	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	stimulating	N/A
6.	rigid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	flexible	N/A
SCREEN		0 1 2 3 4 5 6 7 8 9													
7.	Characters on the computer screen hard to read	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	easy to read	N/A
8.	Highlighting on the screen simplifies task	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	very much	N/A
9.	Organization of information on screen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	very clear	N/A
10.	Sequence of screens	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	very clear	N/A
TERMINOLOGY AND APP INFORMATION		0 1 2 3 4 5 6 7 8 9													
11.	Use of terms throughout app	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	consistent	N/A
12.	Terminology is related to the task you are doing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	always	N/A
13.	Position of messages on screen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	consistent	N/A
14.	Messages on screen which prompt user for input	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	clear	N/A
15.	App keeps you informed about what it is doing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	always	N/A
16.	Error messages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	helpful	N/A



<b>LEARNING</b>		<b>0 1 2 3 4 5 6 7 8 9</b>											
17. Learning to operate the app	difficult											easy	N/A
18. Exploring new features by trial and error	difficult											easy	N/A
19. Remembering names and use of commands	difficult											easy	N/A
20. Tasks can be performed in a straight-forward manner	never											always	N/A
21. Help messages on the screen	unhelpful											helpful	N/A
22. Supplemental reference materials	confusing											clear	N/A
<b>APP CAPABILITIES</b>		<b>0 1 2 3 4 5 6 7 8 9</b>											
23. App speed	too slow											fast enough	N/A
24. App reliability	unreliable											reliable	N/A
25. App tends to be	noisy											quiet	N/A
26. Correcting your mistakes	difficult											easy	N/A
27. Experienced and inexperienced users' needs are taken into consideration	never											always	N/A

28. List the most positive aspects of the app

- 1.
- 2.
- 3.

29. List the most negative aspects of the app

- 1.
- 2.
- 3.

**APPENDIX K: SENSITIVITY ANALYSIS RESULTS OF AGREEMENT WITH USE OF MODALITY TO COMMUNICATE WITH A PROFESSIONAL TO RECEIVE HELP FOR MANAGING ANXIETY**

Sensitivity analysis of agreement with use of modality to communicate with a professional to receive help for managing **anxiety by age group.**

‡Modality	Less than 50 yrs old (N = 232)		50 years and older (N = 163)		Fisher's exact p-value
	Agree N (%)	No Agree N (%)	Agree N (%)	No Agree N (%)	
Text messaging	128 (55.2)	104 (44.8)	55 (33.7)	101 (62.0)	< .001**
Voice call	177 (76.3)	55 (23.7)	110 (67.5)	46 (28.2)	.238
Mobile app	135 (58.2)	97 (41.8)	54 (33.1)	99 (60.7)	< .001**
Video call	172 (74.1)	60 (25.9)	89 (54.6)	65 (39.9)	.001*

‡Total N less than 395 and percentages may not sum to 100% due to item missingness. \*Denotes statistical significance, P<.05. \*\*Denotes statistical significance, P<.001. Note: *Undecided* responses were combined with *Disagree* and *Somewhat disagree* responses to form a category of "No Agree" for those who did not indicate agreement, and test whether the statistical significance changed when *Undecided* responses are included.

Sensitivity analysis of agreement with use of modality to communicate with a professional to receive help for managing **anxiety by education.**

¥Modality	Less than bachelor's degree (N =83)		Bachelor's degree or higher (N = 312)		Fisher's exact p-value
	Agree N (%)	No Agree N (%)	Agree N (%)	No Agree N (%)	
Text messaging	45 (54.2)	36 (43.4)	138 (44.2)	169 (54.2)	.104
Voice call	59 (71.1)	22 (26.5)	228 (73.1)	79 (25.3)	.778
Mobile app	47 (56.6)	33 (39.8)	142 (45.5)	163 (52.2)	.060
Video call	51 (61.4)	30 (36.1)	210 (67.3)	95 (30.4)	.350

¥Total N less than 395 and percentages may not sum to 100% due to item missingness. Note: *Undecided* responses were combined with *Disagree* and *Somewhat disagree* responses to form a category of "No Agree" for those who did not indicate agreement, and test whether the statistical significance changed when *Undecided* responses are included.

**APPENDIX L: SENSITIVITY ANALYSIS RESULTS OF AGREEMENT WITH USE OF MODALITY TO COMMUNICATE WITH A PROFESSIONAL TO RECEIVE HELP FOR MANAGING DEPRESSION**

Sensitivity analysis of agreement with use of modality to communicate with a professional to receive help for managing **depression by age group.**

¥Modality	Less than 50 yrs old (N = 232)		50 years and older (N = 163)		Fisher's exact p-value
	Agree N (%)	No Agree N (%)	Agree N (%)	No Agree N (%)	
Text messaging	125 (53.9)	107 (46.1)	53 (32.5)	102 (62.6)	< .001**
Voice call	174 (75.0)	58 (25.0)	102 (62.6)	55 (33.7)	.040*
Mobile app	131 (56.5)	101 (43.5)	47 (28.8)	106 (65.0)	< .001**
Video call	168 (72.4)	64 (27.6)	86 (52.8)	69 (42.3)	.001*

¥Total N less than 395 and percentages may not sum to 100% due to item missingness. \*Denotes statistical significance, P<.05. \*\*Denotes statistical significance, P<.001. Note: *Undecided* responses were combined with *Disagree* and *Somewhat disagree* responses to form a category of "No Agree" for those who did not indicate agreement, and test whether the statistical significance changed when *Undecided* responses are included.

Sensitivity analysis of agreement with use of modality to communicate with a professional to receive help for managing **depression by education.**

¥Modality	Less than bachelor's degree (N =83)		Bachelor's degree or higher (N = 312)		Fisher's exact p-value
	Agree N (%)	No Agree N (%)	Agree N (%)	No Agree N (%)	
Text messaging	46 (55.4)	35 (42.2)	132 (42.3)	174 (55.8)	.033*
Voice call	58 (69.9)	23 (27.7)	218 (69.9)	90 (28.8)	1.000
Mobile app	45 (54.2)	35 (42.2)	133 (42.6)	172 (55.1)	.045*
Video call	52 (62.7)	29 (34.9)	202 (64.7)	104 (33.3)	.793

¥Total N less than 395 and percentages may not sum to 100% due to item missingness. \*Denotes statistical significance, P<.05. Note: *Undecided* responses were combined with *Disagree* and *Somewhat disagree* responses to form a category of "No Agree" for those who did not indicate agreement, and test whether the statistical significance changed when *Undecided* responses are included.

**APPENDIX M: SENSITIVITY ANALYSIS RESULTS OF ANXIETY SEVERITY AND ATTITUDES TOWARD SEEKING HELP BY AGREEMENT WITH MODALITY**

Sensitivity analysis of Generalized Anxiety Disorder (GAD-7) and Inventory of Attitudes Toward Seeking Mental Health Services factor scores by agreement with using **text messaging** to communicate with a professional to receive help for managing **anxiety**.

¥Measure	Agree		No Agree		t	df	p-value
	N	Mean score (SD)	N	Mean score (SD)			
GAD-7	183	5.98 (5.72)	205	3.91 (4.74)	3.86	354.69	< .001**
Psychological openness	183	23.27 (5.71)	204	23.78 (5.40)	-.90	374.94	.367
Help-seeking propensity	183	25.97 (5.09)	204	25.79 (5.96)	.31	384.12	.758
Indifference to anxiety stigma	182	24.46 (6.44)	203	25.92 (5.50)	-2.37	357.83	.018*
IASMHS total	182	73.68 (13.96)	202	75.38 (13.51)	-1.21	374.93	.228

¥Total N less than 395 due to item missingness. \*Denotes statistical significance, P<.05. \*\*Denotes statistical significance, P<.001. Note: *Undecided* responses were combined with *Disagree* and *Somewhat disagree* responses to form a category of "No Agree" for those who did not indicate agreement, and test whether the statistical significance changed when *Undecided* responses are included.

Sensitivity analysis of Generalized Anxiety Disorder (GAD-7) and Inventory of Attitudes Toward Seeking Mental Health Services factor scores by agreement with using **voice call** to communicate with a professional to receive help for managing **anxiety**.

¥Measure	Agree		No Agree		t	df	p-value
	N	Mean score (SD)	N	Mean score (SD)			
GAD-7	287	4.85 (5.28)	101	5.02 (5.46)	-.27	170.12	.787
Psychological openness	287	23.54 (5.54)	100	23.46 (5.60)	.12	171.20	.906
Help-seeking propensity	287	26.19 (5.37)	100	24.95 (6.01)	1.82	157.49	.070
Indifference to anxiety stigma	285	25.22 (6.04)	100	25.18 (5.85)	.05	178.39	.956
IASMHS total	285	74.89 (13.62)	99	73.44 (14.01)	.89	166.63	.374

¥Total N less than 395 due to item missingness. Note: *Undecided* responses were combined with *Disagree* and *Somewhat disagree* responses to form a category of “No Agree” for those who did not indicate agreement, and test whether the statistical significance changed when *Undecided* responses are included.

Sensitivity analysis of Generalized Anxiety Disorder (GAD-7) and Inventory of Attitudes Toward Seeking Mental Health Services factor scores by agreement with using **mobile app** to communicate with a professional to receive help for managing **anxiety**.

¥Measure	Agree		No Agree		t	df	p-value
	N	Mean score (SD)	N	Mean score (SD)			
GAD-7	189	5.78 (5.58)	195	4.13 (4.95)	3.06	373.47	.002*
Psychological openness	189	23.32 (5.67)	195	23.62 (5.43)	-.53	379.90	.600
Help-seeking propensity	189	25.72 (5.78)	195	25.96 (5.36)	-.41	377.77	.681
Indifference to anxiety stigma	189	24.75 (6.37)	193	25.64 (5.61)	-1.46	371.83	.145
IASMHS total	189	73.79 (14.38)	192	75.07 (13.01)	-.91	374.06	.361

¥Total N less than 395 due to item missingness. \*Denotes statistical significance,  $P < .05$ . Note: *Undecided* responses were combined with *Disagree* and *Somewhat disagree* responses to form a category of "No Agree" for those who did not indicate agreement, and test whether the statistical significance changed when *Undecided* responses are included.



Sensitivity analysis of Generalized Anxiety Disorder (GAD-7) and Inventory of Attitudes Toward Seeking Mental Health Services factor scores by agreement with using **video call** to communicate with a professional to receive help for managing **anxiety**.

‡Measure	Agree		No Agree		t	df	p-value
	N	Mean score (SD)	N	Mean score (SD)			
GAD-7	260	5.13 (5.45)	125	4.55 (5.03)	1.03	263.08	.305
Psychological openness	260	23.95 (5.44)	125	22.51 (5.66)	2.37	236.20	.019*
Help-seeking propensity	260	26.23 (5.23)	125	24.98 (6.11)	1.98	213.87	.049*
Indifference to anxiety stigma	259	25.34 (5.96)	124	24.84 (6.06)	.76	238.74	.447
IASMHS total	258	75.46 (12.95)	124	72.24 (14.92)	2.06	214.81	.041*

‡Total N less than 395 due to item missingness. \*Denotes statistical significance,  $P < .05$ . Note: *Undecided* responses were combined with *Disagree* and *Somewhat disagree* responses to form a category of “No Agree” for those who did not indicate agreement, and test whether the statistical significance changed when *Undecided* responses are included.

**APPENDIX N: SENSITIVITY ANALYSIS RESULTS OF DEPRESSION SEVERITY AND ATTITUDES TOWARD SEEKING HELP BY AGREEMENT WITH MODALITY**

Sensitivity analysis of Patient Health Questionnaire (PHQ-9) and Inventory of Attitudes Toward Seeking Mental Health Services factor scores by agreement with using **text messaging** to communicate with a professional to receive help for managing **depression**.

‡Measure	Agree		No Agree		t	df	p-value
	N	Mean score (SD)	N	Mean score (SD)			
PHQ-9	176	6.69 (6.07)	208	4.99 (4.90)	2.98	335.09	.003*
Psychological openness	178	23.16 (5.73)	208	23.79 (5.37)	-1.10	366.29	.272
Help-seeking propensity	178	25.84 (5.19)	208	25.87 (5.85)	-.05	383.52	.960
Indifference to depression stigma	177	23.90 (6.93)	206	24.88 (6.28)	-1.45	358.67	.148
IASMHS total	177	72.88 (14.49)	206	74.44 (13.91)	-1.07	367.30	.283

‡Total N less than 395 due to item missingness. \*Denotes statistical significance,  $P < .05$ . Note: *Undecided* responses were combined with *Disagree* and *Somewhat disagree* responses to form a category of “No Agree” for those who did not indicate agreement, and test whether the statistical significance changed when *Undecided* responses are included.

Sensitivity analysis of Patient Health Questionnaire (PHQ-9) and Inventory of Attitudes Toward Seeking Mental Health Services factor scores by agreement with using **voice call** to communicate with a professional to receive help for managing **depression**.

‡Measure	Agree		No Agree		t	df	p-value
	N	Mean score (SD)	N	Mean score (SD)			
PHQ-9	273	5.75 (5.51)	112	5.65 (5.59)	.16	204.16	.874
Psychological openness	276	23.61 (5.64)	112	23.25 (5.31)	.59	217.47	.559
Help-seeking propensity	276	26.52 (4.93)	112	24.28 (6.61)	3.24	163.38	.001*
Indifference to depression stigma	275	24.76 (6.29)	110	23.56 (7.17)	1.54	179.86	.126
IASMHS total	275	74.88 (13.47)	110	70.87 (15.50)	2.38	178.29	.019*

‡Total N less than 395 due to item missingness. \*Denotes statistical significance,  $P < .05$ . Note: *Undecided* responses were combined with *Disagree* and *Somewhat disagree* responses to form a category of “No Agree” for those who did not indicate agreement, and test whether the statistical significance changed when *Undecided* responses are included.

Sensitivity analysis of Patient Health Questionnaire (PHQ-9) and Inventory of Attitudes Toward Seeking Mental Health Services factor scores by agreement with using **mobile app** to communicate with a professional to receive help for managing **depression**.

¥Measure	Agree		No Agree		t	df	p-value
	N	Mean score (SD)	N	Mean score (SD)			
PHQ-9	176	6.97 (6.25)	206	4.76 (4.59)	3.89	316.21	< .001**
Psychological openness	178	23.09 (5.93)	206	23.80 (5.19)	-1.23	354.63	.218
Help-seeking propensity	178	25.86 (5.56)	206	25.83 (5.58)	.05	374.41	.959
Indifference to depression stigma	178	24.37 (6.69)	203	24.43 (6.54)	-.09	370.12	.932
IASMHS total	178	73.32 (14.66)	203	73.94 (13.78)	-.42	365.43	.672

¥Total N less than 395 due to item missingness. \*Denotes statistical significance, P<.05. \*\*Denotes statistical significance, P<.001. Note: *Undecided* responses were combined with *Disagree* and *Somewhat disagree* responses to form a category of “No Agree” for those who did not indicate agreement, and test whether the statistical significance changed when *Undecided* responses are included.

Sensitivity analysis of Patient Health Questionnaire (PHQ-9) and Inventory of Attitudes Toward Seeking Mental Health Services factor scores by agreement with using **video call** to communicate with a professional to receive help for managing **depression**.

¥Measure	Agree		No Agree		t	df	p-value
	N	Mean score (SD)	N	Mean score (SD)			
PHQ-9	252	6.00 (5.59)	132	5.32 (5.38)	1.17	275.01	.243
Psychological openness	253	24.05 (5.47)	133	22.46 (5.56)	2.68	264.83	.008*
Help-seeking propensity	253	26.26 (5.24)	133	25.05 (6.05)	1.95	237.46	.053
Indifference to depression stigma	251	24.97 (6.16)	132	23.35 (7.23)	2.19	232.42	.030*
IASMHS total	251	75.22 (13.29)	132	70.78 (15.36)	2.81	235.41	.005*

¥Total N less than 395 due to item missingness. \*Denotes statistical significance,  $P < .05$ . Note: *Undecided* responses were combined with *Disagree* and *Somewhat disagree* responses to form a category of "No Agree" for those who did not indicate agreement, and test whether the statistical significance changed when *Undecided* responses are included.

**APPENDIX O: USABILITY TESTING PARTICIPANT PERFORMANCE VS. BENCHMARK FOR SCENARIO #1 AND TASKS**

<b>Participant Performance vs Benchmark</b>										
<b>Task 1: Find out your levels of anxiety for the past 6 weeks</b>										
<b>Steps</b>	<b>Correct Action</b>	<b>2.22_P1</b>	<b>2.22_P3</b>	<b>2.22_P4</b>	<b>2.24_P2</b>	<b>2.26_P1</b>	<b>2.29_P1</b>	<b>2.29_P3</b>	<b>3.01_P1</b>	<b>Benchmark</b>
Step 1: Open the app.	Tap the <b>TherapyLink</b> icon	X	X	X	X	X	X	X	X	X
Step 2: Find the graphs feature.	Tap the <b>Graphs</b> icon	X	X	X	X	X	X	X	X	X
Step 3: Find the anxiety checkup graph.	Tap the <b>Anxiety Checkup History</b> link	X	X	X	X	X	X	X	X	X
Step 4: Report your most recent level of anxiety recorded in the graph (severity and date).	Find and report anxiety severity for February 12	X	X	X	X	X	X	X	X	X
Taps to Complete Task:		<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>6</b>	<b>3</b>
Time to Complete Task (MM:SS):		<b>0:20</b>	<b>0:56</b>	<b>1:41</b>	<b>0:58</b>	<b>1:13</b>	<b>0:26</b>	<b>0:36</b>	<b>1:40</b>	<b>0:13</b>
<b>Task 2: Find information on how to manage anxiety</b>										
<b>Steps</b>	<b>Correct Action</b>	<b>2.22_P1</b>	<b>2.22_P3</b>	<b>2.22_P4</b>	<b>2.24_P2</b>	<b>2.26_P1</b>	<b>2.29_P1</b>	<b>2.29_P3</b>	<b>3.01_P1</b>	<b>Benchmark</b>
Step 1: Find the information feature.	Use the menu to navigate back to the information feature by taping the hamburger icon or slide right to show menu	X	X		X	X	X		X	X
	Tap the <b>Back</b> button in the menu	X	X		X	X	X		X	X
	Tap the <b>Information</b> link in the menu	X	X			X	X		X	X
Step 2: Find the anxiety information.	Tap the <b>Anxiety Info</b> button	X	X	X	X	X	X	X	X	X
Step 3: Find the information on how to manage anxiety.	Tap the <b>Managing Anxiety</b> tab	X	X	X	X	X	X	X	X	X
Step 4: Report the first tip on managing anxiety.	Tap the <b>Tips</b> link and report the first tip	X	X	X	X	X	X	X	X	X
Taps to Complete Task:		<b>6</b>	<b>14</b>	<b>6</b>	<b>18</b>	<b>6</b>	<b>37</b>	<b>6</b>	<b>12</b>	<b>6</b>
Time to Complete Task (MM:SS):		<b>0:48</b>	<b>1:43</b>	<b>1:09</b>	<b>1:50</b>	<b>1:15</b>	<b>4:24</b>	<b>0:53</b>	<b>2:03</b>	<b>0:25</b>

Participant Performance vs Benchmark										
Task 3: Add a new entry to your journal										
Steps	Correct Action	2.22_P1	2.22_P3	2.22_P4	2.24_P2	2.26_P1	2.29_P1	2.29_P3	3.01_P1	Benchmark
Step 1: Find the journal feature.	Use the menu to navigate back to the information feature by tapping the hamburger icon or slide right to show menu	X	X		X	X			X	X
	Tap the <b>Back</b> button in the menu	X	X		X	X			X	X
	Tap the <b>Journal</b> link in the menu	X	X			X			X	X
Step 2: Create a new journal entry.	Tap the (+) button to add a new entry	X	X	X	X	X	X	X	X	X
	Tap in the <b>Title</b> field and enter "Today was a lot"	X	X	X	X	X	X	X	X	X
	Tap in the <b>Thoughts</b> field and manually or use the voice-to-text feature to enter, "Today my AP told me that I will be teaching one more section of Algebra in the Spring. I am already overwhelmed with the sections that I have now. I don't know how to tell him that it is going to be too much to manage."	X	X	X	X	X	X	X	X	X
	Tap the <b>Next</b> button	X	X	X	X	X	X	X	X	X
Step 3: Report your feelings.	Tap <b>Pick Items</b> to open the dropdown list of feelings	X	X	X	X	X	X		X	X
	Tap "anxious" and "overwhelmed" as your options to report your feelings	X	X	X	X	X	X		X	X
	Tap the <b>Save</b> button	X	X	X	X	X	X	X	X	X
Step 4: Indicate that there is something you can do to make the situation better, or avoid it from happening in the future.	Tap the <b>Yes</b> button to answer the question, "Is there anything you can do to make the situation better, or avoid it from happening in the future?"	X	X	X	X	X	X			X
Step 5: Report on what you think can be done to make the situation better.	Tap in the field to write out your thoughts and manually or use the voice-to-text feature to enter, "I can email the AP to schedule a meeting to discuss my concerns, and propose that other tasks be taken off my plate if I am going to teach one more class."	X	X	X	X	X				X
	Tap the <b>Next</b> button	X	X	X	X	X	X			X
Step 6: Save the journal entry.	Review the <b>Journal Entry Summary</b> and tap the <b>Save</b> button	X	X	X	X	X			X	X
Taps to Complete Task:		17	18	18	17	19	15*	9*	13*	15
Time to Complete Task (MM:SS):		4:07	2:48	6:10	3:23	4:50	4:23*	4:17*	3:10*	3:10

Participant Performance vs Benchmark										
Task 4: Locate a therapist to schedule an appointment										
Steps	Correct Action	2.22_P1	2.22_P3	2.22_P4	2.24_P2	2.26_P1	2.29_P1	2.29_P3	3.01_P1	Benchmark
Step 1: Find the resources feature	Use the menu to navigate back to the information feature by tapping the hamburger icon or slide right to show menu	X	X	X	X	X			X	X
	Tap the <b>Back</b> button in the menu	X	X	X	X	X			X	X
	Tap the <b>Resources</b> link in the menu	X	X			X				X
Step 2: Find a therapist in your area from the Therapy for Black Girls Therapist Directory	Tap the <b>Find A Therapist</b> button	X	X	X	X	X	X	X	X	X
	Tap the <b>Therapy for Black Girls Therapist Directory</b> button	X	X	X	X	X	X	X	X	X
	Tap in the <b>Your Location</b> field and enter zip code “33015”	X	X	X		X	X	X	X	X
	Tap the <b>Search</b> button	X	X	X	X	X	X	X	X	X
	Scroll down the screen to find “Nakita Charles” and tap the profile	X	X	X	X	X	X	X	X	X
	Scroll down the screen and report whether she is accepting new clients	X	X	X	X	X	X	X	X	X
Taps to Complete Task:		<b>10</b>	<b>15</b>	<b>11</b>	<b>35</b>	<b>11</b>	<b>13</b>	<b>10</b>	<b>14</b>	<b>8</b>
Time to Complete Task (MM:SS):		<b>2:04</b>	<b>1:42</b>	<b>2:10</b>	<b>3:21</b>	<b>1:43</b>	<b>2:13</b>	<b>1:46</b>	<b>3:14</b>	<b>0:56</b>



**APPENDIX P: USABILITY TESTING PARTICIPANT PERFORMANCE VS. BENCHMARK FOR SCENARIO #2 AND TASKS**

<b>Participant Performance vs Benchmark</b>									
<b>Task 1: Find out your levels of depression for the past 6 weeks</b>									
<b>Steps</b>	<b>Correct Action</b>	<b>2.22_P2</b>	<b>2.22_P5</b>	<b>2.24_P1</b>	<b>2.24_P3</b>	<b>2.26_P2</b>	<b>2.29_P2</b>	<b>3.02_P1</b>	<b>Benchmark</b>
Step 1: Open the app.	Tap the <b>TherapyLink</b> icon	X	X	X	X	X	X	X	X
Step 2: Find the graphs feature.	Tap the <b>Graphs</b> icon	X	X	X	X	X	X	X	X
Step 3: Find the depression checkup graph.	Tap the <b>Depression Checkup History</b> link	X	X	X	X	X	X	X	X
Step 4: Report your most recent level of depression recorded in the graph (severity and date).	Find and report depression severity for February 12	X	X	X	X	X	X	X	X
Taps to Complete Task:		<b>3</b>	<b>3</b>	<b>5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>6</b>	<b>3</b>
Time to Complete Task (MM:SS):		<b>0:48</b>	<b>0:27</b>	<b>0:37</b>	<b>0:31</b>	<b>0:30</b>	<b>0:37</b>	<b>0:44</b>	<b>0:14</b>
<b>Task 2: Find information on how to overcome depression</b>									
<b>Steps</b>	<b>Correct Action</b>	<b>2.22_P2</b>	<b>2.22_P5</b>	<b>2.24_P1</b>	<b>2.24_P3</b>	<b>2.26_P2</b>	<b>2.29_P2</b>	<b>3.02_P1</b>	<b>Benchmark</b>
Step 1: Find the information feature.	Use the menu to navigate back to the information feature by tapping the hamburger icon or slide right to show menu					X	X	X	X
	Tap the <b>Back</b> button in the menu					X	X	X	X
	Tap the <b>Information</b> link in the menu					X	X	X	X
Step 2: Find the depression information.	Tap the <b>Depression Info</b> button	X	X	X	X	X	X	X	X
Step 3: Find the information on how to overcome depression.	Tap the <b>Overcome Depression</b> tab	X	X	X	X	X	X	X	X
Step 4: Report the first tip on overcoming depression.	Tap the <b>Tips</b> link and report the first tip	X	X	X	X	X	X	X	X
Taps to Complete Task:		<b>14</b>	<b>12</b>	<b>6</b>	<b>9</b>	<b>6</b>	<b>6</b>	<b>11</b>	<b>6</b>
Time to Complete Task (MM:SS):		<b>1:38</b>	<b>2:14</b>	<b>0:28</b>	<b>1:50</b>	<b>0:45</b>	<b>1:24</b>	<b>1:11</b>	<b>0:20</b>

Participant Performance vs Benchmark										
Task 3: Create a self-care plan										
Steps	Correct Action	2.22_P2	2.22_P5	2.24_P1	2.24_P3	2.26_P2	2.29_P2	3.02_P1	Benchmark	
Step 1: Find the self-care plan feature.	Use the menu to navigate back to the information feature by tapping the hamburger icon or slide right to show menu					X	X		X	
	Tap the <b>Back</b> button in the menu					X	X		X	
	Tap the <b>Home</b> link in the menu					X	X		X	
Step 2: Create a new self-care plan	Tap the <b>Self-Care</b> icon	X	X	X	X	X	X	X	X	
	Tap the <b>Create Plan</b> button	X	X	X	X	X	X	X	X	
	Tap the <b>Start Date</b> button	X	X	X	X	X	X	X	X	
	Select "March 23, 2020" from the calendar	X	X	X	X	X	X	X	X	
	Tap <b>OK</b>	X	X	X	X	X	X	X	X	
	Tap the <b>End Date</b> button	X	X	X	X	X	X	X	X	
	Select "March 29, 2020" from the calendar	X	X	X	X	X	X	X	X	
	Tap <b>OK</b>	X	X	X	X	X	X	X	X	
	Tap in the first text entry field and enter "Go to yoga class"	X	X	X	X	X	X	X	X	X
	Tap in the second text entry field and enter "Have lunch with Ashley"	X	X	X	X	X	X	X	X	X
Step 3: Save the self-care plan.	Tap in the third text entry field and enter "Read one chapter of the new book I purchased"	X	X	X	X	X	X	X	X	
	Tap the <b>Save</b> button	X	X	X	X	X	X	X	X	
Taps to Complete Task:		21	23	19	21	21	17	16	15	
Time to Complete Task (MM:SS):		2:08	1:57	1:27	1:42	2:47	2:08	1:17	1:17	

Participant Performance vs Benchmark									
Task 4: Locate a therapist to schedule an appointment									
Steps	Correct Action	2.22_P2	2.22_P5	2.24_P1	2.24_P3	2.26_P2	2.29_P2	3.02_P1	Benchmark
Step 1: Find the resources feature	Use the menu to navigate back to the information feature by tapping the hamburger icon or slide right to show menu				X	X	X		X
	Tap the <b>Back</b> button in the menu				X	X	X		X
	Tap the <b>Resources</b> link in the menu					X	X		X
Step 2: Find a therapist in your area from the Therapy for Black Girls Therapist Directory	Tap the <b>Find A Therapist</b> button	X	X	X	X	X	X	X	X
	Tap the <b>Therapy for Black Grils Therapist Directory</b> button	X	X	X	X	X	X	X	X
	Tap in the <b>Your Location</b> field and enter zipcode “28202”	X	X	X	X	X	X	X	X
	Tap the <b>Search</b> button	X	X	X	X	X	X	X	X
	Scroll down the screen to find “Montina Myers-Galloway” and tap the profile	X	X	X	X	X	X	X	X
	Scroll down the screen and report whether she is accepting new clients	X	X	X	X	X	X	X	X
Taps to Complete Task:		9	13	7	9	9	9	11	8
Time to Complete Task (MM:SS):		1:24	2:09	1:07	1:26	1:22	1:55	1:30	0:49

## REFERENCES

- A. Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behaviour: An introduction to theory and research* (Vol. 27).
- Aguilera, A., & Berridge, C. (2014). Qualitative feedback from a text messaging intervention for depression: benefits, drawbacks, and cultural differences. *JMIR mHealth and uHealth*, 2(4), e46. doi:10.2196/mhealth.3660
- Aguilera, A., & Muñoz, R. F. (2011). Text Messaging as an Adjunct to CBT in Low-Income Populations: A Usability and Feasibility Pilot Study. *Professional psychology, research and practice*, 42(6), 472–478. doi:10.1037/a0025499
- Aguilera, A., Schueller, S. M., & Leykin, Y. (2015). Daily mood ratings via text message as a proxy for clinic based depression assessment. *Journal of Affective Disorders*, 175, 471–474. doi:10.1016/j.jad.2015.01.033
- Agyapong, V. I. O., Juhás, M., Ohinmaa, A., Omeje, J., Mrklas, K., Suen, V. Y. M., ... Greenshaw, A. J. (2017). Randomized controlled pilot trial of supportive text messages for patients with depression. *BMC Psychiatry*, 17(1), 286. doi:10.1186/s12888-017-1448-2
- Agyapong, V. I. O., Mrklas, K., Juhás, M., Omeje, J., Ohinmaa, A., Dursun, S. M., & Greenshaw, A. J. (2016). Cross-sectional survey evaluating Text4Mood: mobile health program to reduce psychological treatment gap in mental healthcare in Alberta through daily supportive text messages. *BMC Psychiatry*, 16(1), 378. doi:10.1186/s12888-016-1104-2
- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (eds.), *Action Control* (pp. 11–39). Berlin, Heidelberg: Springer Berlin Heidelberg. doi:10.1007/978-3-642-69746-3\_2
- Ajzen, I. (2006). Behavioral Interventions Based on the Theory of Planned Behavior . Retrieved from <http://people.umass.edu/aizen/pdf/tpb.intervention.pdf>
- Arean, P. A., Hallgren, K. A., Jordan, J. T., Gazzaley, A., Atkins, D. C., Heagerty, P. J., & Anguera, J. A. (2016). The use and effectiveness of mobile apps for depression: results from a fully remote clinical trial. *Journal of Medical Internet Research*, 18(12), e330. doi:10.2196/jmir.6482
- Berrouiguet, S., Baca-García, E., Brandt, S., Walter, M., & Courtet, P. (2016). Fundamentals for Future Mobile-Health (mHealth): A Systematic Review of Mobile Phone and Web-Based Text Messaging in Mental Health. *Journal of Medical Internet Research*, 18(6), e135. doi:10.2196/jmir.5066
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77–101. doi:10.1191/1478088706qp063oa

- Brenes, G. A., Danhauer, S. C., Lyles, M. F., Hogan, P. E., & Miller, M. E. (2015). Telephone-Delivered Cognitive Behavioral Therapy and Telephone-Delivered Nondirective Supportive Therapy for Rural Older Adults With Generalized Anxiety Disorder: A Randomized Clinical Trial. *JAMA psychiatry*, *72*(10), 1012–1020. doi:10.1001/jamapsychiatry.2015.1154
- Brown, S. D., Lee, K., Schoffman, D. E., King, A. C., Crawley, L. M., & Kiernan, M. (2012). Minority recruitment into clinical trials: experimental findings and practical implications. *Contemporary clinical trials*, *33*(4), 620–623. doi:10.1016/j.cct.2012.03.003
- Buntrock, C., Ebert, D. D., Lehr, D., Smit, F., Riper, H., Berking, M., & Cuijpers, P. (2016). Effect of a Web-Based Guided Self-help Intervention for Prevention of Major Depression in Adults With Subthreshold Depression: A Randomized Clinical Trial. *The Journal of the American Medical Association*, *315*(17), 1854–1863. doi:10.1001/jama.2016.4326
- Centers for Disease Control and Prevention. (2020, May 9). Cases in the U.S. Retrieved May 10, 2020, from <https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html>
- Centers for Disease Control and Prevention. Mental Illness Surveillance Among Adults in the United States. *MMWR* 2011;60(Suppl). (2011).
- Chin, J. P., Diehl, V. A., & Norman, L. K. (1988). Development of an instrument measuring user satisfaction of the human-computer interface. In J. J. O'Hare (ed.), *Proceedings of the SIGCHI conference on Human factors in computing systems' ' - CHI '88* (pp. 213–218). New York, New York, USA: ACM Press. doi:10.1145/57167.57203
- Choi, I., Zou, J., Titov, N., Dear, B. F., Li, S., Johnston, L., ... Hunt, C. (2012). Culturally attuned Internet treatment for depression amongst Chinese Australians: a randomised controlled trial. *Journal of Affective Disorders*, *136*(3), 459–468. doi:10.1016/j.jad.2011.11.003
- Choi, N. G., Hegel, M. T., Marti, N., Marinucci, M. L., Sirrianni, L., & Bruce, M. L. (2014). Telehealth problem-solving therapy for depressed low-income homebound older adults. *The American Journal of Geriatric Psychiatry*, *22*(3), 263–271. doi:10.1097/JGP.0b013e318266b356
- Chong, J., & Moreno, F. (2012). Feasibility and acceptability of clinic-based telepsychiatry for low-income Hispanic primary care patients. *Telemedicine Journal and E-Health*, *18*(4), 297–304. doi:10.1089/tmj.2011.0126
- Clarke, G., Reid, E., Eubanks, D., O'Connor, E., DeBar, L. L., Kelleher, C., ... Nunley, S. (2002). Overcoming depression on the Internet (ODIN): a randomized controlled trial of an Internet depression skills intervention program. *Journal of Medical Internet Research*, *4*(3), E14. doi:10.2196/jmir.4.3.e14
- Clarke, J., Proudfoot, J., Birch, M.-R., Whitton, A. E., Parker, G., Manicavasagar, V., ... Hadzi-Pavlovic, D. (2014). Effects of mental health self-efficacy on outcomes of a mobile phone and web intervention for mild-to-moderate depression, anxiety and stress:

- secondary analysis of a randomised controlled trial. *BMC Psychiatry*, *14*, 272. doi:10.1186/s12888-014-0272-1
- Crenshaw, K. (1989). Demarginalizing the intersection of race and sex: A Black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics. *University of Chicago Legal Forum*, *1989*(8).
- Critical Appraisal Skills Programme. (n.d.-a). *CASP Cohort Study Checklist*. Available at <https://casp-uk.net/casp-tools-checklists/>. Accessed: 23 August 2018.
- Critical Appraisal Skills Programme. (n.d.-b). *CASP Randomised Controlled Trial Checklist*. Available at <https://casp-uk.net/casp-tools-checklists/>. Accessed: 23 August 2018.
- Cukrowicz, K. C., & Joiner, T. E. (2007). Computer-Based Intervention for Anxious and Depressive Symptoms in a Non-Clinical Population. *Cognitive therapy and research*, *31*(5), 677–693. doi:10.1007/s10608-006-9094-x
- Davis, F. (1986). *A Technology Acceptance Model for Empirically Testing New End-User Information Systems: Theory and Results*. Doctoral dissertation, Sloan School of Management, Massachusetts Institute of Technology.
- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, *35*(8), 982–1003. doi:10.1287/mnsc.35.8.982
- Deady, M., Choi, I., Calvo, R. A., Glozier, N., Christensen, H., & Harvey, S. B. (2017). eHealth interventions for the prevention of depression and anxiety in the general population: a systematic review and meta-analysis. *BMC Psychiatry*, *17*(1), 310. doi:10.1186/s12888-017-1473-1
- Department of Health and Human Services Office of Minority Health. (2019, November 2). Profile: Black/African Americans. Retrieved May 27, 2019, from <https://minorityhealth.hhs.gov/omh/browse.aspx?lvl=3&lvlID=61>
- Dorstyn, D. S., Saniotis, A., & Sobhanian, F. (2013). A systematic review of telecounseling and its effectiveness in managing depression amongst minority ethnic communities. *Journal of telemedicine and telecare*, *19*(6), 338–346. doi:10.1177/1357633X13501767
- Dunstan, D. A., & Tooth, S. M. (2012). Treatment via videoconferencing: a pilot study of delivery by clinical psychology trainees. *The Australian Journal of Rural Health*, *20*(2), 88–94. doi:10.1111/j.1440-1584.2012.01260.x
- Dwight-Johnson, M., Aisenberg, E., Golinelli, D., Hong, S., O'Brien, M., & Ludman, E. (2011). Telephone-based cognitive-behavioral therapy for Latino patients living in rural areas: a randomized pilot study. *Psychiatric Services*, *62*(8), 936–942. doi:10.1176/ps.62.8.pss6208\_0936
- Firth, J., Torous, J., Nicholas, J., Carney, R., Rosenbaum, S., & Sarris, J. (2017). Can smartphone mental health interventions reduce symptoms of anxiety? A meta-analysis of

- randomized controlled trials. *Journal of Affective Disorders*, 218, 15–22.  
doi:10.1016/j.jad.2017.04.046
- Fischer, E. H., & Turner, J. L. (1970). Orientations to seeking professional help: development and research utility of an attitude scale. *Journal of Consulting and Clinical Psychology*, 35(1), 79–90.
- Glueckauf, R. L., Davis, W. S., Willis, F., Sharma, D., Gustafson, D. J., Hayes, J., ... Springer, J. (2012). Telephone-based, cognitive-behavioral therapy for African American dementia caregivers with depression: initial findings. *Rehabilitation psychology*, 57(2), 124–139.  
doi:10.1037/a0028688
- Greer, T. M. (2011). Coping Strategies as Moderators of the Relationship Between Race-and Gender-Based Discrimination and Psychological Symptoms for African American Women. *Journal of Black Psychology*, 37(1), 42–54. doi:10.1177/0095798410380202
- Guest, G., Namey, E., & McKenna, K. (2017). How many focus groups are enough? building an evidence base for nonprobability sample sizes. *Field methods*, 29(1), 3–22.  
doi:10.1177/1525822X16639015
- Health Resources and Services Administration, Maternal and Child Health Bureau. *Women's Health USA 2010*. Rockville, Maryland: U.S. Department of Health and Human Services. (2010).
- Hightow-Weidman, L. B., Muessig, K. E., Pike, E. C., LeGrand, S., Baltierra, N., Rucker, A. J., & Wilson, P. (2015). HealthMpowerment.org: Building Community Through a Mobile-Optimized, Online Health Promotion Intervention. *Health education & behavior : the official publication of the Society for Public Health Education*, 42(4), 493–499.  
doi:10.1177/1090198114562043
- Hilty, D. M., Ferrer, D. C., Parish, M. B., Johnston, B., Callahan, E. J., & Yellowlees, P. M. (2013). The effectiveness of telemental health: a 2013 review. *Telemedicine Journal and E-Health*, 19(6), 444–454. doi:10.1089/tmj.2013.0075
- Himelhoch, S., Mohr, D., Maxfield, J., Clayton, S., Weber, E., Medoff, D., & Dixon, L. (2011). Feasibility of telephone-based cognitive behavioral therapy targeting major depression among urban dwelling African-American people with co-occurring HIV. *Psychology, health & medicine*, 16(2), 156–165. doi:10.1080/13548506.2010.534641
- Hines-Martin, V., Malone, M., Kim, S., & Brown-Piper, A. (2003). Barriers to mental health care access in an african american population. *Issues in mental health nursing*, 24(3), 237–256. doi:10.1080/01612840305281
- Huguet, A., Rao, S., McGrath, P. J., Wozney, L., Wheaton, M., Conrod, J., & Rozario, S. (2016). A systematic review of cognitive behavioral therapy and behavioral activation apps for depression. *Plos One*, 11(5), e0154248. doi:10.1371/journal.pone.0154248

- Ivanova, E., Lindner, P., Ly, K. H., Dahlin, M., Vernmark, K., Andersson, G., & Carlbring, P. (2016). Guided and unguided Acceptance and Commitment Therapy for social anxiety disorder and/or panic disorder provided via the Internet and a smartphone application: A randomized controlled trial. *Journal of Anxiety Disorders, 44*, 27–35. doi:10.1016/j.janxdis.2016.09.012
- James, D. C., Harville, C., Sears, C., Efunbumi, O., & Bondoc, I. (2017). Participation of African Americans in e-Health and m-Health Studies: A Systematic Review. *Telemedicine Journal and E-Health, 23*(5), 351–364. doi:10.1089/tmj.2016.0067
- James, D. C. S., Harville, C., Whitehead, N., Stellefson, M., Dodani, S., & Sears, C. (2016). Willingness of African American Women to Participate in e-Health/m-Health Research. *Telemedicine Journal and E-Health, 22*(3), 191–197. doi:10.1089/tmj.2015.0071
- Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62*(6), 593–602. doi:10.1001/archpsyc.62.6.593
- Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of General Internal Medicine, 16*(9), 606–613.
- Lacey, K. K., Parnell, R., Mouzon, D. M., Matusko, N., Head, D., Abelson, J. M., & Jackson, J. S. (2015). The mental health of US Black women: the roles of social context and severe intimate partner violence. *BMJ Open, 5*(10), e008415. doi:10.1136/bmjopen-2015-008415
- Mackenzie, C. S., Knox, V. J., Gekoski, W. L., & Macaulay, H. L. (2004). An adaptation and extension of the attitudes toward seeking professional psychological help scale<sup>1</sup>. *Journal of applied social psychology, 34*(11), 2410–2433. doi:10.1111/j.1559-1816.2004.tb01984.x
- Mavandadi, S., Benson, A., DiFilippo, S., Streim, J. E., & Oslin, D. (2015). A Telephone-Based Program to Provide Symptom Monitoring Alone vs Symptom Monitoring Plus Care Management for Late-Life Depression and Anxiety: A Randomized Clinical Trial. *JAMA psychiatry, 72*(12), 1211–1218. doi:10.1001/jamapsychiatry.2015.2157
- McCall, T., Schwartz, T., & Khairat, S. (2019). Acceptability of telemedicine to help African American women manage anxiety and depression. *Studies in Health Technology and Informatics, 264*, 699–703. doi:10.3233/SHTI190313
- McCall, Terika, Schwartz, T. A., & Khairat, S. (2020). The Acceptability of Text Messaging to Help African American Women Manage Anxiety and Depression: Cross-Sectional Survey Study. *JMIR mental health, 7*(2), e15801. doi:10.2196/15801
- Merritt-Davis, O. B., & Keshavan, M. S. (2006). Pathways to care for african americans with early psychosis. *Psychiatric Services, 57*(7), 1043–1044. doi:10.1176/appi.ps.57.7.1043



- Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Medicine*, 6(7), e1000097. doi:10.1371/journal.pmed.1000097
- Moreno, F. A., Chong, J., Dumbauld, J., Humke, M., & Byreddy, S. (2012). Use of standard Webcam and Internet equipment for telepsychiatry treatment of depression among underserved Hispanics. *Psychiatric Services*, 63(12), 1213–1217. doi:10.1176/appi.ps.201100274
- Morgan, A. J., Jorm, A. F., & Mackinnon, A. J. (2012). Email-based promotion of self-help for subthreshold depression: Mood Memos randomised controlled trial. *The British Journal of Psychiatry*, 200(5), 412–418. doi:10.1192/bjp.bp.111.101394
- Musiat, P., Conrod, P., Treasure, J., Tylee, A., Williams, C., & Schmidt, U. (2014). Targeted prevention of common mental health disorders in university students: randomised controlled trial of a transdiagnostic trait-focused web-based intervention. *Plos One*, 9(4), e93621. doi:10.1371/journal.pone.0093621
- Naslund, J. A., Aschbrenner, K. A., Marsch, L. A., & Bartels, S. J. (2016). The future of mental health care: peer-to-peer support and social media. *Epidemiology and psychiatric sciences*, 25(2), 113–122. doi:10.1017/S2045796015001067
- Newlin, T., McCall, T., Ottmar, P., Welch, B., & Khairat, S. (2018). Assessing the satisfaction of citizens using teleconsent in clinical research. *Studies in Health Technology and Informatics*, 247, 685–689.
- Nicholson, L. M., Schwirian, P. M., & Groner, J. A. (2015). Recruitment and retention strategies in clinical studies with low-income and minority populations: Progress from 2004-2014. *Contemporary clinical trials*, 45(Pt A), 34–40. doi:10.1016/j.cct.2015.07.008
- Padgett, D. K., Patrick, C., Burns, B. J., & Schlesinger, H. J. (1994). Ethnic differences in use of inpatient mental health services by blacks, whites, and Hispanics in a national insured population. *Health Services Research*, 29(2), 135–153.
- Peek, S. T. M., Wouters, E. J. M., van Hoof, J., Luijkx, K. G., Boeije, H. R., & Vrijhoef, H. J. M. (2014). Factors influencing acceptance of technology for aging in place: a systematic review. *International Journal of Medical Informatics*, 83(4), 235–248. doi:10.1016/j.ijmedinf.2014.01.004
- Pew Research Center. (2011, September). Americans and Text Messaging. Retrieved May 9, 2020, from <https://www.pewresearch.org/internet/2011/09/19/americans-and-text-messaging/>
- Pew Research Center. (n.d.). *Mobile Fact Sheet*. Retrieved 15 November 2018 from <http://www.pewinternet.org/fact-sheet/mobile/>.

- Polson, P. G., Lewis, C., Rieman, J., & Wharton, C. (1992). Cognitive walkthroughs: a method for theory-based evaluation of user interfaces. *International journal of man-machine studies*, 36(5), 741–773. doi:10.1016/0020-7373(92)90039-N
- Proudfoot, J., Clarke, J., Birch, M.-R., Whitton, A. E., Parker, G., Manicavasagar, V., ... Hadzi-Pavlovic, D. (2013). Impact of a mobile phone and web program on symptom and functional outcomes for people with mild-to-moderate depression, anxiety and stress: a randomised controlled trial. *BMC Psychiatry*, 13, 312. doi:10.1186/1471-244X-13-312
- Sandelowski, M. (2000). Whatever happened to qualitative description? *Research in nursing & health*, 23(4), 334–340. doi:10.1002/1098-240X(200008)23:4<334::AID-NUR9>3.0.CO;2-G
- Sarkar, U., Gourley, G. I., Lyles, C. R., Tieu, L., Clarity, C., Newmark, L., ... Bates, D. W. (2016). Usability of commercially available mobile applications for diverse patients. *Journal of General Internal Medicine*, 31(12), 1417–1426. doi:10.1007/s11606-016-3771-6
- Schlicker, S., Ebert, D. D., Middendorf, T., Titzler, I., & Berking, M. (2018). Evaluation of a text-message-based maintenance intervention for Major Depressive Disorder after inpatient cognitive behavioral therapy. *Journal of Affective Disorders*, 227, 305–312. doi:10.1016/j.jad.2017.10.047
- Soorgi, Z., Miri, M., & Sharifzadeh, G. (2015). The Impact of Planned Behavior Theory-Based Education on Female Students' Obesity-Related Behaviors. *Modern Care Journal*, 12(4). doi:10.17795/modernc.8672
- Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of Internal Medicine*, 166(10), 1092–1097. doi:10.1001/archinte.166.10.1092
- Substance Abuse and Mental Health Services Administration. (2018). 2019 National Survey on Drug Use and Health (NSDUH): CAI Specifications for Programming (English Version). Retrieved from <https://www.samhsa.gov/data/report/nsduh-2019-questionnaire>
- Substance Abuse and Mental Health Services Administration. (2019). National Survey on Drug Use and Health, 2018 [data file]. Research Triangle Park, NC: RTI International [distributor]. Accessed 21 February 2020 from <https://www.samhsa.gov/data>. (n.d.).
- Taherdoost, H. (2018). A review of technology acceptance and adoption models and theories. *Procedia Manufacturing*, 22, 960–967. doi:10.1016/j.promfg.2018.03.137
- Tan, G., Teo, I., Srivastava, D., Smith, D., Smith, S. L., Williams, W., & Jensen, M. P. (2013). Improving access to care for women veterans suffering from chronic pain and depression associated with trauma. *Pain Medicine*, 14(7), 1010–1020. doi:10.1111/pme.12131

- Taylor, S., & Todd, P. A. (1995). Understanding information technology usage: A test of competing models. *Information Systems Research*, 6(2), 144–176. doi:10.1287/isre.6.2.144
- Terrell, F., & Terrell, S. (1984). Race of counselor, client sex, cultural mistrust level, and premature termination from counseling among Black clients. *Journal of Counseling Psychology*, 31(3), 371–375. doi:10.1037/0022-0167.31.3.371
- The Nielsen Company. (2017). Reaching Black Women Across Media Platforms. Retrieved 14 November 2018 from [www.nielsen.com/us/en/insights/news/2017/reaching-black-women-across-media-platforms.html](http://www.nielsen.com/us/en/insights/news/2017/reaching-black-women-across-media-platforms.html).
- Thomas, A. J., Witherspoon, K. M., & Speight, S. L. (2008). Gendered racism, psychological distress, and coping styles of African American women. *Cultural Diversity & Ethnic Minority Psychology*, 14(4), 307–314. doi:10.1037/1099-9809.14.4.307
- Thompson, V. L. S., Bazile, A., & Akbar, M. (2004). African americans' perceptions of psychotherapy and psychotherapists. *Professional Psychology: Research and Practice*, 35(1), 19–26. doi:10.1037/0735-7028.35.1.19
- Topham, P., Caleb-Solly, P., Matthews, P., Farmer, A., & Mash, C. (2015). Mental health app design: A journey from concept to completion. In *Proceedings of the 17th International Conference on Human-Computer Interaction with Mobile Devices and Services Adjunct - MobileHCI '15* (pp. 582–591). New York, New York, USA: ACM Press. doi:10.1145/2786567.2787136
- Veritas Health Innovation. (n.d.). *Covidence systematic review software*. Melbourne, Australia. Available at [www.covidence.org](http://www.covidence.org).
- Virzi, R. A. (1992). Refining the test phase of usability evaluation: how many subjects is enough? *Human Factors*, 34(4), 457–468. doi:10.1177/001872089203400407
- Ward, E. C., & Heidrich, S. M. (2009). African American women's beliefs about mental illness, stigma, and preferred coping behaviors. *Research in nursing & health*, 32(5), 480–492. doi:10.1002/nur.20344
- Watson, N. N., & Hunter, C. D. (2015). Anxiety and depression among African American women: The costs of strength and negative attitudes toward psychological help-seeking. *Cultural Diversity & Ethnic Minority Psychology*, 21(4), 604–612. doi:10.1037/cdp0000015
- Watson, N. N., & Hunter, C. D. (2016). I had to be strong. *Journal of Black Psychology*, 42(5), 424–452. doi:10.1177/0095798415597093
- White, K. M., Jimmieson, N. L., Obst, P. L., Graves, N., Barnett, A., Cockshaw, W., ... Paterson, D. (2015). Using a theory of planned behaviour framework to explore hand hygiene beliefs at the “5 critical moments” among Australian hospital-based nurses. *BMC Health Services Research*, 15, 59. doi:10.1186/s12913-015-0718-2

- Woods-Giscombé, C. L. (2010). Superwoman schema: African American women's views on stress, strength, and health. *Qualitative Health Research, 20*(5), 668–683.  
doi:10.1177/1049732310361892
- World Health Organization. (2020, May 9). Coronavirus disease (COVID-19) Pandemic. Retrieved May 10, 2020, from <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>
- Yuen, E. K., Herbert, J. D., Forman, E. M., Goetter, E. M., Juarascio, A. S., Rabin, S., ... Bouchard, S. (2013). Acceptance based behavior therapy for social anxiety disorder through videoconferencing. *Journal of Anxiety Disorders, 27*(4), 389–397.  
doi:10.1016/j.janxdis.2013.03.002
- Ziemba, S. J., Bradley, N. S., Landry, L.-A. P., Roth, C. H., Porter, L. S., & Cuyler, R. N. (2014). Posttraumatic stress disorder treatment for Operation Enduring Freedom/Operation Iraqi Freedom combat veterans through a civilian community-based telemedicine network. *Telemedicine Journal and E-Health, 20*(5), 446–450.  
doi:10.1089/tmj.2013.0312