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Methodologies for the Successful Implementation and Dissemination of Digital Mental Health  
Interventions: Improving User Attitudes among Black, Indigenous, and People of Color

by

Donovan Ellis

Under the Direction of Page Anderson, PhD

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

in the College of Arts and Sciences

Georgia State University

2022

## ABSTRACT

Mental illness is a leading global cause of disability and persists at disproportionately high rates for Black, Indigenous, and People of Color (BIPOC). This European-style dissertation examines methods for improving user attitudes and treatment-seeking behavior for digital mental health interventions (DMHIs) among BIPOC. This dissertation comprises three studies that are situated within the broader context of efforts to successfully design, implement, and disseminate culturally responsive DMHIs as a mitigation strategy for barriers to mental health treatment.

**Study 1** is a systematic review and meta-analysis that explored culturally adapted DMHIs and examined the efficacy and acceptability of these interventions among racial and ethnic minorities. Three electronic databases (PsycINFO, Web of Science, PubMed) were searched and thirty-two studies examining the impact of a culturally adapted DMHI among international racial or ethnic minority populations were included. Studies reported significant evidence for the efficacy and acceptability of culturally adapted DMHIs. **Study 2** is an experimental study that tested the effects of a treatment rationale and authority endorsement on acceptability and treatment-seeking interest for DMHIs among Black Americans. Results indicated that participants reporting fewer barriers to treatment had more positive attitudes towards DMHIs after reading a treatment rationale than those who read a definition. Participants reported a greater likelihood of using DMHIs when endorsed by a health professional than by a spiritual leader or no authority figure. **Study 3** presents a confirmatory factor analysis of the Attitudes towards Psychological Online Interventions Scale (APOI; Schröder et al., 2015) - the first structured measure of acceptability toward DMHIs – among a sample of Black Americans. Results indicated that a bifactor model demonstrated excellent fit ( $CFI = .96$ ,  $TLI = .94$ ,  $SRMR = .03$  and  $RMSEA = .09$ ), suggesting that within a Black American sample there may be greater

utility in interpreting the APOI subscales as attitudinal constructs distinct from a global “acceptability” factor. All three studies aim to inform clinical research initiatives and implementation frameworks for addressing unmet mental health needs among minoritized communities by leveraging advancements in telemedicine and DMHIs.

**INDEX WORDS:** Digital mental health interventions, Black Americans, BIPOC, Acceptability, Systematic review, Factor analysis

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2022

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Interventions: Improving User Attitudes among Black, Indigenous, and People of Color

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May 2023

## **DEDICATION**

To my dear friends, family, lab mates, and colleagues whose unending support over the years have made these projects possible. I could not have made it this far without you.

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## TABLE OF CONTENTS

<b>ACKNOWLEDGEMENTS .....</b>	<b>V</b>
<b>LIST OF TABLES .....</b>	<b>XI</b>
<b>LIST OF FIGURES .....</b>	<b>XII</b>
<b>LIST OF ABBREVIATIONS .....</b>	<b>XIII</b>
<b>1 INTRODUCTION.....</b>	<b>1</b>
<b>1.1 The Burden of Mental Illness and Access to Treatment for BIPOC.....</b>	<b>2</b>
<b>1.2 Digital Mental Health Interventions.....</b>	<b>3</b>
<b>1.3 Challenges in Implementation of Digital Mental Health among BIPOC .....</b>	<b>4</b>
<b>1.4 Bridging the Implementation and Access Gap for Digital Mental Health .....</b>	<b>6</b>
<b>1.5 Cultural Adaptation of Digital Mental Health .....</b>	<b>9</b>
<b>1.6 Proposed Studies to Further Research to Inform Implementation and         Dissemination .....</b>	<b>11</b>
<b><i>1.6.1 Study 1: Cultural Adaptation, Targeting, and Tailoring of DMHIs for BIPOC                 communities.....</i></b>	<b><i>12</i></b>
<b><i>1.6.2 Study 2: Improving Acceptability of DMHIs among Black Americans.....</i></b>	<b><i>13</i></b>
<b><i>1.6.3 Study 3: Evaluating the Psychometric Properties of a Self-Report Measure of                 Acceptability of DMHIs among Black Americans.....</i></b>	<b><i>14</i></b>
<b>2 STUDY 1.....</b>	<b>16</b>
<b>2.1 Abstract.....</b>	<b>16</b>
<b>2.2 Public Health Significance Statement .....</b>	<b>17</b>

<b>2.3</b>	<b>Introduction .....</b>	<b>18</b>
<b>2.4</b>	<b>Method .....</b>	<b>21</b>
2.4.1	<i>Electronic Searches .....</i>	<i>21</i>
2.4.2	<i>Study Selection Criteria.....</i>	<i>22</i>
2.4.3	<i>Data Extraction and Study Evaluation.....</i>	<i>23</i>
2.4.4	<i>Transparency and Openness.....</i>	<i>26</i>
<b>2.5</b>	<b>Results .....</b>	<b>26</b>
2.5.1	<i>Study Selection .....</i>	<i>26</i>
2.5.2	<i>Participants .....</i>	<i>26</i>
2.5.3	<i>Cultural Adaptation of DMHIs.....</i>	<i>28</i>
2.5.4	<i>Quality Appraisal.....</i>	<i>28</i>
2.5.5	<i>Digital Mental Health Intervention and Implementation Characteristics.....</i>	<i>30</i>
2.5.6	<i>Clinical Outcomes .....</i>	<i>31</i>
2.5.7	<i>Efficacy and Effectiveness .....</i>	<i>31</i>
2.5.8	<i>Acceptability.....</i>	<i>34</i>
2.5.9	<i>Adherence and Attrition .....</i>	<i>35</i>
<b>2.6</b>	<b>Discussion.....</b>	<b>35</b>
2.6.1	<i>Optimizing Cultural Adaptations .....</i>	<i>39</i>
2.6.2	<i>Strengths and Limitations .....</i>	<i>40</i>
2.6.3	<i>Future Directions .....</i>	<i>41</i>

2.6.4	<i>Conclusions</i> .....	43
2.7	<b>References</b> .....	44
2.7.1	<i>Transparency and Openness</i> .....	56
3	<b>STUDY 2</b> .....	67
3.1	<b>Abstract</b> .....	67
3.2	<b>Introduction</b> .....	69
3.2.1	<i>Present Study</i> .....	72
3.3	<b>Methods</b> .....	73
3.3.1	<i>Participants</i> .....	73
3.3.2	<i>Measures</i> .....	74
3.3.3	<i>Procedure</i> .....	76
3.4	<b>Analytic Plan</b> .....	77
3.5	<b>Results</b> .....	78
3.5.1	<i>Descriptive Statistics</i> .....	79
3.5.2	<i>Does using a treatment rationale lead to greater acceptance of iCBT?</i> .....	80
3.5.3	<i>Do participants who report more barriers to treatment show greater acceptance of iCBT?</i> .....	80
3.5.4	<i>Do treatment barriers moderate the relation between receiving a treatment rationale and acceptance of iCBT?</i> .....	81

3.5.5	<i>Does endorsement from an authority figure increase the likelihood of using iCBT?</i>	82
3.6	Discussion	83
3.6.1	<i>Strengths and Limitations</i>	86
3.6.2	<i>Future Directions</i>	87
3.7	References	90
4	STUDY 3	112
4.1	Abstract	112
4.2	Introduction	114
4.2.1	<i>Acceptability of iCBT</i>	114
4.2.2	<i>Racially Minoritized Communities are Underrepresented in Acceptability Research</i>	116
4.2.3	<i>Present Study</i>	117
4.3	Methods	118
4.3.1	<i>Participants</i>	118
4.3.2	<i>Measures</i>	118
4.3.3	<i>Procedure</i>	119
4.3.4	<i>Analytic Plan</i>	120
4.4	Results	122
4.4.1	<i>Sample Characteristics</i>	122

4.4.2	<i>Construct Validity</i> .....	122
4.4.3	<i>Reliability</i> .....	125
4.5	<b>Discussion</b> .....	125
4.5.1	<i>Strengths and Limitations</i> .....	128
4.5.2	<i>Future Directions</i> .....	129
4.5.3	<i>Conclusion</i> .....	130
4.6	<b>Data Transparency Statement</b> .....	131
4.7	<b>References</b> .....	132
5	<b>CONCLUSIONS</b> .....	151
5.1	<b>Implications within the Digital Mental Health Interventions Literature</b> .....	151
5.2	<b>Future Directions</b> .....	157
5.2.1	<i>Global Trends in DMHI Implementation</i> .....	158
5.2.2	<i>Cultural Considerations for DMHIs</i> .....	159
5.2.3	<i>Modern Models of DMHI Delivery</i> .....	161
5.2.4	<i>Leveraging Strengths and Mitigating Weaknesses of DMHIs in Implementation and Dissemination Research</i> .....	163
	<b>REFERENCES</b> .....	167

## LIST OF TABLES

<b>Table 1</b> Characteristics of included studies.....	57
<b>Table 2</b> Treatment effect sizes for the primary psychological outcome measures .....	62
<b>Table 3</b> Quality assessment / risk-of-bias across study design .....	64
<b>Table 4</b> Demographic characteristics for participants recruited from the university participant pool and from the surrounding community for each experimental condition .....	104
<b>Table 5</b> Measures of acceptability of iCBT, symptoms of depression and anxiety, and barriers to treatment across participants recruited from the university and the community and by experimental group .....	106
<b>Table 6</b> Means, standard deviations, and correlations between attitudes towards Internet-based cognitive-behavior therapy, symptoms of depression and anxiety, barriers to treatment, and history of face-to-face treatment .....	107
<b>Table 7</b> Percentage of participants reporting that an item on the Perceived Barriers to Psychological Treatment Scale was a “Substantial” Barrier (as recommended by the authors of the scale; Mohr et al., 2010). .....	108
<b>Table 8</b> Demographic and clinical characteristics of participants.....	140
<b>Table 9</b> Names and descriptions of measures and items examined .....	141
<b>Table 10</b> Bivariate correlations between the 16 APOI items .....	143
<b>Table 11</b> Goodness-of-fit indices of models tested in CFA.....	144
<b>Table 12</b> Model 3 parameters with standardized estimates, standard errors.....	145

## LIST OF FIGURES

<b>Figure 1</b> PRISMA flowchart of the selection process for included studies .....	65
<b>Figure 2</b> Forest plot of effect sizes from the 12 randomized studies that assessed the effect of digital mental health interventions (DMHIs) relative to a comparison condition (most commonly a waitlist control condition). .....	66
<b>Figure 3</b> Line graph indicating that overall barriers to psychological treatment moderates the relationship between treatment rationale and acceptability toward therapist-assisted iCBT .....	110
<b>Figure 4</b> Line graph indicating that stigma significantly moderates the relationship between treatment rationale and acceptability toward therapist-assisted iCBT.....	111
<b>Figure 5</b> Higher-Order, 2-factor model depicting hierarchical relationship among indicators of two latent factors: Positive and Negative attitudes towards treatment loading on a global Acceptability factor.....	147
<b>Figure 6</b> Higher-Order, 4-factor model depicting hierarchical relationship among indicators of four latent factors: Confidence, Anonymity Benefits, Skepticism, and Technologization Threat loading on a global Acceptability factor. ....	148
<b>Figure 7</b> Bifactor model depicting orthogonal relationship among indicators of four latent factors: Confidence, Anonymity Benefits, Skepticism, and Technologization Threat loading alongside a global Acceptability factor.....	149
<b>Figure 8</b> Bifactor model depicting orthogonal relationship among indicators of four latent factors: Confidence, Anonymity Benefits, Skepticism, and Technologization Threat loading alongside a global Acceptability factor. Standardized parameter estimates shown. ....	150

**LIST OF ABBREVIATIONS**

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AFI	Acceptance facilitating interventions
APOI	Attitudes towards Psychological Online Interventions Questionnaire
BIPOC	Black, Indigenous, People of Color
CoCM	Collaborative care model
DMHIs	Digital mental health interventions
HIC	High income country
iCBT	Internet-based cognitive behavioral therapy
LMIC	Lower-middle income country
TA-iCBT	Therapist-assisted internet-based cognitive behavioral therapy

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## 1 INTRODUCTION

This European-style dissertation will examine strategies for improving user attitudes and treatment-seeking behavior for digital mental health interventions among Black, Indigenous, and People of Color (BIPOC). The proposed studies are situated within a broader context of efforts to successfully design, implement, and disseminate culturally responsive digital mental health interventions (DMHIs) as a mitigation strategy for barriers to mental health treatment. The first chapter reviews the empirical and theoretical literature on the acceptability of and attitudinal barriers to mental health treatments and efforts to culturally adapt DMHIs for communities historically underrepresented in development of evidence-based treatments. A review of these literatures reveals gaps in health service delivery for DMHIs, the need for valid measurement of attitudes towards DMHIs among BIPOC communities, and the importance of effective and culturally responsive digital mental health interventions alongside strategies to implement them sustainably among ethnic and racial minority communities. The subsequent chapters seek to address these issues with three proposed studies. Study 1 is a systematic review of culturally adapted DMHIs among racial and ethnic minorities, which is needed because DMHIs are often designed as “one-size fits all”, which can perpetuate existing health disparities for ethnic and racially minoritized communities as compared to White majority patients. Study 2 is an experimental study testing the effects of a treatment rationale on acceptability and treatment-seeking interest for Internet-based cognitive behavioral therapy (iCBT) among Black Americans. This study is notable as the first comprehensive assessment of Black American attitudes towards iCBT and examination of actionable strategies for improving these attitudes. Study 3 is a confirmatory factor analysis of the Attitudes Towards Psychological Online Interventions Scale (APOI; Schröder et al., 2015) - the first validated measure of acceptability toward DMHIs –

among a sample of Black Americans. Study 3 is crucial as it evaluates the psychometric properties of an important attitudinal measure in a cross-cultural context among a community that faces historic and contemporary barriers to psychotherapy. The dissertation concludes with a global perspective on how this research fits into international clinical research initiatives and implementation frameworks for addressing unmet mental health needs among minoritized communities by leveraging advancements in telemedicine and DMHIs.

### **1.1 The Burden of Mental Illness and Access to Treatment for BIPOC**

Mental illness is a leading global cause of disability (S. L. James et al., 2018; Prince et al., 2007). In the United States, approximately one in five adults meet diagnostic criteria for a mental disorder at any given time (Park-Lee et al., 2018) and lifetime prevalence rises to nearly 50% (Kessler et al., 2005). The burden of mental illness has likely increased in 2020 due to the COVID-19 pandemic, as researchers have already reported alarming trends in the rise of mental distress including anxiety, depression, and substance use (CDC, 2020; Czeisler et al., 2020). There is an inadequate number of mental health professionals to meet this demand (Weil, 2015) and the cost of in-person therapy can be expensive (Benson & Song, 2020; Lazar, 2010; Olfson & Pincus, 1994), which contributes to persistent and alarming rates of unmet mental health needs (Center for Behavioral Health Statistics and Quality [CBHSQ], 2016; Park-Lee et al., 2018). These trends are magnified for Black, Indigenous, and People of Color (BIPOC), a term comprising historically racialized and minoritized communities (Garcia, 2020), that have been underrepresented and undertreated in the healthcare system. Even though rates of anxiety, depression, psychosis, and substance use are lower among Black, Latinx/e, and Asian American adults compared to White adults (Alvarez et al., 2019; CBHSQ, 2020; Substance Abuse and Mental Health Services Administration [SAMHSA], 2015), rates of unmet mental health need

are significantly higher among racial and ethnic minorities (Alegría et al., 2008; Breslau et al., 2005, 2006; SAMHSA, 2015). Such disparities have long been attributed to systemic inequalities in financial resources, transportation, and stigma (Andrade et al., 2014), resulting in both structural (Alegría et al., 2002; Snell-Johns et al., 2004) and attitudinal (Ayalon & Alvidrez, 2007; Gaston et al., 2016; Ward et al., 2013; Williams et al., 2012) barriers to treatment. Researchers and clinicians have sought to develop and implement novel, efficacious interventions to reduce these persistent gaps in mental health need, including digital mental health interventions.

## **1.2 Digital Mental Health Interventions**

Digital mental health interventions (DMHIs) are telecommunication or Internet-based programs that can be delivered via mobile, smartphone, web-based, and/or text-based interventions (Schueller & Torous, 2020). These psychosocial interventions are adapted to a digital medium and can represent a variety of psychotherapy models (e.g., CBT, interpersonal therapy, psychodynamic) although the majority use elements of cognitive-behavioral therapy (Himle et al., 2021). Most DMHIs use common techniques including psychoeducation, behavioral activation, mindfulness techniques, and symptom tracking (Andersson et al., 2019). DMHIs can be self-guided or therapist-assisted. Due to their structured and programmable nature, DMHIs can maintain high fidelity to evidence-based practices while mitigating the risk of “therapist drift” that occurs when clinicians inconsistently attend to core elements of treatment over time (G. Waller, 2009; G. Waller & Turner, 2016). Mental health consumers perceive DMHIs as more private and convenient than face-to-face therapy (Carolan & De Visser, 2018; Mohr et al., 2010; Travers & Benton, 2014), which supports the belief that DMHIs can deliver

cost-effective, widely accessible mental health services that circumvent barriers to treatment (Olf, 2015; Schueller & Torous, 2020).

Meta-analyses show that DMHIs effectively treat a wide range of mental illnesses including anxiety, depression, and substance use disorders (Andrews et al., 2018; Barak et al., 2008; Eilert et al., 2021). Therapist-assisted DMHIs are generally more effective than DMHIs that do not include support (Johansson & Andersson, 2012; Linardon et al., 2019). DMHIs are increasingly leveraged in the health services industry across the world to promote widespread access to evidence-based mental health treatment. Health organizations in Australia (Prime Minister's Office of Australia [PMO], 2020), The Netherlands (Healthcare Information and Management Systems Society [HIMSS], 2021) and Nordic countries, especially Sweden (Ekman et al., 2019; HIMSS, 2021) among others, have formally integrated digital health interventions into their healthcare models, although subsidies and reimbursement varies. Additionally, agencies in the United States (Sprunt, 2020) and the United Kingdom (National Health Service, 2020) have announced policy and funding plans for long-term development in the digital health space. Large-scale adoption and dissemination of DMHIs has been slow (Cresswell & Sheikh, 2013; Lennon et al., 2017) – although it has expanded considerably during the COVID-19 pandemic (Fisk et al., 2020; PMO, 2020) - and nations from the global south are underrepresented (Chakrabarti & Shah, 2016; Naslund et al., 2017; World Health Organization, 2010).

### **1.3 Challenges in Implementation of Digital Mental Health among BIPOC**

Despite demonstrated efficacy and growing ubiquity of DMHIs, implementation and dissemination has faced considerable challenges. Consumer-side barriers have included broad underutilization by the general public (Apolinário-Hagen, Kemper, et al., 2017; R. Waller &

Gilbody, 2009), variable adherence and high attrition rates (Christensen et al., 2009; Eysenbach, 2005) and varied measurement of user engagement with DMHIs (Molloy & Anderson, 2021). Additionally, clinicians are largely undertrained for integrating DMHIs into routine practice. There are mixed results about health providers' skepticism of DMHIs (Bruno & Abbott, 2015; Feijt et al., 2018; Kivi et al., 2015; Ramsey et al., 2016). For example, all therapists participating in a qualitative study perceived DMHIs as a viable treatment (Kivi et al., 2015), but 34% of therapists in another study cited privacy and security concerns and 19% felt inadequately trained/confident to use them (Ramsey et al., 2016). Organizational and institutional barriers include a lack of designated work hours for DMHI training (Feijt et al., 2018), limited endorsement by administrators (Ramsey et al., 2016), poor funding (Druss & Dimitropoulos, 2013; Ramsey et al., 2016; Salloum et al., 2015) and inadequate technical support (E. M. Becker & Jensen-Doss, 2013), all of which hamper the widespread adoption of DMHIs by providers (E. M. Becker & Jensen-Doss, 2013; Ramsey et al., 2016).

The potential of DMHIs to increase access to and benefit from care is limited by the fact ethnic minorities are underrepresented in clinical research (Brown et al., 2014; U.S. Department of Health and Human Services [USDHHS], 2011; M. T. Williams et al., 2013). Reports indicate that the proportion of racial and ethnic minorities in clinical research persists at markedly low levels (USDHHS, 2011). This trend applies to DMHI research as well. Indeed, 97% of the studies included in a recent meta-analysis of 64 randomized controlled trials examining the efficacy of Internet-based cognitive behavioral therapy (Andrews et al., 2018), did not include (or did not report) racial minorities in their efficacy studies. This leaves a glaring gap in the implementation and dissemination literature for communities that stand to benefit the most from efficacious and accessible DMHIs — BIPOC communities.

#### **1.4 Bridging the Implementation and Access Gap for Digital Mental Health**

For DMHIs to be widely used, they must first be acceptable to potential consumers. Therapist-supported DMHIs are generally rated as more acceptable than self-guided programs (Casey et al., 2013; Mitchell & Gordon, 2007). However, overall willingness to use DMHIs is more modest. In one study, 16% of non-treatment-seeking adults reported a willingness to consider using a DMHI to address a mental health concern (Travers & Benton, 2014) while another study reported that only 12% of participants were “definitely interested” in Internet-based treatment (Mohr et al., 2010). Additionally, where positive attitudes towards DMHIs have been documented, there remains a significant preference for face-to-face therapy (Choi et al., 2015; Mohr et al., 2010).

A problem in this budding literature is that the construct of acceptability has been defined in a variety of ways, which may contribute to heterogenous conclusions regarding consumer attitudes towards DMHIs (Molloy et al., 2021). Retrospective study outcomes, such as treatment satisfaction, usability, and feasibility are often used interchangeably with acceptability (Ng et al., 2019). Other researchers propose more prospective metrics, conceptualizing acceptability as “cognitively based, positive attitudes towards such interventions” that aim to predict treatment-seeking behavior (Schröder et al., 2015, p. 137). Acceptability has sometimes been operationalized with measures of similar constructs, such as outcome expectancy — the expectation that one will benefit from treatment (Deville & Borkovec, 2000). In some studies, acceptability is operationalized using single Likert-scale items measuring willingness to use an intervention (Handley et al., 2015; Mohr et al., 2010; Wootton et al., 2011), while in other studies, researchers develop their own measure of acceptability (Apolinário-Hagen, Vehreschild, et al., 2017; Travers & Benton, 2014). The lack of precision in conceptualization of

acceptability, compounded by both variability and idiosyncrasy in measurement methods, may help explain why conclusions about the acceptability of iCBT varies widely across studies. Accordingly, six measures of consumer acceptability towards digital mental health interventions have been developed in recent years with evidence for their psychometric properties and factor structure to improve this gap in the literature including the Attitudes towards Psychological Online Interventions Questionnaire (APOI; Schröder et al., 2015) the Electronic Therapy Attitudes and Process Questionnaire (eTAP; Clough, Eigeland, et al., 2019), the Working Alliance Inventory applied to Virtual and Augmented Reality (WAI-VAR; Miragall et al., 2015), the Working Alliance Inventory adapted for guided Internet interventions (WAI-I; Gómez Penedo et al., 2020), Virtual Therapist Alliance Scale (VTAS; Miloff et al., 2020), and the Online Psychoeducational Intervention – Brief Attitudes Scale (OPI-BAS; Teles et al., 2021).

Precise definition and measurement of the construct of acceptability is integral for the implementation and widespread use of DMHIs. This is because the impact of intervention efficacy and accessibility is mitigated if consumers do not actually use them. Accordingly, acceptability is a core component of models that predict intervention usage. The Theory of Planned Behavior (Ajzen, 1991) has long been used to predict usage of novel interventions. This model describes the link between attitudes, intentions and behaviors, with intentions as the immediate link to behavioral usage of a novel intervention. Behavioral intentions refer to an individual's willingness to perform a given behavior (e.g., "I intend to use a digital program for my mental health"). The stronger the intention, the greater the likelihood the behavior occurs. The Theory of Planned Behavior is a foundational framework for conceptualizing individual acceptance and engagement behavior and has been adapted to multiple contexts. One such application includes The Unified Theory of Acceptance and Use of Technology (Venkatesh et

al., 2003) which describes the importance of behavioral intention in the acceptability and use of technologies, like DMHIs. This model expands on the Theory of Planned Behavior by consolidating competing theories of the acceptance of information technologies (e.g., Technology Acceptance Model; Davis, 1989; Model of PC Utilization; Thompson et al., 1991; Innovation Diffusion Theory; Oldenburg & Glanz, 2008; Rogers, 2003) and proposes four positive predictors for behavioral intention: performance expectancy (belief that an intervention will be beneficial), effort expectancy (expected ease of use), social influence (expected attitudes of others towards the intervention) and facilitating conditions (resources and preconditions to technology use). Evidence suggests that performance expectancy is the strongest predictor of both patients' and health providers' intentions to use DMHIs (Dünnebeil et al., 2012; Li et al., 2013; Philippi et al., 2021) and has commonly been used as a proxy for acceptability (Titov et al., 2010). Taken together, this theory suggests that in order to increase help-seeking behaviors, attitudes of acceptability among target consumers must improve. This is a useful model for understanding patient engagement with DMHIs.

In addition to individual preferences, wide-scale acceptability and implementation of DMHIs requires systemic and institutional support. The Diffusion of Innovations Theory (Oldenburg & Glanz, 2008; Rogers, 2003) describes five domains that affect institutional adoption of innovations, including relative advantage (degree to which an innovation is better than alternatives), compatibility (perceived fit of innovation to needs), complexity (ease of use of an innovation), trialability (the ability to use an innovation on a trial-basis), and observability (degree to which an innovation is frequently seen or encountered). It is important that healthcare administrators, stakeholders, and consumers perceive the benefits of using DMHIs to improve the dissemination of these interventions. The Diffusion of Innovations Theory can inform



strategies for promoting the comparative advantages of DMHIs to face-to-face psychotherapy (e.g., cost, accessibility, privacy) to all relevant stakeholders.

One promising strategy derived from this theory includes the implementation of DMHIs in routine care. The collaborative care model (CoCM) is an integrated healthcare framework, designed to address mental health in primary care settings by managing mental disorders as a chronic disease rather than treating acute symptoms (Thielke et al., 2007; Unützer et al., 2006). Offering mental health treatments in primary care is convenient for patients, efficient for clinicians, builds on existing provider-patient relationships, and has the potential to reduce stigma associated with treatment-seeking for mental disorders. Several meta-analyses have demonstrated the efficacy of collaborative care for mental health disorders in more than 80 randomized controlled trials (Archer et al., 2012; Gilbody et al., 2006; Muntingh et al., 2016; Thota et al., 2012) and among racially and ethnically minoritized communities (Hu et al., 2020). Furthermore, emerging evidence has demonstrated the utility of the collaborative care model for implementing DMHIs among Black communities, citing clinically meaningful improvements in depression (Adewuya et al., 2019; Jonassaint et al., 2017, 2020). Leveraging existing primary care infrastructure through the provision of collaborative care treatment for mental disorders may be a particularly efficacious strategy for improving acceptability and broadening the dissemination and uptake of DMHIs.

### **1.5 Cultural Adaptation of Digital Mental Health**

Another key strategy for improving acceptability and treatment efficacy of DMHIs is through the modification of mental health interventions for BIPOC communities. This is commonly achieved through cultural adaptation. Cultural *adaptation* refers to the modification of evidence-based treatments or protocols to reflect the client's language, culture, and context

(Bernal et al., 2009). This is distinct from a culturally *targeted* intervention where the intervention is initially designed for a subcultural group with a priori considerations of characteristics shared across the group members (Kreuter & Skinner, 2000), or *tailored* interventions which Kreuter et al. (1999, p. 3). define as “any combination of information or change strategies intended to reach *one specific person*.”

Cultural adaptations draw from several theoretical models which have identified essential components for effective adaptation, including ethnic group affiliation (Domenech Rodríguez et al., 2011; Whitbeck, 2006), therapeutic process and skills (Hwang, 2006), elements within the intervention (Bernal et al., 1995), and cross-cultural frameworks (Bernal & Sáez-Santiago, 2006) among others. Culturally adapted interventions are effective (Griner & Smith, 2006; G. C. N. Hall et al., 2016), and implementation of these strategies have demonstrated success in reducing mental health burden among racial and ethnic minority communities (Harper Shehadeh et al., 2016). In one meta-analysis of 78 studies, researchers found that culturally adapted face-to-face interventions performed better than the comparison conditions with an average effect size of  $g = 0.67$  (G. C. N. Hall et al., 2016). Furthermore, culturally adapted interventions were more effective than their original unadapted versions, with a medium effect size of  $g = 0.52$ .

Culturally adapted DMHIs may hold promise in mitigating one of the most pernicious attitudinal barriers to mental health treatment – stigma. Stigma refers to “a social devaluation of a person” (Thara & Srinivasan, 2000, p. 135) and can be conceptualized as comprising “problems of ignorance, prejudice, and discrimination” (Thornicroft, 2006, p. 182). Furthermore, when stigma becomes internalized, some people with mental illness may come to accept the dehumanizing prejudice directed towards them leading to diminished self-esteem, shame, and social withdrawal (Ritsher et al., 2003; Ritsher & Phelan, 2004). Stigma is a global barrier to

mental health treatment and when unaddressed, may perpetuate unmet mental health needs (Semrau et al., 2015; Thornicroft, 2008).

Macro-level frameworks for cultural adaptations of psychotherapy have been applied to DMHIs, including the foundational Ecological Validity Model (Bernal et al., 1995; Bronfenbrenner, 1977). Culturally adapted DMHIs may improve access and uptake by mitigating the impacts of mental health stigma and increasing the acceptability of treatment-seeking for historically underrepresented communities (Choi et al., 2012; Salamanca-Sanabria et al., 2020; Sit et al., 2020). For example, Sit et al. (2020) used the Ecological Validity Model to inform the inclusion of culturally sensitive dimensions (e.g., language, metaphors, content, goals, etc.) in the adaptation of their mobile-based DMHI. This resulted in an adapted program targeting depression among Chinese adults from both Macao and mainland China. Their intervention used culturally relevant illustrations and avatars, metaphors, and target goals, and could be delivered using both traditional and simplified Chinese. Focus group participants indicated that they found the DMHI to be acceptable, relevant, and comprehensible, while maintaining fidelity to therapeutic elements of the intervention.

## **1.6 Proposed Studies to Further Research to Inform Implementation and Dissemination**

The Consolidated Framework for Implementation Research (CFIR; Damschroder et al., 2009) is derived from the Diffusion of Innovations Theory, and provides a unifying model for summarizing constructs related to adoption and implementation of *health service innovations* across multiple domains (Damschroder et al., 2009). Compared to existing theories which propose ‘what works’ but not ‘where’ and ‘for whom’, the CFIR offers a typology of shared language and constructs that promotes theory development and evaluation in varied contexts. The CFIR proposes four primary domains that comprise key drivers and barriers to

implementation within health service systems. These include 1) intervention characteristics, which are defined by the core components and adaptable features of an intervention, 2) outer setting, which is the collective economic, political, and social context within which an organization resides and operates (e.g., municipality healthcare system), 3) inner setting, which includes the structural, political, and cultural contexts which will be directly responsible for the implementation process (e.g., outpatient clinic), and 4) participant characteristics which reflects all relevant attributes, cultural norms, and interests of the individuals involved in the target intervention or implementation process. The three studies proposed in this dissertation will focus on two domains of the CFIR model: (1) intervention characteristics and (2) characteristics of individuals involved. The following section will describe how these areas of research can facilitate user-centered implementation studies for DMHIs among BIPOC communities.

#### ***1.6.1 Study 1: Cultural Adaptation, Targeting, and Tailoring of DMHIs for BIPOC communities***

The first study is a systematic review and meta-analysis of research on culturally adapted DMHIs for BIPOC communities. Systematic reviews are well-positioned to examine the limited, yet evolving literature on culturally adapted DMHIs, given the heterogeneity of populations targeted, clinical outcomes measured, and implementation methods used to culturally adapt DMHIs. Exploring the utility of cultural adaptation and defining adaptation-response curves (i.e., how much adaptation is required to facilitate a measurable effect) is needed in the literature. Indeed, some studies indicate that only one adaptation element is required to see benefits of an adapted DMHI compared to treatment as usual (Mauriello et al., 2016). Others suggest that the more adaptation elements included (e.g., language translation, audio/visual modifications, cultural idioms) the greater the effect of the intervention (Harper Shehadeh et al., 2016). It has

been noted, however, that modifications incur additional costs, and full community-based participatory research models require resources that may be prohibitive to some researchers (Harper Shehadeh et al., 2016). Therefore, more efficient adaptation approaches have gained popularity. For example, the World Health Organization developed an online self-help program, “Step-by-Step”, that was designed to be adaptable across nations and cultures (Carswell et al., 2018). This modular approach to DMHIs may mitigate the significant start-up costs and resources needed to develop DMHIs. Study 1 aims to address the gap in knowledge regarding the heterogeneous approaches to culturally adapted DMHIs and their efficacy and acceptability by conducting a systematic review and meta-analysis of empirical studies on culturally adapted DMHIs that used quantitative, qualitative, or mixed-methods approaches.

#### ***1.6.2 Study 2: Improving Acceptability of DMHIs among Black Americans***

Experimental studies have demonstrated that providing video and text-based treatment rationales for DMHIs can significantly increase participants’ feelings of credibility, expectancy for improvement and likelihood of using DMHIs, generally citing strong effect sizes (Ebert et al., 2015;  $d = .65$ ; Mitchell & Gordon, 2007;  $r = .56$ ; Soucy et al., 2016;  $\eta_p^2 = 0.21$ ; for a more conservative effect size see Casey et al., 2013). However, nearly all studies did not include (or did not report) racial or ethnic minority participants. Study 2 is an experimental study testing the effects of a treatment rationale on acceptability and treatment-seeking interest for a DMHI, Internet-based cognitive behavioral therapy (iCBT) among a non-clinical sample of Black Americans ( $n = 268$ ). Participants completed a standardized self-report measure of mental health treatment barriers, were randomly assigned to receive a treatment rationale or not, and then reported their attitudes of acceptability toward iCBT. Participants also rated their likelihood of using iCBT if endorsed by an authority figure. It was hypothesized that 1) participants who

received a treatment rationale would report greater acceptability of iCBT compared to those who did not receive a rationale, 2) participants' barriers to mental health treatment would be positively related to acceptability of iCBT, 3) barriers to treatment would moderate the relationship between receiving the treatment rationale and acceptability towards iCBT such that those endorsing more barriers would report stronger attitudes of acceptability and 4) participants would indicate a greater likelihood of using iCBT if endorsed by an authority figure as compared to no authority endorsement.

This research is notable as the first comprehensive assessment of Black American attitudes towards iCBT. Furthermore, treatment rationales may be a useful tool in the initial stages of dissemination studies for DMHIs among communities of color, especially when researchers first engage with participants that are likely to have reservations and ambivalent perceptions of digital treatment.

### ***1.6.3 Study 3: Evaluating the Psychometric Properties of a Self-Report Measure of Acceptability of DMHIs among Black Americans***

Improving measurement of acceptability is a necessary step in the assessment of attitudes towards DMHIs among diverse populations. Measures of attitudes toward DMHIs have demonstrated evidence for validity and reliability among both mental health consumers (Clough, Eigeland, et al., 2019; Gómez Penedo et al., 2020; Miragall et al., 2015; Schröder et al., 2015; Teles et al., 2021) and mental health professionals (Clough, Rowland, et al., 2019; Schröder et al., 2017). However, all but one of these measures (Miragall et al., 2015; Spanish sample) have been developed and evaluated among overwhelmingly White majority (and predominantly European language) samples. The final study presented in this dissertation provides an examination of the psychometric properties of the Attitudes towards Psychological Online

Interventions Scale (APOI; Schröder et al., 2015) – the first psychometrically evaluated measure of acceptability toward DMHIs – among a sample of Black Americans ( $n = 254$ ). As the 16-item APOI was developed among a German-speaking population, this study will employ a confirmatory factor analysis to examine the appropriateness of the underlying factor structure of acceptability in a cross-cultural context. This study further investigates alternative factor structures to illuminate nuances in the theoretical construct of acceptability. Study 3 is crucial as it evaluates the psychometric properties of a widely used measure of the acceptability of DMHIs among a community that faces historic and contemporary barriers to psychotherapy. Further research is necessary to improve the standardization of acceptability if it is to be leveraged for the greater adoption of DMHIs among BIPOC communities.

## 2 STUDY 1

**Ellis, D. M. & Anderson, P. L.,** (in revision). Culturally adapted digital mental health interventions among racial/ethnic minorities: A systematic review and meta-analysis. *Journal of Consulting and Clinical Psychology*

### 2.1 Abstract

**Objective:** Digital mental health interventions (DMHIs) are typically designed as “one-size fits all” which may perpetuate health disparities for racial and ethnic minorities. This systematic review identified culturally adapted DMHIs and examined their efficacy and acceptability among racial and ethnic minorities. **Method:** PsycINFO, Web of Science, and PubMed databases were searched between 2000-2021. Studies that examined the development or impact of a culturally adapted DMHI for racial or ethnic minority populations using quantitative and/or qualitative methodologies were included. Meta-analyses were conducted to explore the efficacy of DMHIs, and moderator analyses were used to identify differences in effect sizes due to study quality, clinical outcomes, therapist support, and attrition. **Results:** Thirty-two studies met inclusion criteria and were reviewed. DMHIs were deemed acceptable and feasible in most studies ( $n = 24$ ). Among eligible randomized controlled studies ( $n = 12$ ) comprising 653 participants, results indicated that culturally adapted DMHIs produced a large, positive, significant effect ( $g = 0.90$ ) across a range of outcomes when compared to wait-list and treatment as usual control conditions. The average attrition rate per study was 42%, and most participants did not complete all modules. **Conclusions:** Culturally adapted DMHIs are efficacious and acceptable. Such interventions represent a powerful opportunity to circumvent barriers to mental health treatment and improve mental health equity among racially and ethnically minoritized communities. However, the large proportion of feasibility studies - and limited research for



Black and Indigenous populations - indicate that more research is needed to achieve this purpose. Considerations for effective adaptations are discussed.

**Keywords:** Digital mental health intervention; Racial/ethnic minority; Acceptability; Systematic review; Meta-analysis

## **2.2 Public Health Significance Statement**

This study provides strong evidence that culturally adapted digital mental health interventions are both effective and acceptable for racial and ethnic minority communities. Further research is needed to examine the utility of these interventions among Black and Indigenous populations and to improve intervention adherence.

## 2.3 Introduction

Unmet mental health need among racial and ethnic minorities persists at alarming levels. Studies indicate that Black American, Hispanic, and Asian communities have less access to mental health care as compared to White individuals (Cook et al., 2017) due to both practical barriers (e.g., cost) and emotional barriers (e.g., stigma; Mohr, Ho, et al., 2010). The growing ubiquity of Internet connectivity and smartphone ownership positions digital mental health interventions (DMHIs) to circumvent such barriers (Ryan, 2018).

DMHIs are delivered in various forms (e.g., mobile applications, web-based interventions) and with varying levels of support from a mental health professional. DMHIs are commonly based on cognitive behavior theory models which are well-suited to delivery in a digital space due to their structured nature and focus on skills development (Himle et al., 2021). People who use DMHIs say they are convenient and private (Carolan & De Visser, 2018; Mohr, Siddique, et al., 2010; Travers & Benton, 2014). Meta-analyses show that DMHIs are effective in treating a wide range of mental illnesses including anxiety, depression, and substance use disorders (Andrews et al., 2018; Barak et al., 2008). These findings highlight the potential for DMHIs to improve mental health access and equity.

However, DMHIs are generally designed to be “one-size fits all,” which may turn DMHIs’ potential to reduce mental health disparities into a missed opportunity. For example, 97% of the studies included in a meta-analysis for Internet-delivered cognitive behavioral therapy did not include (or report) participants identifying as racial or ethnic minorities (Andrews et al., 2018). The acontextual development and racially unrepresentative samples of existing studies of DMHIs not only limits their potential to improve mental health equity, but also researchers’ ability to evaluate it.

A wealth of data supports the benefits of adapting therapeutic interventions for racial and ethnic minority groups. Culturally-adapted face-to-face interventions are effective and reduce mental health burden among racial and ethnic minority communities including Black American, Hispanic/Latinx, Asian American, and Native American populations (Griner & Smith, 2006; Hall et al., 2016). A meta-analysis of 78 studies (Hall et al., 2016) found that culturally adapted face-to-face interventions performed better than control conditions and better than their original un-adapted versions, with large ( $g = 0.67$ ) and medium ( $g = 0.52$ ) effect sizes, respectively. Similarly, a meta-analysis of culturally-adapted self-help interventions used with minimal guidance from a professional (e.g., bibliotherapy) found that cultural adaptation was associated with greater reductions in depression and anxiety symptoms and that more extensively adapted interventions showed greater effects (Harper Shehadeh et al., 2016).

Culturally adapted DMHIs are well-positioned to circumvent barriers to mental health treatment that particularly affect racial and ethnic minority communities including stigma, cost, and accessibility. An internationally representative survey study across 24 countries demonstrated that attitudinal barriers to treatment were the most prevalent obstacles to both initiating and continuing treatment and that structural barriers were of greater importance for those experiencing severe psychopathology (L. H. Andrade et al., 2014). Epidemiologic studies further indicate that Black American and Latinx individuals cite cost and lack of insurance as barriers to seeking treatment (Alegria et al., 2012; Cook et al., 2017). DMHIs are generally considered more cost-effective and accessible relative to in-person psychotherapy (Hedman et al., 2012), although a critique of the literature on economic evaluations of DMHIs is that they fail to capture all relevant available evidence and comparators (Jankovic et al., 2021). Cost effectiveness may assist treatment systems and providers that specifically serve racial/ethnic

minority communities and incentivize systems and providers that do not currently use DMHIs to consider doing so.

A rapidly growing body of literature is beginning to examine modifications to DMHIs, which involve a range of cultural adaptations. Bernal et al.'s (1995) Ecological Validity Model for cultural adaptation identifies core elements for adaptation, including language, persons, metaphors, content, concepts, goals, methods, and context. The extent to which cultural adaptations are made for DMHIs vary widely. Muñoz et al. (2016), for example, solicited 27,000 Spanish-speaking participants from 168 countries for an international proof of concept study of a massively open online intervention (MOOI) for smoking cessation for which the primary adaptation was translation to Spanish. Choi et al. (2012), on the other hand, used several elements from Bernal et al.'s (1995) framework to adapt an existing DMHI for Chinese Australians, including translating the DMHI into Mandarin Chinese, redrawing illustrations to reflect Asian features, and modifying phrasing to reflect cultural colloquialisms.

The body of literature on culturally adapted DMHIs has grown to the point that a systematic review and meta-analysis are warranted. A recent umbrella review shows that cultural adaptations of digital health interventions for medical concerns are increasing in popularity (Armaou et al., 2020), but there are few reviews evaluating culturally adapted digital *mental* health interventions. Ramos and Chavira (2022) described a set of commonly used behavioral intervention technologies and evaluated the evidence base for their use among racial and ethnic minorities, but it was not a systematic review and it did not specifically review culturally adapted DMHIs. Harper Shehadeh et al.'s (2016) systematic review assessed cultural adaptation of minimally-guided interventions, but 4 of the 8 studies evaluated bibliotherapy (i.e., self-help books), and the review only included randomized controlled trials. To date, there is no

systematic review and meta-analysis of studies examining culturally adapted DMHIs among racial and ethnic minority communities.

The present study is a systematic review and meta-analysis of DMHIs that have been adapted for people from racially and ethnically minoritized communities. This is a mixed study review (MSR; Pluye & Hong, 2014), inclusive of both quantitative and qualitative studies, which is important because some culturally adapted interventions regularly solicit community feedback that is reported in qualitative research. Intervention elements that were intentionally designed to be culturally responsive were identified for each study to evaluate the type and range of cultural adaptations for a given population. The review evaluates the efficacy, acceptability, and adherence of culturally adapted DMHIs among racial and ethnic minority communities, which is crucial as acontextually designed DMHIs may perpetuate disparities in access to and benefit from mental health treatment. Findings are discussed as they relate to theoretical models, to improving clinical research, and to optimizing cultural adaptation and cultural targeting for DMHIs to better serve people from racial and ethnic minority communities.

## **2.4 Method**

### **2.4.1 *Electronic Searches***

A systematic review was conducted using the PsycINFO, PubMed, and Web of Science databases to identify studies adopting quantitative and/or qualitative methodology. Three search concepts were combined to capture relevant literature: intervention modality (e.g., digital mental health), adaptation (e.g., culturally adapted), and racial/ethnic samples. The search framework used a wide range of keywords and free text items to increase the sensitivity and inclusiveness of the searches (see Supplemental Material S1). Studies published between January 2000 through July 2021 were eligible for inclusion because the year 2000 marked the emergence of mobile

phone, text-based interventions. In accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher et al., 2009), each step of the systematic search and reasons for exclusions were recorded (see Figure 1). Both lead and third authors coded studies for exclusion criteria. All discrepancies were discussed until consensus was met.

#### **2.4.2 Study Selection Criteria**

Development of the inclusion criteria was based on the PICO (population, intervention, control, and outcomes) model (Schardt et al., 2007). The *population* referred to racial or ethnic minority adults. Minority status was defined as a group with distinct racial, ethnic, or linguistic traditions that differ from that of the majority of the national population where the research was based *or* where the original evidence-based treatment was developed (United Nations Human Rights Office of the High Commissioner, 2010).

An *intervention* referred to a DMHI or application delivered via the Internet, such as computers, tablets, or mobile phones to individuals through platforms such as websites, applications (apps), email, or text messaging. To be included, the primary goal of the DMHI had to be improvement of a mental health outcome (e.g., symptoms, quality of life, emotion regulation, self-efficacy) and the DMHI had to include adaptations that were explicitly based on culture, race, and/or ethnicity. Cultural “adapting”, “targeting”, and “tailoring” are often used interchangeably and have related, but distinct definitions. Cultural *adaptation* refers to the modification of an existing evidence-based treatment or protocol to reflect the client’s language, culture, and context (Bernal et al., 2009). A culturally *targeted* intervention is developed ‘from the ground up’ for a subcultural group with a priori considerations of characteristics shared across the group members (Kreuter & Skinner, 2000). Cultural tailoring is “any combination of

information or change strategies intended to reach *one specific person*” (Kreuter et al., 1999, p. 3). As most studies employ subcultural group considerations, the term culturally adapted will be used throughout, except where indicated to distinguish between culturally targeted interventions.

*Comparison group* was not used as an inclusion criterion because eligible studies included a variety of methodologies, some of which had comparison groups (e.g., randomized controlled trials) while others did not (e.g., qualitative studies). *Outcomes* referred to studies that had a mental health clinical outcome as the primary outcome, such as mental health symptomatology (e.g., depression), behaviors (e.g., smoking), self-efficacy, and wellness (e.g., quality of life, improvements in social or daily functioning). Only original studies published in English peer-reviewed journals with full text available were included.

Studies were excluded if they: 1) did not report a clinical outcome (e.g., study protocol or economic evaluation), 2) evaluated synchronous therapist interventions only (e.g., teleconferencing), 3) evaluated interventions that did not require active participation from participants (e.g., tele-monitoring), 4) did not use samples comprised of racial and/or ethnic minorities, 5) examined an intervention that was not culturally adapted, 6) examined an intervention that was adapted for characteristics other than race and ethnicity (e.g., gender, sexual orientation), 7) used physical or sexual health as the primary clinical outcome, 8) measured attitudes towards digital mental health broadly or 9) evaluated DMHIs as adjuncts to face-to-face therapy.

### **2.4.3 Data Extraction and Study Evaluation**

In accordance with PRISMA guidelines, the lead author developed a data extraction method based on recent reviews of digital health interventions adapted for racial and ethnic minority communities (Armaou et al., 2020; Harper Shehadeh et al., 2016; Ramos & Chavira,

2022) and a preliminary review of articles that met inclusion criteria. For each study, the lead author recorded the number and percentage of racial/ethnic minorities comprising the sample, recruitment setting, study design, attrition rate, and primary clinical outcome. The name and type of DMHI, the theoretical model on which the DMHI was designed, and whether the DMHI included support from a therapist/coach were also reported. The types of cultural adaptation used in DMHIs were coded according to the framework proposed by Bernal et al. (2009). See Table 1 for data extraction. Articles that provided effect sizes (or enough information to calculate effect sizes) for primary clinical outcomes (e.g., depression) were also coded for effect size and the number of participants that completed the intervention from the racial/ethnic groups for which it was adapted (see Table 2).

For the meta-analysis, data were extracted by the first and second authors. Any inconsistencies in the data were discussed and corrected. Outcome data were converted into a standard format by calculating the standardized mean difference in primary and secondary outcome measures from pre- to post-treatment between a DMHI and a comparison condition, when possible ( $n = 12$  studies). Data from studies that did not include a comparison condition (Harper Shehadeh et al., 2020; Watson-Singleton et al., 2021) or reported data in a format that did not allow for calculation of an effect size based on differences between conditions (Osilla et al., 2015) were also extracted and included in most analyses ( $n = 3$  studies). For most studies, effect sizes were calculated by subtracting mean change in treatment outcomes in the comparison condition from the mean change in treatment outcomes from the DMHI condition and dividing by the pooled standard deviation of the two groups so that positive effect sizes reflect greater improvement in treatment outcomes in the DMHI relative to the comparison group. All effect sizes reported in results of the meta-analyses are reported using Hedges'  $g$  (Hedges, 1981).



Interpretive ranges of small, medium, and large effect sizes are 0.2, 0.5, and 0.8, respectively. Analyses were conducted using Comprehensive Meta-Analysis software. An alpha level of 0.05 was used in all analyses. Main effect analyses were calculated using a random-effects model. Moderator analyses explored the possibility that heterogeneity in effect sizes was due, at least in part, to study quality, type of outcome measure used, therapist support, and attrition. Interstudy variation in effect sizes was evaluated using the  $Q$  and  $I^2$  statistics (Cooper, 2010; Hedges & Olkin, 1985). A significant  $Q$  value reflects that the distribution of effect sizes is significantly greater than expected based on sampling error. The  $I^2$  statistic reflects the degree of heterogeneity in effect sizes, with 25%, 50%, and 75% indicating low, moderate, and high degrees of between-studies variability, respectively. Publication bias was evaluated with a funnel plot of included studies' standard errors and effect sizes as well as Duval and Tweedie (2000) trim-and-fill procedure, which identifies the likely number of missing studies and calculates an adjusted overall effect size.

The quality of each study was evaluated using the Mixed Methods Appraisal Tool (Hong et al., 2018), which can be used to assess the methodological quality of multiple study designs simultaneously (qualitative, quantitative randomized controlled trial, quantitative non-randomized, quantitative descriptive, and mixed methods). The Mixed Methods Appraisal Tool uses five criteria to assess study quality/risk of bias, which varies slightly across study designs, but generally assesses the representativeness of participant samples, confounds in study design, and coherence of data-driven conclusions. Quality scores were rated by the lead author.

The extent to which each core design element is present and adequately reported is rated "No", "Can't Tell", or "Yes". Consistent with recommendations by Hong et al. (2018) each criterion's quality rating is reported in full for contextualized appraisal of study quality and risk-

of-bias (see Table 3). Summary ratings (1 – 5), however, were included in the meta-analysis moderator analyses.

#### **2.4.4 Transparency and Openness**

The authors affirm that the data presented in this manuscript are original and not previously published elsewhere. All data were collected in aggregate via online databases and will be made available upon reasonable request. This study was not preregistered.

### **2.5 Results**

#### **2.5.1 Study Selection**

A total of 3,299 references were identified through the database search. After duplicates were removed and an additional 21 records were identified through other sources, 2,193 articles were reviewed by title and abstract. The authors reviewed 108 text articles and 76 studies were excluded that did not meet inclusion criteria such as DMHI parameters, non-racial or ethnic minority samples, and not being culturally adapted. No article was excluded due to lack of full-text availability, as all were successfully obtained via databases and inter-library loans. Ultimately, 32 studies reporting on the findings of 27 interventions delivered to 27,000 participants were included. See Figure 1 for PRISMA flow chart of the study selection process.

Among the 32 studies, 17 (53%) were RCTs, 6 (19%) were non-randomized experimental studies, 8 (25%) were qualitative studies, and 1 (3%) was mixed methods. Overall, 13 (41%) articles represented feasibility or pilot studies. The vast majority of studies were published in the last decade ( $n = 30$ , 94%) with 15 (47%) published in 2019 or later.

#### **2.5.2 Participants**

Participants were recruited from several racial and ethnic minority communities across the globe. The samples of most studies ( $n = 29$  studies, 91%) included a single racial, ethnic, or

language minority group. The most frequently represented racial and ethnic groups were Hispanic/Latinx and Asian/Pacific Islander participants accounting for 50% ( $n = 16$ ) and 31% ( $n = 10$ ) of included studies, respectively. Studies investigating participants from Middle Eastern or Arabic-speaking populations accounted for 22% ( $n = 7$ ) of studies. A smaller proportion of studies examined culturally adapted DMHIs among Black American participants ( $n = 4$ , 13%) and even fewer evaluated DMHIs among Indigenous communities ( $n = 2$ , 6%; Bramley et al., 2005; McCool et al., 2018). Although most studies investigated a single racial or ethnic group for a given intervention, several examined DMHIs that were adapted to serve more than one racial or ethnic minority population ( $n = 3$ , 9%). One study examined DMHIs among Black/African Americans without another ethnic racial or racial ethnic group present (Watson-Singleton et al., 2021).

Regarding recruitment setting, most studies investigated DMHIs among participants in an urban setting ( $n = 20$ , 63%) defined by proximity to a metropolitan city and characterized by community-based recruitment strategies (e.g., advertising, mailing lists). Online-only recruitment was the second most popular source ( $n = 9$ , 28%) and was characterized by Internet-based recruitment strategies (e.g., website traffic, social media). Four studies exclusively recruited participants presenting for clinical treatment in outpatient settings situated in urban centers (Caplan et al., 2020; Espinosa et al., 2016; Menezes et al., 2019; Tiburcio et al., 2018) and one in a residential/inpatient setting (Muroff et al., 2017). Several studies utilized multi-prong recruitment ( $n = 8$ , 25%) combining recruitment strategies across settings (e.g., urban and online). In one study, participants from both rural and urban areas were recruited ( $n = 1$ , 3%). Recruitment setting was unclear for  $n = 2$  (6%) studies, although the authors reported recruitment strategies.

### **2.5.3 Cultural Adaptation of DMHIs**

Studies cited a variety of theoretical frameworks used in the adaptation process including the Ecological Validity Model (Sit et al., 2020), Self-Determination Theory (Arevian et al., 2018), and the Integrate, Design, Assess, and Share (IDEAS) framework (Burchert et al., 2019). Seven of the eight qualitative studies utilized a community-based participatory research model that included stakeholders and focus groups on the design and feedback of the DMHI.

Strategies for cultural adaptation were grouped into three conceptual categories: 1) language translation, 2) modification of audio/visual content, and 3) inclusion of culturally salient messaging. Most studies ( $n = 24$ , 75%) used all three cultural adaptation strategies in their DMHI adaptations. Virtually all studies ( $n = 30$ , 94%) used language translation. Most studies ( $n = 24$ , 75%) used audio/visual modifications to produce digital avatars consistent with the racial/ethnic group for which the DMHI was developed, and culturally salient messaging ( $n = 26$ , 81%). It was uncommon for a study to use only one method of adaptation; six studies (19%) used language translation only, one study used culturally relevant messages only, and no studies singularly implemented audio/visual modifications.

### **2.5.4 Quality Appraisal**

Table 3 shows quality and risk of bias ratings for each study using the Mixed Method Assessment Tool (Hong et al., 2018). Quality ratings for the eight qualitative studies included in this review were quite high. Seven studies were rated as having met all methodological quality metrics, including using a conceptually driven approach, adequate qualitative data collection methods, appropriately derived findings, sufficiently substantiated interpretations, and coherent integration of data sources and interpretation.

The study quality across the 17 randomized clinical trials included in the review was generally adequate. All studies implemented randomization, but one trial did not report randomization protocols (Osilla et al., 2015). All studies established parity between experimental and control groups at baseline, with the exception of one study that reported significant differences between groups at baseline (Lin et al., 2020) and two studies that did not report enough information to be able to evaluate this criterion (Choi et al., 2012; Muñoz et al., 2009). Most studies ( $n = 14$ , 82%) reported complete data or the presence of intention-to-treat analyses (e.g., Lin et al., 2020; Wang et al., 2013) or multiple imputation methods (e.g., Ünlü Ince et al., 2013). Most studies reported variable adherence to the DMHI, with six studies reporting drop-out rates of greater than 50% (Barrera et al., 2015; Lin et al., 2020; Salamanca-Sanabria et al., 2020; Tiburcio et al., 2018; Ünlü Ince et al., 2013; Wang et al., 2013). Risk of bias due to assessor influence was by far the poorest element of study quality, as only seven studies reported implementing a single or double-blind protocol.

Each of the six non-randomized experimental studies were rated as ‘satisfactory’ for participant representation and appropriate measurement. Two studies reported incomplete data (A. L. M. Andrade et al., 2016; Lara et al., 2014) due to significant attrition, and only one study failed to demonstrate participant fidelity to the intervention (Lara et al., 2014). The poorest element of study quality was failure to report meaningful covariates/confounds as evidenced by the absence of covariate (e.g., ANCOVA) or sensitivity analyses across all studies.

One mixed methods study was included for review (Harper Shehadeh et al., 2020). This study demonstrated adequate rationale for a mixed methods approach, appropriate integration, interpretation, and quality of the respective component approaches. However, it was unclear how discrepancies in qualitative and quantitative findings were reconciled.

### ***2.5.5 Digital Mental Health Intervention and Implementation Characteristics***

Most studies examined DMHIs delivered via the Internet or a web-based interface ( $n = 20, 63\%$ ), in which participants typically accessed modular content via webpage or portal at their convenience. Eight studies (25%) examined DMHIs that were delivered via smartphone or mobile application available to iPhone and Android users. Participants in four studies (13%) used smartphones or iPads provided by the researchers to standardize access to the DMHI (Liu et al., 2020; Mauriello et al., 2016; Menezes et al., 2019; Muroff et al., 2017). A few studies examined DMHIs that were delivered solely via text-messaging ( $n = 3, 9\%$ ), which typically incorporated daily text-messages to which participants could respond for interactive content (Arevian et al., 2018; Bramley et al., 2005; McCool et al., 2018). One study provided DMHI in a hybrid web and text-based format (Knaevelsrud et al., 2015). All studies investigated DMHIs that incorporated elements of evidence-based therapies based on cognitive behavior theory. Most studies included standard elements of cognitive-behavioral therapy ( $n = 25, 78\%$ ), including cognitive restructuring, behavioral activation, and problem solving. Five studies (16%) evaluating substance abuse/smoking cessation, incorporated motivational interviewing (A. L. M. Andrade et al., 2016; Mauriello et al., 2016; McCool et al., 2018; Osilla et al., 2015; Tiburcio et al., 2018). One study utilized a problem-solving therapy framework for the treatment of depression within a Turkish migrant sample (Ünlü Ince et al., 2013), and one study implemented mindfulness-based strategies for stress reduction in Black Americans (Watson-Singleton et al., 2021). Half of the studies included some level of therapist or coach support for the DMHI ( $n = 16, 50\%$ ), typically a weekly check-in by email/phone.

### **2.5.6 Clinical Outcomes**

Studies in this review most commonly targeted depression as the primary clinical outcome ( $n = 16$ , 50%), followed by alcohol, drug, and/or tobacco use ( $n = 9$ , 28%), post-traumatic stress disorder ( $n = 2$ , 6%) and anxiety ( $n = 2$ , 6%) - although several studies examined anxiety as a secondary or tertiary metric of improvement. DMHIs in two studies primarily sought to enhance wellness or ‘quality of life’ via social support, healthy activities and stress reduction (Arevian et al., 2018; Watson-Singleton et al., 2021). Mauriello et al. (2016) examined two ‘primary’ outcome measures where they investigated the utility of a DMHI for reducing/preventing smoking behaviors and improving healthy eating and coping strategies among Latinx and Black pregnant women. All experimental studies examined the efficacy of DMHIs for improving depression, anxiety, stress, or substance use. However, there was variability in the way these constructs were measured.

### **2.5.7 Efficacy and Effectiveness**

A total of 15 studies with a combined sample size of 653 participants who received a DMHI were included in meta-analyses exploring the effectiveness of culturally adapted DMHIs (see Table 2). The overall effect of DMHIs on primary outcomes was evaluated among studies that reported data allowing for comparison of the DMHI to a control group (typically wait-list control [ $n = 10$ ], though 2 studies included a treatment as usual comparison condition). The overall effect was large and statistically significant ( $g = 0.90$ , 95% CI: [0.60-1.20],  $p < 0.01$ ), reflecting that culturally adapted DMHIs had a greater ameliorative effect on clinical outcomes than that of the comparison conditions (see Figure 2). This effect may have been impacted by publication bias, as the funnel plot appeared to be asymmetrical, and three missing studies were identified by the trim-and-fill procedure. The adjusted overall effect accounting for missing

studies was  $g = 0.74$  (95% CI: 0.50-1.02). Heterogeneity in effect sizes was significant [ $Q(11) = 47.84, p < 0.01$ ] and high ( $I^2 = 77.01\%$ ). When study effect sizes were based on averages of all included measures rather than just the primary outcome measures, the overall effect size was moderate-to-large ( $g = 0.69$ , 95% CI: [0.37-1.01],  $p < 0.01$ ).

Overall efficacy of DMHIs on all outcome measures including outcomes that were not directly targeted by the intervention was also evaluated for all 15 studies without including data from comparison groups. The overall effect was large and significant ( $g = 0.71$ , 95% CI [0.56-0.85],  $p < 0.01$ ). Some asymmetry was noted in the funnel plot and the trim-and-fill procedure indicated two studies were likely missing to the right of the mean with an adjusted overall effect of  $g = 0.76$  (95% CI: [0.61-0.91]). Heterogeneity was significant [ $Q(14) = 129.08, p < 0.01$ ] and high ( $I^2 = 89.15\%$ ). Notably, these estimates were likely conservative given inclusion of secondary outcome measures. Analyses conducted with only primary outcome measures revealed a large and significant effect size for all studies when comparison group data were not included ( $g = 0.75$ , 95% CI: [0.62-0.88],  $p < 0.01$ ).

Moderator analyses were conducted to identify between-studies factors that may account for significant heterogeneity in effect sizes. Note that the more conservative approach of including study's primary and secondary outcome measures was utilized for all moderator analyses.

Study quality was evaluated as a potential moderator using meta-regression (the maximum likelihood estimate method was employed). Results indicated that differences in study quality did not significantly influence between-studies heterogeneity ( $p = 0.39$ ) and heterogeneity remained high [ $Q(13) = 129.05, I^2 = 89.93\%$ ].



Meta-regression was also used to evaluate the potential moderating role of attrition. Attrition rates were calculated as a percentage of participants that dropped out from pre-test/allocation to treatment (whatever the earliest timepoint was) to post-test. Results indicated that attrition did not significantly influence between-studies heterogeneity ( $p = 0.96$ ) and heterogeneity remained high [ $Q(11) = 101.46, I^2 = 89.16\%$ ].

Other potential moderators, including the type of outcome measure used and inclusion of therapist support, were evaluated using subgroup analyses employing random effects models with separate estimates of  $\tau^2$  (due to significant variability between effect sizes within groups). In studies where more than one estimate of an experimental factor was reported (e.g., a study that used multiple outcome measures of the same type), effect sizes for each estimate were treated as if they were derived from an independent study. For each of the subgroup analyses, we only included groups that contained three or more studies in order to have adequate power.

Surprisingly, therapist support was not a significant moderator of heterogeneity [ $Q(1) = 3.14, p = 0.08$ ]. Regarding outcomes, studies in this review used multiple measures of anxiety symptoms ( $n = 17$  across eight studies), depressive symptoms ( $n = 13$  across 10 studies), posttraumatic stress disorder symptoms ( $n = 4$  across 3 studies), self-efficacy ( $n = 3$  across 2 studies), improvements in functioning, wellbeing, or quality of life ( $n = 10$  across 7 studies), and behavioral changes (primarily involving alcohol use but also including engagement in healthy behaviors such as mindfulness, healthy eating, and stress management;  $n = 9$  across 5 studies). The subgroup analysis of type of measure was significant [ $Q(5) = 288.44, p < 0.01$ ] though heterogeneity remained high within each group, ranging from  $I^2 = 83.67\% - 94.79\%$ . The effect of DMHI was large for symptoms of anxiety ( $g = 0.92, 95\% \text{ CI: } [0.72-1.13], p < 0.01$ ) symptoms of depression ( $g = 0.90, 95\% \text{ CI: } [0.66-1.15], p < 0.01$ ), measures of improved functioning,

wellbeing, and quality of life ( $g = 0.71$ , 95% CI: [0.49-0.92],  $p < 0.01$ ), and symptoms of posttraumatic stress disorder ( $g = 0.70$ , 95% CI: [0.51-0.90],  $p < 0.01$ ). A moderate effect of DMHI on behavior changes was detected ( $g = 0.40$ , 95% CI: [0.25-0.55],  $p < 0.01$ ). A small and marginally significant effect was detected regarding improvements in self-efficacy ( $g = 0.18$ , 95% CI: [-0.00-0.37],  $p = 0.05$ ).

For non-randomized studies that examined the pre-post impact of DMHIs on substance use and omitted direct effect sizes (therefore were excluded from the meta-analyses), the benefits of DMHIs were more contextualized. Muñoz et al. (2016) reported observed smoking cessation rates of at least 40% at month – to – month follow up (but decreased to 8% quit rates if participant non-response was presumed to indicate relapse in smoking) and results from Muroff et al. (2017) reported that 34% of the sample experienced relapse in substance use, with the remaining participants indicating abstinence up to 16 weeks post-residential treatment.

### **2.5.8 Acceptability**

Of the 24 quantitative studies (both RCT and non-randomized) included in this review, 20 studies reported the acceptability and feasibility of their culturally adapted DMHI— using a wide range of metrics (e.g., treatment satisfaction, drop out, adherence). Participants in the majority of studies ( $n = 16$ , 80%) indicated generally positive attitudes towards, satisfaction with, and willingness to recommend DMHIs. Two studies reported low acceptability (Eylem et al., 2021; Lindegaard et al., 2021), as operationalized by high drop-out rates and/or minimal adherence. Participants found DMHIs delivered through each modality (mobile application, web-based, and text-based) to be acceptable, although no study directly compared satisfaction across modality.

Qualitative studies ( $n = 8$ ) of DMHIs assessed acceptability to the group of interest by soliciting feedback from community stakeholders and focus groups (e.g., “How can we improve the session?”, Caplan et al., 2020; “Would all or most OFWs [overseas Filipino workers] understand this text?”, Garabiles et al., 2019). All studies reported that including intentional considerations of the target community’s mental healthcare priorities, language, and culturally consistent messaging led to culturally adapted DMHIs that were viewed positively, reduced treatment-seeking stigma, and improved accessibility.

Collectively, the majority of studies ( $n = 24$ , 75%) indicated that both DMHIs adapted from existing interventions and those initially targeted towards minority populations attained moderate to high levels of acceptability and treatment satisfaction across participants.

### **2.5.9 Adherence and Attrition**

Attrition rates for quantitative studies ( $n = 24$ ) in this review ranged from 0% to 96%, with an average attrition rate of 42% per study (Christensen et al., 2009; Eysenbach, 2005). One study of Chinese survivors of trauma showed 0% attrition in its rural sample and 54% attrition in its urban sample (Wang et al., 2013). Across all studies, most participants did not complete all modules, sessions, or lessons provided.

## **2.6 Discussion**

The studies in this review examined the efficacy, acceptability, and attrition of culturally adapted digital mental health interventions among racial and ethnic minority communities. These studies are an important contribution to the literature, as most research conducted on DMHIs has been evaluated on the majority culture (i.e., White). This is the first systematic review and meta-analysis of culturally adapted DMHIs and the results provide another level of evidence for the effectiveness of culturally adapted DMHIs and urge further research in this area (Berlin &

Golub, 2014). As racial minorities have smartphone ownership at equal or greater rates to White counterparts and are more likely to use smartphones as their primary access to broadband Internet (Perrin & Turner, 2019) this creates a crucial opportunity for intervention delivery via Internet and other mobile devices.

Culturally adapted DMHIs were effective at reducing symptoms of depression, anxiety, and posttraumatic stress disorder. They also promoted behavioral changes (including reduced substance use and increased healthy behaviors) and improved self-efficacy and quality of life in populations culturally and linguistically distinct from those for which the interventions had been originally designed. Meta-analytic results demonstrated that these interventions contributed to significant improvements relative to control conditions (predominately wait-list control conditions).

A growing body of literature also indicates the magnitude of effect for those that benefit from DMHIs is likely higher for programs with therapist assistance (Johansson & Andersson, 2012; Linardon et al., 2019). The current findings were inconsistent, demonstrating no difference in effect sizes for DMHIs that included therapist or coach support. This finding could potentially indicate that DMHIs can be useful even when therapist or coach support is not possible (e.g., due to limited resources). Further research is needed to explore this possibility.

Additionally, most studies in this review implemented DMHIs with elements of cognitive-behavioral therapy (CBT). Internet-based CBT is the most empirically studied form of DMHI (Andrews et al., 2018) and has been found to be effective in treating a wide range of mental health illnesses. However, given that recent meta-analyses largely omitted racial or ethnic minority participants, it is promising that culturally adapted DMHIs are translating CBT for communities that have been largely unrepresented in this research.

Beyond results from the meta-analysis, narrative findings from the systematic review indicated that DMHIs demonstrated efficacy when delivered through varied modalities (i.e., web-based, mobile application, text-based), suggesting that adapting DMHIs for communities with different levels of access to and preference for digital technologies is acceptable. However, some individual studies that reported null results may be due to the lower barrier of entry to mass marketed DMHIs. For instance, both Muñoz et al. (2009) and Barrera et al. (2015) recruited international samples which may have attracted Internet users who were browsing the Internet but potentially less committed to engaging in a structured online intervention.

Culturally adapted DMHIs were found to be acceptable. However, “acceptability” of DMHI is not well-defined as a construct and has been operationalized in a variety of ways (Molloy et al., 2021). Some studies operationalized the construct of acceptability as treatment satisfaction, which has been measured by treatment adherence in some studies. Other studies asked participants rate their satisfaction using Likert-type questions such as “I was happy to use the computer to access the treatment” (Salamanca-Sanabria et al., 2020) and “The program valued my opinion” (Osilla et al., 2015), without an a priori definition or cut-off scores for ‘acceptability’. As such, interpretation of the acceptability of DMHIs appears to rely on varied and subjective metrics that may hinder consistent conclusions without the use of a priori thresholds and more standardized measures. Notwithstanding, acceptability was maintained by both culturally adapted interventions (i.e., modified from existing intervention) and culturally targeted interventions (i.e., created with target population in mind).

The eight qualitative studies provided strategies for improving acceptability of DMHI, along with insights into *why* certain DMHI elements were perceived as more acceptable than others. Primarily, the use of community-based focus groups was found to provide a level of

cultural responsiveness in DMHI development that is often neglected in quantitative research. For example, Sit et al. (2020) reported significant differences in gender preferences for illustrated avatars among Chinese young adults. Female participants indicated preferring female “senior peer” characters, whereas men preferred cartoons that did not evoke negative memories of maternal or school authority figures. Notably, gendered preferences among focus group participants differed from recommendations provided by the older, expert-group of key informants, highlighting a degree of within group heterogeneity across participant demographics. Similarly, in a study of overseas Filipino workers, participants indicated that depictions of a character “staying in bed all day”, in a DMHI for depression, would actually be interpreted as a positive coping strategy for Filipino workers in physically demanding occupations and made suggestions for de-stigmatizing self-care activities (Garabiles et al., 2019).

Only two studies (Eylem et al., 2021; Lindegaard et al., 2021) self-reported low acceptability, defined as high participant attrition and minimal adherence to the intervention. This comparatively low acceptability may reflect the unique circumstances of these samples. Both studies recruited recently immigrated, Arabic-speaking populations in European countries. It is plausible that participants in both samples may have had unstable living conditions which could explain lower adherence and higher attrition. These results may indicate the need for more rigorous culturally adapted treatments for middle eastern ethnic communities.

Adherence to culturally adapted DMHIs varied significantly. Studies reported a heterogeneous mix of participant adherence measures including “completers” (those who engaged throughout standard intervention duration), those available at follow-up, and a variety of engagement metrics including number of days logged in, modules completed and/or pages visited. The average attrition rate reported per study was 42% which is consistent with previous

research indicating that low adherence and drop-out rates approaching 50% is not uncommon among non-adapted Internet-based interventions (Christensen et al., 2009; Eysenbach, 2005). These results suggest that culturally adapted DMHIs have not yet fulfilled the promise of improving adherence to DMHI trials. One study, however, reported 0% attrition in a rural sample of Chinese participants (Wang et al., 2013), which is notable given the difficulty accessing and retaining rural participants in digital health research. This success may be due to the provision of the DMHI within a dedicated counseling center, and a compensation schedule where participants were provided with progressively more payment in kind (e.g., rice, cooking oil, pot) after each visit.

Although participants in most studies did not complete all modules of the DMHIs, they reported significant improvements in most clinical outcomes. It is possible that DMHI's with fewer modules may produce similar benefits as DMHIs with more modules (Lindegaard et al., 2019). These findings corroborate evidence that patients experience the greatest improvements in clinical outcomes during the earlier half of face-to-face treatment (Howard et al., 1986) although this dose-response effect has not been formally examined within DMHIs. Alternatively, symptom improvement may be driven in part by demand characteristics, expectancies, or non-specific effects. Further direct comparisons to active treatments are needed to evaluate these possibilities and account for confounding variables. It is also possible that interacting with DMHIs may lead participants to engage in other adaptive behaviors that lead to symptom improvement; such 'indirect effects' of DMHIs are worthy of further study.

### ***2.6.1 Optimizing Cultural Adaptations***

Most studies examined DMHIs that used multiple strategies of cultural adaptation, a positive finding given that research shows that more extensively adapted interventions correlate

with greater effect sizes (Harper Shehadeh et al., 2016). Translation of a DMHI into the participant's native language was the most reported strategy of adaptation, followed by culturally salient messaging, and audio/visual modifications. Culturally adapting or targeting interventions to the needs of users is particularly salient for DMHIs, as there is often minimal therapist interaction to convey culturally responsive treatment in the digital intervention itself (Harper Shehadeh et al., 2016). For example, modular settings with alternative language scripts, avatars, etc., that can be customized to populations are promising and could be particularly valuable for adaptations intended to address poor fit between existing interventions and intended communities (Domenech Rodríguez et al., 2011; Lau, 2006; Whitbeck, 2006). Four studies in this review examined cultural adaptations of an internationally developed DMHI that included customizable options (Step-by-Step; Carswell et al., 2018), and each study found it to be effective in reducing mental health symptomatology in their populations of interest (i.e., Syrian, Lebanese, Palestinian, Filipino, Chinese). These results are consistent with research that shows high acceptability for both culturally adapted and culturally targeted interventions and speaks to the importance of assessing the cost-benefit of “re-inventing the wheel” when adapting DMHIs.

Lastly, although community feedback for designing culturally adapted DMHIs is widely supported, this can range from a single focus group to a costly multi-stakeholder consultation program. Further research is needed to ascertain the most cost-effective design and adaptation strategies needed to balance treatment efficacy and scalable dissemination.

### ***2.6.2 Strengths and Limitations***

Strengths of this review include a systematic and meta-analytic approach and a comprehensive set of search terms. Empirical studies with a range of methodologies were eligible for inclusion including qualitative studies which have been largely excluded from



previous reviews. In addition, this review is timely. Nearly half of included studies were published since 2019, reflecting a pace of research development unaccounted for in prior systematic reviews. Indeed, of the eight studies identified in an earlier review (Harper Shehadeh et al., 2016) only three eligible DMHIs (Choi et al., 2012; Ünlü Ince et al., 2013; Wang et al., 2013) had been published. As the literature on culturally adapted DMHIs continues to grow, the current systematic review and meta-analysis can inform future directions for the field.

This review also has several limitations. Because there was substantial heterogeneity in adaptation strategies, the categories used for data extraction did not capture all multicultural nuances. Furthermore, this review did not include a comprehensive search of grey literature (i.e., dissertations, unpublished manuscripts) or study protocols that were otherwise eligible, which may reflect publication bias. Additionally, meta-analytic study weights were not modified based on study quality (although results from this moderator analysis indicate study quality likely did not affect findings). In addition, it was not possible to test whether culturally adapted DMHIs were associated with improved outcomes relative to the same intervention without cultural adaptation as only one study implemented this comparison (Dahne et al., 2019). More studies comparing culturally adapted and unadapted DMHIs are needed. Lastly, the inclusion criteria of studies available in English excludes papers on culturally adapted interventions published in other languages. In fact, these authors discovered articles indexed in non-English language journals that were subsequently published in English, were unintentionally excluded during the initial round of database searches. This deserves attention in future reviews.

### **2.6.3 *Future Directions***

Studies investigating the utility of culturally adapted DMHIs for Black populations are sorely needed. There was only one study examining DMHI that was expressly adapted for Black

Americans (Watson-Singleton et al., 2021), which is surprising, given persistent disparities in access to mental health care among Black communities (Cook et al., 2017) and high rates of smartphone ownership (Perrin & Turner, 2019). Furthermore, there is a dearth of studies of Indigenous populations (Bramley et al., 2005; McCool et al., 2018) which is notable as research indicates potential benefits of Internet-delivered treatment for these communities (Dawson et al., 2020). Similarly, there was a lack of research with a focus on rural populations. Only one study recruited rural participants, and this was in combination with an urban sample (Wang et al., 2013). The rural sample had 0% attrition - unheard of in studies of DMHIs. This is a promising finding because face-to-face treatment is particularly difficult to access for rural populations. The use of culturally adapted DMHIs to increase access to mental health treatment for rural populations is worthy of further study. Given the presumed benefits of DMHI to circumvent traditional barriers to mental health treatment and chronic disparities in access for Black, Indigenous, and rural populations, more study of these communities is needed. Lastly, most studies that included one racial or ethnic group did not account for heterogeneity within that racial or ethnic group; further subgroup analyses are appropriate.

Qualitative studies represent a key contribution to this literature because they often apply community-based participatory research frameworks and solicit feedback from stakeholders in developing culturally adapted DMHIs. More qualitative research can elucidate pitfalls and opportunities that can improve the dissemination of these interventions. Conversely, as the gold standard of efficacy research, randomized controlled trials are well suited to examine the efficacy of DMHIs. There is a significant need for full-scale RCTs as nearly half of the articles included were pilot or feasibility studies, indicating the preliminary nature of these conclusions. More research is needed to examine clinical severity as a potential moderating factor for the efficacy of

DMHIs. Furthermore, studies examining direct comparisons of culturally adapted DMHIs to unadapted DMHIs are crucial, as the preponderance of eligible studies in this review used wait-list control or treatment as usual comparison conditions.

Lastly, non-randomized experimental studies that leverage the ubiquitous reach of the Internet, such as the “massively open online interventions” conducted by Muñoz et al. (2009, 2016) and Lara et al. (2014) provide proof of concept for how to widely disseminate DMHIs. More research is needed to assess the dual demands of global reach and treatment effectiveness. Findings of this systematic review highlight the complementary strengths of these varied empirical approaches to understanding the efficacy, acceptability, and adherence to DMHIs and ultimately the need to apply them in tandem.

#### **2.6.4 Conclusions**

Culturally adapted and targeted DMHIs have the potential to reduce the mental health burden among racial and ethnic minority populations on a global scale. This field is still nascent, as most research has been conducted with majority White samples. The heterogeneity of adaptation strategies and digital health modalities provides support for the flexible targeting of mental health outcomes among underrepresented communities. As DMHIs are adapted for diverse populations, more study will be needed to optimize adherence and ensure fidelity to intervention and accessibility for Black, Indigenous, and rural communities.

## 2.7 References

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### **2.7.1 Transparency and Openness**

We state that the manuscript is original, not previously published, and not under concurrent consideration elsewhere. Data from this manuscript have appeared in the following poster presentation:

\*\*\*\*\* & \*\*\*\*\* (2021, November). The effectiveness and acceptability of culturally adapted digital mental health interventions among racial and ethnic minorities: A systematic review [Poster presentation]. The 55th Annual Convention for the Association for Behavioral and Cognitive Therapies (ABCT), Virtual.



**Table 1** *Characteristics of included studies*

Authors (year)	Country(s) of Origin	<i>n</i> : % of R&EM	Recruit Setting	DMHI	DMHI Type	Therapist / Coach Support	EBT Delivered	Cultural Adaptation	Study Design	Primary Clinical Outcome (Measure)
Andrade et al. (2016)	Brazil	<b>929</b> : 100% Brazilian	Online	Drink Less / Beber menos	Web-based	None	CBT; MI	Translation	Non-randomized Feasibility/ Pilot study	Substance use/ cessation (self-report)
Arevian et al. (2018)	United States	<b>30</b> : 57% Black/African American, 30% Hispanic/Latinx, 3% Asian	Urban	B-RESILIENT	Text-based	None	CBT	Metaphors	Qualitative; Feasibility/ Pilot study	Quality of Life (n/a)
Barrera et al. (2015)	Multinational	<b>111</b> : 83% Spanish speaking; 71% Hispanic/Latinx	Online	Mothers and Babies Course / Curso de Mamás y Bebés	Web-based	None	CBT	Translation ; A/V; Metaphors	RCT; Feasibility/ Pilot study	Depression (CES-D; EPDS)
Bramley et al. (2005)	New Zealand	<b>355</b> : 100% Maori	Unclear	STOP smoking by Mobile Phone – STOMP	Text-based	None	CBT	Translation ; A/V; Metaphors	RCT	Substance use/ cessation (self-report)
Burchert et al. (2019)	Multinational	<b>128</b> : 100% Syrian refugee	Unclear	Step-By-Step	Mobile app	Present	CBT	Translation ; A/V; Metaphors	Qualitative	Depression (n/a)
Campos et al. (2019)	Multinational	<b>69</b> : 100% Hispanic	Urban; Online	NO-FEAR Airlines	Web-based	Present	CBT	Translation	RCT	Anxiety (FFQ-II; FFS)
Caplan et al. (2020)	Dominican Republic	<b>23</b> : 100% Dominican	Urban; Outpatient	The Mobile Sound Advice / El Buen Consejo Movil	Mobile app	None	CBT	Translation ; A/V; Metaphors	Qualitative	Depression (n/a)

Choi et al. (2012)	Australia	<b>63:</b> 100% Chinese Australians	Online	Brighten Your Mood	Web-based	Present	CBT	Translation ; A/V; Metaphors	RCT	Depression (BDI†; PHQ-9†)
Dahne et al. (2019)	United States	<b>42:</b> 100% Hispanic/Latinx	Urban; Outpatient ; Online	¡Aptivate!	Mobile app	None	CBT	Translation ; A/V; Metaphors	RCT; Feasibility/ Pilot study	Depression (BDI-II†; PHQ-8†)
Espinosa et al. (2016)	Chile	<b>35:</b> 100% Chilean	Urban; Outpatient	SUMMIT / ASCENSO	Web-based	Present	Unclear	Translation	Qualitative	Depression (n/a)
Eylem et al. (2021)	The Netherlands, United Kingdom	<b>18:</b> 100% Turkish	Online	ICBT (van Spijker et al., 2010)	Web-based	Present	CBT	Translation ; A/V; Metaphors	RCT; Qualitative; Feasibility/ Pilot study	Depression (BSSI†)
Garabiles et al. (2019)	China	<b>31:</b> 100% Filipino	Urban	Step-By-Step	Web-based	None	CBT	Translation ; A/V; Metaphors	Qualitative	Depression (n/a)
Harper Shehadeh et al. (2020)	Lebanon	<b>129:</b> 88% Lebanese, 6% Palestinian, 4% Syrian, 2% Other	Outpatient ; Online	Step-By-Step / Khoutweh-Khoutweh	Web-based	Present	CBT	Translation ; A/V; Metaphors	Non-randomized Feasibility/ Pilot study	Depression (PHQ-8†)
Knaevelsrud et al. (2015)	Germany	<b>159:</b> 100% Arabic-speaking adults	Urban; Outpatient ; Online	Interapy	Web-based; Text-based	Present	CBT	Translation ; A/V; Metaphors	RCT	Trauma (PDS†)
Lara et al. (2014)	Mexico	<b>17318:</b> 95% Mexican, 5% Other Hispanic	Online	Help for Depression / Ayuda para depression	Web-based	None	CBT	Translation ; A/V; Metaphors	Non-randomized	Depression (CES-D)
Lin et al. (2020)	China	<b>80:</b> 100% Chinese	Urban; Online	ICBT (Berger et al., 2009)	Web-based	None	CBT	Translation ; A/V; Metaphors	RCT	Anxiety (SIAS†; SPS†; TKSS†)

Lindegaard et al. (2019)	Sweden	<b>50:</b> 100% Kurdish	Urban; Online	ICBT	Web-based	Present	CBT	Translation ; A/V; Metaphors	RCT	Depression (BDI-II†)
Lindegaard et al. (2021)	Sweden	<b>59:</b> 100% Arabic-speaking adults	Online	ICBT (Nygren et al., 2018)	Web-based	Present	CBT	Translation ; A/V; Metaphors	RCT; Feasibility/ Pilot study	Depression (PHQ-9†)
Liu et al. (2020)	United States	<b>22:</b> 100% Chinese	Urban	Care Me Too	Mobile app	Present	PST	Translation ; A/V; Metaphors	Qualitative	Quality of Life (n/a)
Mauriello et al. (2016)	United States	<b>335:</b> 9% Black/African American; 65% Hispanic/Latinx	Urban	Healthy Pregnancy: Step by Step	Mobile app	None	MI	Translation	RCT	Substance use/ cessation (self-report); Quality of Life (self-report)
McCool et al. (2018)	American Samoa	<b>36:</b> 100% Samoan	Urban	TxtStopSmoke / TXTTaofiTapaa	Text-based	None	MI	Translation ; A/V; Metaphors	Qualitative	Substance use/ cessation (n/a)
Menezes et al. (2019)	Brazil, Peru	<b>66:</b> 100% Hispanic/Latinx	Urban; Outpatient	Emotional Control (CONEMO)	Mobile app	Present	CBT	Translation ; A/V; Metaphors	Non-randomized Feasibility/ Pilot study	Depression (PHQ-9†)
Muñoz et al. (2009)	Multinational	<b>1000:</b> 53% Hispanic/Latinx	Online	Stop Smoking Guide / Guía para Dejar de Fumar	Web-based	None	CBT	Translation	RCT	Substance use/ cessation (FTND; self-report)
Muñoz et al. (2016)	Multinational	<b>7407:</b> 76% Hispanic/Latinx	Online	Stop Smoking Guide / Guía para Dejar de Fumar	Web-based	None	CBT	Translation	Non-randomized	Substance use/ cessation (FTND; self-report)

Muroff et al. (2017)	United States	<b>79:</b> 100% Hispanic/Latinx	Urban; Inpatient	CASA-CHES	Mobile app	Present	CBT	Translation ; A/V; Metaphors	Non-randomized Feasibility/ Pilot study	Substance use/ cessation (self-report)
Osilla et al. (2015)	United States	<b>159:</b> 9% Black/African American; 7% Asian; 40% Hispanic/Latinx	Urban	Project REACH	Web-based	Present	MI	Translation ; A/V; Metaphors	RCT; Feasibility/ Pilot study	Substance use/ cessation (SIP-DU; self-report)
Salamanca-Sanabria et al. (2020)	Colombia	<b>214:</b> 100% Colombian	Urban; Online	I can feel better / Yo puedo sentirme bien	Web-based	Present	CBT	Translation ; A/V; Metaphors	RCT	Depression (PHQ-9†)
Sit et al. (2020)	China	<b>40:</b> 100% Chinese	Urban	Step-by-Step	Web-based	None	CBT	Translation ; A/V; Metaphors	Qualitative	Depression (n/a)
Tiburcio et al. (2018)	Mexico	<b>74:</b> 100% Mexican	Urban; Outpatient	PAADD	Web-based	Present	CBT; MI	Translation ; A/V; Metaphors	RCT; Feasibility/ Pilot study	Substance use/ cessation (TLFB†; DAST-20†) Depression (PHQ-9†)
Ünlü Ince et al. (2013)	The Netherlands	<b>96:</b> 100% Turkish	Online	Everything under Control / Alles Onder Controle	Web-based	Present	PST	Translation ; A/V; Metaphors	RCT	Depression (CES-D†)
Wang et al. (2013)	China	<b>197:</b> 100% Chinese	Urban; Rural; Online	Chinese My Trauma Recovery	Web-based	None	CBT	Translation ; A/V; Metaphors	RCT	Trauma (PDS†)

Watson-Singleton et al. (2021)	United States	<b>39:</b> 100% Black/African American	Urban	Mindful You	Mobile app	None	MIND	A/V; Metaphors	Non-randomized Feasibility/Pilot study	Stress reduction (PSS); Emotion regulation (DERS)
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**Measures:** BDI = Beck Depression Inventory; BSSI = Beck Scale for Suicidal Ideation; CES-D = Center for Epidemiologic Studies-Depression Scale; DAST-20 = Drug Abuse Screening Test - 20; DERS = Difficulties in Emotion Regulation Scale; EPDS = Edinburgh Postnatal Depression Scale; FFQ-II = Fear of Flying Questionnaire-II; FFS = Fear of Flying Scale; FTND = Fagerström Test for Nicotine Dependence; PDS = Posttraumatic Diagnostic Scale; PHQ-8|9 = Patient Health Questionnaire - 8|9; PSS = Perceived Stress Scale; SIAS = Social Interaction Anxiety Scale; SIP-DU = Shortened Inventory of Problems Modified for Alcohol and Drug Use; SPS = Social Phobia Scale; TKSS = Taijin Kyofusho Scale; TLFB = Alcohol Timeline Followback

**Treatment Orientation:** CBT = Cognitive Behavioral Therapy; EBT = Evidence Based Therapy; ICBT = Internet-based Cognitive Behavioral Therapy Program; MI = Motivational Interviewing; MIND = Mindfulness; PST = Problem-Solving Therapy

**Study Characteristics:** A/V = Audio/visual modifications; Metaphors = Culturally relevant messages, concepts, and metaphors; Multinational = Comprising three or more countries; RCT = Randomized Controlled Trial; R&EM = Racial and Ethnic Minority

†Indicates that measure has established validation to be provided in native language of the participant sample

**Table 2** *Treatment effect sizes for the primary psychological outcome measures*

DMHI Type	Lead Author	Primary Clinical Measure(s)	Subscale	Study Design	N	Pre-to-Post Treatment Assessment		
						Effect size	95% CI	
							Lower	Upper
Web-based	Andrade et al. (2016)	Self-report	Substance use/ Cessation	T	77	0.19 <sup>a*</sup>	0.09	0.30
Web-based	Barrera et al. (2015)	EPDS	Depression	T vs. C	111	0.60 <sup>b</sup>	0.34	1.02
Text-based	Bramley et al. (2005)	Self-report	Substance use/ Cessation	T vs. C	355	2.34 <sup>b*</sup>	1.44	3.79
Web-based	Campos et al. (2019) †	FFQ-II FFS	Web-based	T vs. C	46	1.27 <sup>b*</sup>	0.56	1.98
				T vs. C	46	1.21 <sup>b*</sup>	.49	1.92
Web-based	Choi et al. (2012) †	BDI-II PHQ-9	Depression	T vs. C	55	0.93 <sup>c*</sup>	-4.57	1.88
						0.50 <sup>c*</sup>	-2.37	0.81
Mobile application	Dahne et al. (2019)	BDI-II	Depression	T vs. T	33	0.61 <sup>c*</sup>	-0.23	1.3
Web-based	Eylem et al. (2021) †	BSSI	Depression	T vs. C	16	n/a <sup>e</sup>	—	—
Web-based	Harper Shehadeh et al. (2020) †	PHQ-8	Depression	T	26	1.56 <sup>d*</sup>	1.05	2.07
Web-based	Knaevelsrud et al. (2015) †	PDS HSCL-25	Trauma	T vs. C	159	0.92 <sup>c*</sup>	—	—
			Anxiety	T vs. C	159	0.79 <sup>c*</sup>	—	—
			Depression	T vs. C	159	1.03 <sup>c*</sup>	—	—
Web-based	Lin et al. (2020) †	SIAS SPS TKSS	Anxiety	T	55	0.80 <sup>c*</sup>	-0.51	3.72
				T	55	0.48 <sup>c*</sup>	-0.80	1.65
				T vs. C	80	0.19 <sup>a*</sup>	0.02	0.38
Web-based	Lindegaard et al. (2019) †	BDI-II	Depression	T vs. C	50	1.27 <sup>c*</sup>	0.72	1.94
Web-based	Lindegaard et al. (2021) †	PHQ-9	Depression	T vs. C	59	0.85 <sup>c*</sup>	0.29	1.41
Mobile application	Mauriello et al. (2016) †	Self-report	Substance use/ Cessation	T vs. T	282	0.70 <sup>b*</sup>	—	—

Web-based	Muñoz et al. (2009)	Self-report	Substance use/ Cessation	T vs. T	1000	n/a <sup>e</sup>	—	—
Web-based	Osilla et al. (2015) †	Self-report	Substance use/ Cessation	T vs. T T	159 54	0.00 <sup>c</sup> 0.19 <sup>c*</sup>	0.00 —	0.12 —
Web-based	Salamanca-Sanabria et al. (2020) †	PHQ-9	Depression	T T vs. C	21 75	1.44 <sup>c*</sup> 0.91 <sup>c*</sup>	0.38 —	2.49 —
Web-based	Tiburcio et al. (2018)†	TLFB DAST-20 PHQ-9	Substance use/ Cessation Depression	T vs. T T vs. T T vs. T	19 19 19	1.49 <sup>d*</sup> 0.09 <sup>d</sup> 1.61 <sup>d*</sup>	— — —	— — —
Web-based	Ünlü Ince et al. (2013) †	CES-D	Depression	T vs. C	96	0.37 <sup>c</sup>	-0.03	0.78
Web-based	Wang et al. (2013) †	PDS (Urban) PDS (Rural)	Trauma	T vs. C T vs. C	90 93	0.44 <sup>c*</sup> 0.54 <sup>c*</sup>	0.02 0.13	0.86 0.96
Mobile application	Watson-Singleton et al. (2021) †	PSS DERS	Stress Emotion Regulation	T T	39 39	0.73 <sup>c</sup> 0.52 <sup>c</sup>	— —	— —

**Abbreviations:** DMHI: Digital mental health intervention; T vs C: two independent treatment vs. control groups; T vs T: two independent treatment groups; T: dependent groups (i.e. pre-post intervention scores for treatment only); *N*: number of participants providing data; CI: 95% confidence interval (upper and lower limits).

**Measures:** BDI = Beck Depression Inventory; CES-D = Center for Epidemiologic Studies-Depression Scale; DAST-20 = Drug Abuse Screening Test - 20; FFQ-II = Fear of Flying Questionnaire-II; FFS = Fear of Flying Scale; EPDS = Edinburgh Postnatal Depression Scale; HSCL-25 = Hopkins Symptom Checklist; PDS = Posttraumatic Diagnostic Scale; PHQ-8|9 = Patient Health Questionnaire - 8|9; SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale; TKSS = Taijin Kyofusho Scale; TLFB = Alcohol Timeline Followback

**Effect Sizes:** <sup>a</sup>partial eta-squared; <sup>b</sup>Hazard Ratio|Incident Rate Ratio|Odds Ratio|Relative-Risk; <sup>c</sup>Cohen's d; <sup>d</sup>Hedge's g;; <sup>e</sup>authors did not report effect sizes/statistical tests for primary hypotheses due to null findings/underpowered

\*Effect size was significant in favor of DMHI

†Study included in meta-analyses (data available for calculating standardized mean differences in clinical outcomes pre-post)

**Table 3** *Quality assessment / risk-of-bias across study design*

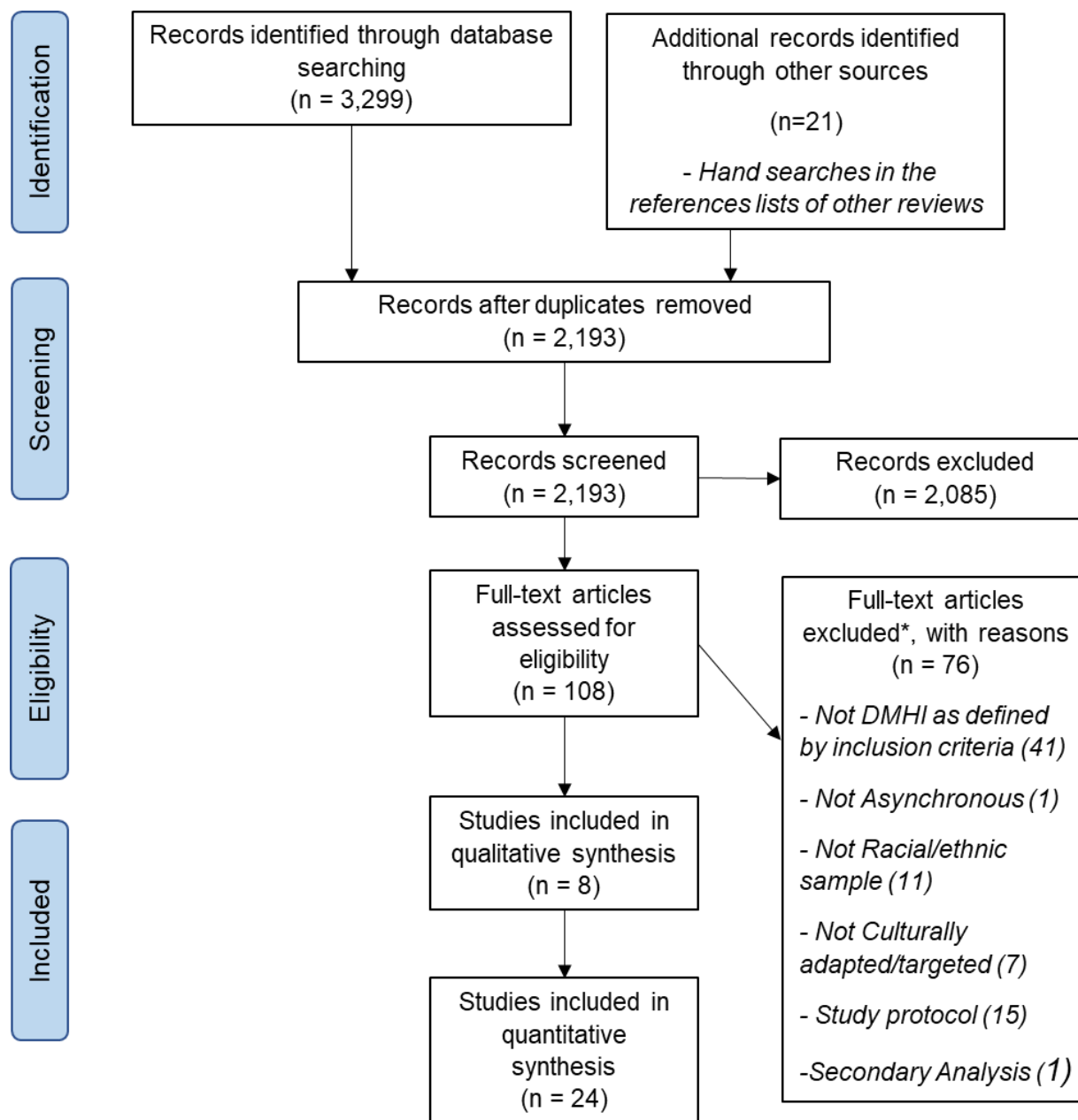
Study Design	Authors	1	2	3	4	5
		Approach	Data Collection	Findings - Derivation	Interpretation	Coherence and Consolidation
Qualitative						
	Arevian et al. (2018)	●	●	●	●	●
	Burchert et al. (2019)	●	●	●	●	●
	Caplan et al. (2020)	●	●	●	●	●
	Espinosa et al. (2016)	●	●	●	●	●
	Garabiles et al. (2019)	●	●	●	●	●
	Liu et al. (2020)	●	●	●	●	●
	McCool et al. (2018)	●	●	●	●	●
	Sit et al. (2020)	●	●	●	●	●
Quantitative RCT		Randomization	Baseline	Data Completion	Blinding	Adherence
	Barrera et al. (2015)	●	●	○	●	○
	Bramley et al. (2005)	●	●	●	●	●
	Campos et al. (2018)*	●	●	●	●	●
	Choi et al. (2012)*	●	○	●	○	●
	Dahne et al. (2019)	●	●	●	○	●
	Eylem et al. (2021)	●	●	●	○	●
	Knaevelsrud et al. (2015)*	●	●	●	●	●
	Lin et al. (2020)	●	○	●	○	○
	Lindegaard et al. (2019)*	●	●	●	○	●
	Lindegaard et al. (2021)	●	●	●	○	●
	Mauriello et al. (2016)	●	●	●	●	●
	Muñoz et al. (2009)	●	○	●	●	●
	Osilla et al. (2015)	○	●	●	○	●
	Salamanca-Sanabria et al. (2020)	●	●	○	●	○
	Tiburcio et al. (2018)*	●	●	○	○	○
	Ünlü Ince et al. (2013)*	●	●	●	○	○
	Wang et al. (2013)*	●	●	●	●	○
Quantitative Non-Randomized Experiment		Appropriate Representation	Measurement	Data Completion	Confounders / Covariates	Intervention Fidelity
	Andrade et al. (2016)	●	●	○	○	●
	Lara et al. (2014)	●	●	○	○	○
	Menezes et al. (2019)	●	●	●	○	●
	Muñoz et al. (2016)	●	●	●	○	●
	Muroff et al. (2017)	●	●	●	○	●
	Watson-Singleton et al. (2021)	●	●	●	○	●
Mixed Methods		Rationale	Integration	Output Interpretation	Discrepancy Reconciliation	Sub-part Quality
	Harper Shehadeh et al. (2020)	●	●	●	○	●

Note: Quality / Risk of Bias Assessment conducted according to Mixed Methods Appraisal Tool (MMAT; Hong et al., 2018)

Key ● = Yes; ○ = Can't Tell; ○ = No

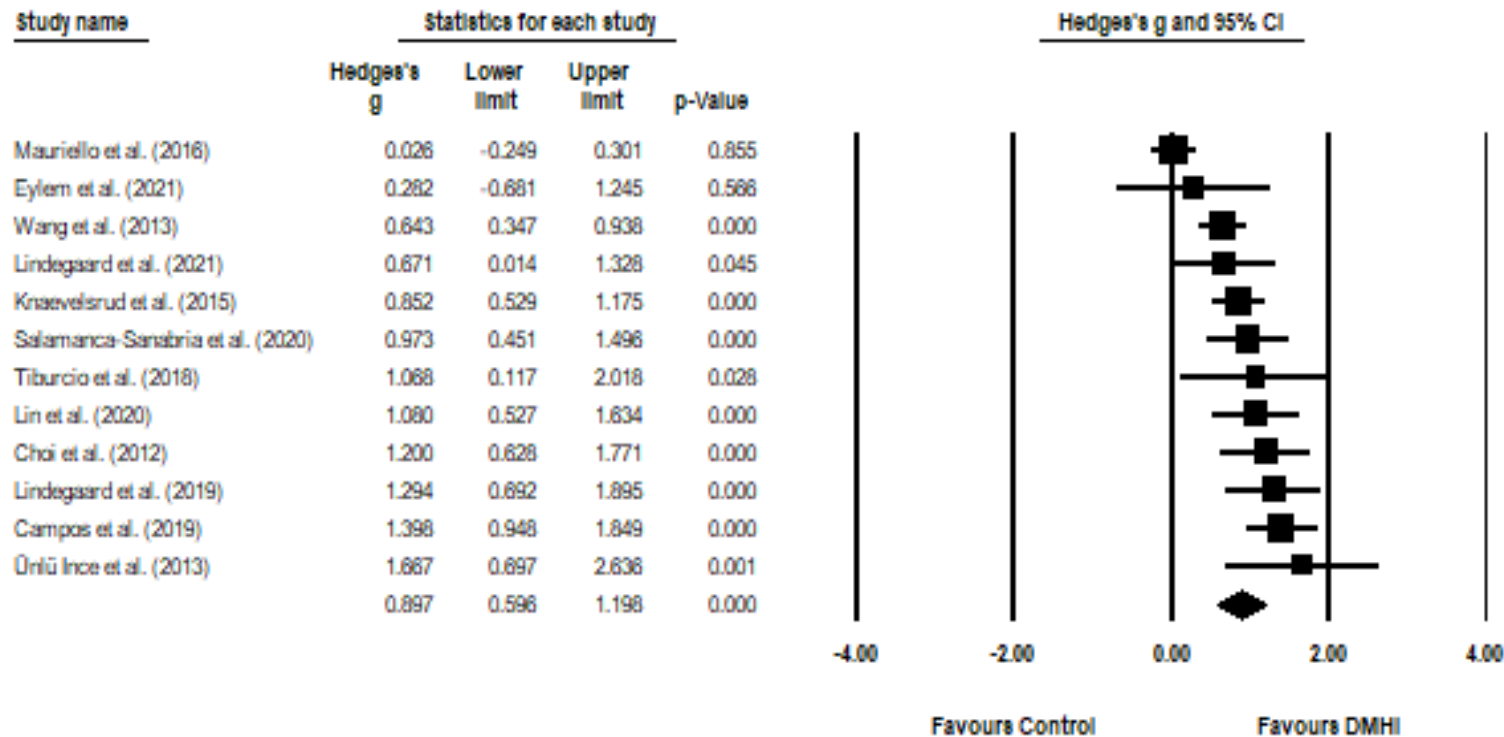
\*Study used intention-to-treat analyses





**Figure 1** PRISMA flowchart of the selection process for included studies

\*Categories are mutually exclusive. For studies that met more than one exclusion criterion, only one is presented, following the order on the screening form.



**Figure 2** Forest plot of effect sizes from the 12 randomized studies that assessed the effect of digital mental health interventions (DMHIs) relative to a comparison condition (most commonly a waitlist control condition).

**Note:** Only outcome data from primary outcome measures were included in this meta-analysis. In the figure, a square represents the effect size for a given study and its size is proportional to the weight of the study in the meta-analysis. A horizontal line centered in a square represents the 95% confidence interval for an effect. The diamond at the bottom of the plot symbolizes the overall effect using a random-effects model, and the width of the diamond represents the 95% confidence interval for the overall effect size.

### 3 STUDY 2

**Ellis, D. M. & Anderson, P. L., (2021).** Improving the acceptability of Internet-based cognitive-behavioral therapy among Black Americans. *Technology, Mind, and Behavior*, 2(3).

<https://doi.org/10.1037/tmb0000044>

#### 3.1 Abstract

This experiment tested whether reading a treatment rationale using evidenced-based persuasion techniques increases the acceptability of therapist-assisted Internet-based cognitive behavioral therapies (iCBT) among Black individuals and explored whether self-reported barriers to treatment moderated this relation. The study also examined whether endorsement of iCBT by a health professional or spiritual leader is positively associated with attitudes towards iCBT. University undergraduate ( $n = 139$ ) and community participants ( $n = 129$ ) were randomly assigned to read a treatment rationale for iCBT that used evidenced-based persuasion techniques or a definition of iCBT that did not. Participants completed standardized self-report measures of treatment barriers and acceptability toward iCBT and rated their likelihood of using iCBT if endorsed by a health professional or spiritual leader. Participants reporting fewer barriers to treatment had more positive attitudes towards iCBT after reading a treatment rationale than those who read a definition. Participants reported a greater likelihood of using iCBT when endorsed by a health professional than by a spiritual leader or no authority figure. Participants recruited from the university reported more barriers to treatment than those recruited from the surrounding community. Future research is needed to replicate and better understand the use of persuasion techniques, authority figures, and differences in barriers to treatment between different communities in order to improve the acceptability of iCBT among Black Americans.

**Keywords:** Black American, iCBT, Acceptability, Treatment rationale, Mental health barriers

### 3.2 Introduction

Despite recent gains in mental health consciousness and resources, many Black Americans who could benefit from mental health treatment do not seek it (U.S. Department of Health and Human Services [USDHHS], 2001). Barriers to treatment seeking have been well documented among Black communities, ranging from prohibitive costs and transportation (Alegria et al., 2002; Snell-Johns et al., 2004), to mental health stigma and a lack of faith in treatment efficacy (Ayalon & Alvidrez, 2007; Gaston et al., 2016; Ward et al., 2013; M. T. Williams et al., 2012). Internet-based cognitive-behavioral therapies (iCBT) are mental health treatments delivered via the Internet or other digital medium and are text-based, often with the inclusion of video clips, audio files, and multimedia elements (Andersson et al., 2014). iCBT has the potential to circumvent barriers identified by Black Americans, as they are cost-effective (Gerhards et al., 2010; Hedman et al., 2011), do not require transportation, and can be done in the privacy of one's home, potentially addressing concerns of treatment-seeking stigma.

iCBT is, unfortunately, vastly underutilized by the general public, which has prompted research into its poor uptake (Carper et al., 2013; Hennemann et al., 2017; Waller & Gilbody, 2009). Studies have noted that although there are advantages to using iCBT, there are disadvantages, too, such as concerns of confidentiality and lack of personal contact (Apolinário-Hagen et al., 2017; Choi et al., 2012; Schröder et al., 2015) and that people prefer face-to-face psychotherapy. However, research on iCBT among Black Americans is virtually non-existent. The only study to explicitly examine attitudes towards iCBT among Black Americans (Jonassaint et al., 2017, 2020) found that, compared to Whites, Black participants were less likely to start and complete iCBT, although those who do complete report similar levels of improvement. A recent meta-analysis of randomized controlled trials investigating the efficacy

and acceptability of iCBT (Andrews et al., 2018) supported the appeal and perceived benefits of iCBT, but the majority of studies (97%) did not report the racial/ethnic make-up of their sample. Among studies that do report racial/ethnic demographics, there are very few Black participants, with most studies recruiting less than ten Black participants (Choi et al., 2015; Lattie et al., 2019; Patel et al., 2018; Rosso et al., 2017). Only one study included a proportionate number of Black participants compared to population estimates (Forand et al., 2018). Thus, the literature on attitudes towards iCBT reflects the systemic pattern of Black underrepresentation in the psychological research (Cundiff, 2012). It is unknown how Black individuals feel toward iCBT. Given its potential to overcome barriers specifically documented for Black Americans, this is a critical gap in the literature.

Efforts to improve attitudes towards iCBT have drawn on the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003), which posits that performance expectancy (i.e., an individual's perception that technology will be beneficial) has the greatest impact on attitudes. Experimental studies show that providing a video explaining the rationale for iCBT significantly increased participants' feelings of credibility, expectancy-for-improvement, and likelihood of using iCBT among those reporting depressive symptoms, citing strong effect sizes ( $d = .65$ ; Ebert et al., 2015;  $r = -.56$ ; Mitchell & Gordon, 2007;  $\eta_p^2 = 0.21$ ; Soucy et al., 2016). Casey et al. (2013) found that presenting even a brief, text-based educational component improved participants likelihood of using e-mental health services in the future. This work supports the Theory of Planned Behavior (Ajzen, 1991) which emphasizes the relationship among beliefs, attitudes, and behavioral intentions, with intentions being an immediate determinant of actual behavior and is consistent with research showing that mental health attitudes are predictive of treatment-seeking behaviors when examined both retrospectively

(Beatie et al., 2016) and prospectively (Hammer & Spiker, 2018). Each of these studies presumed that informing participants of the advantages of iCBT in reducing treatment barriers (e.g., cost, convenience) would lead to improved attitudes toward the intervention, especially among those who endorsed more barriers to face-to-face treatment. None of these studies, however, reported Black Americans in their samples. It is therefore unknown whether this popular method for improving acceptability of iCBT will be effective for Black Americans or if the impact will be different for Black people endorsing various barriers to traditional mental health treatment.

Research on treatment-seeking for in-person mental health treatment shows that Black Americans are less likely to seek specialty care due to cultural mistrust engendered by racism and mistreatment in the healthcare system (Cuevas et al., 2016; Whaley, 2001b, 2001a). Instead, Black Americans have historically sought information from a trusted institution that is associated with caregiving and coping among the Black community: the Church. The majority of Black Americans in the U.S. (87%) belong to a religious group (Pew Research Center, 2009), and seeking informal advice and treatment for mental illness from clergy is both common and encouraged for many Black Americans (Avent et al., 2015; Blank et al., 2002; Taylor et al., 2004). Additionally, research has indicated that Black clergy hold more positive attitudes than previously assumed toward making referrals to mental health resources (secular or otherwise) when member distress is apparent (Payne, 2014; Young et al., 2003). Therefore, it may be possible to leverage the trusted authority of spiritual leaders and clergy persons to increase the acceptability of iCBT.

Similarly, Black Americans often visit their primary care physicians as their immediate link to healthcare (Schappert & Burt, 2006). National surveys have indicated that less than half

of Black respondents experiencing personal distress sought professional assistance for mental health problems (Neighbors, 1985; Neighbors et al., 2007). Black Americans who do obtain professional care are more likely to seek primary medical care than specialty mental health care (Neighbors, 1985; Neighbors et al., 2007; Snowden & Pingitore, 2002). Medical professionals are thus an avenue for referral to mental health services. Recent research has found the prescription of iCBT by general practitioners to be an effective method for promoting the use and completion of these programs (Hobbs et al., 2018; Newby et al., 2017; A. D. Williams & Andrews, 2013). Therefore, employing common help-seeking avenues used by Black Americans, such as medical and spiritual authority figures, may improve the attitudes, uptake, and utilization of iCBT.

### **3.2.1 Present Study**

The purpose of this research is to identify strategies to increase acceptability of iCBT among Black Americans. This experimental study tests whether providing a rationale for iCBT that uses evidence-based persuasion techniques increases its acceptability among Black individuals. For the current study, *acceptability* was defined as a set of cognitively based, positive attitudes towards these interventions (Schröder et al., 2015). This contrasts with previous studies defining acceptability as a construct of treatment satisfaction. The study also examines whether referral by a medical or spiritual authority figure is associated with increased likelihood of using iCBT. Based on prior literature, we hypothesized the following:

**H (1):** Participants who read a treatment rationale for iCBT will report greater acceptability compared to those who read a definition of iCBT.

**H (2):** Participants reporting more barriers to mental health treatment will report greater acceptability of iCBT.



**H (3):** Barriers to mental health treatment will moderate the effect of a treatment rationale on acceptability of iCBT such that there will be a stronger positive relation between receiving a rationale and acceptability of iCBT among participants reporting more barriers.

**H (4):** Participants will report being more likely to use iCBT if recommended by a spiritual leader or if prescribed by a health professional as compared to no recommendation.

### 3.3 Methods

#### 3.3.1 *Participants*

Participants were self-identified Black/African American adults ( $N = 268$ ). To be eligible, participants had to be at least 18 years of age and fluent in English, evidenced by completion of the informed consent form (Flesch-Kincaid 7<sup>th</sup> grade reading level). Undergraduate participants ( $n = 139$ ) were recruited from a large, urban, southeastern university and received course credit for their participation. Community participants ( $n = 129$ ) were recruited in public places throughout the surrounding metropolitan area (e.g., parks) and had the opportunity to enter a raffle with a 1 in 30 chance of winning a \$25 Amazon gift card. The participants ranged in age from 18 to 85 ( $M = 27.59$ ,  $SD = 13.58$ ), were predominantly female (67%) and highly educated (70% have some college education). Table 1 shows participants' demographic characteristics.

An a-priori power analysis was conducted based on the work of Ebert et al., (2015). Because this study used a video-based treatment rationale to increase acceptability, a more conservative effect size ( $\eta^2 = 0.03$ ) was adopted for the current study's text-based treatment rationale. A sample size of  $N = 260$  was determined to be sufficiently powered (.80) to test the hypotheses.

### 3.3.2 Measures

Participants completed a survey developed and hosted on the *Qualtrics* online survey platform. The survey included the following measures:

#### 3.3.2.1 Treatment Acceptability

*Attitudes Toward Psychological Online Interventions Scale* (APOI; Schröder et al., 2015) is a 16-item validated measure of attitudes toward online psychological interventions that, for the purposes of the current project, was modified to reference therapist-assisted iCBT. The APOI comprises four subscales measuring attitudes towards psychological online interventions: “Skepticism and Perception of Risk”, “Confidence in Effectiveness”, “Technologization Threat”, and “Anonymity Benefits”. Participants rate their agreement with each item (e.g., “I have the feeling that iCBT can help me.”) on a 5-point Likert scale (1 = Totally agree to 5 = Totally disagree). Although not indicated in original paper (Schröder et al., 2015), positively valenced items should be reverse-coded (J. Schröder, personal communication, February 12, 2020). Total scores range from 16-80 with higher scores indicating more positive attitudes towards iCBT. The APOI demonstrated high overall internal consistency ( $\alpha = .77$ ) in a sample of 1013 German-speaking participants (Schröder et al., 2015). The APOI was used as the primary measure for acceptability of iCBT and demonstrated excellent internal consistency in the present sample ( $\alpha = .89$ ).

#### 3.3.2.2 Barriers to Treatment

*Perceived Barriers to Psychological Treatment Scale* (PBPT; Mohr, Ho, et al., 2010). The PBPT is a self-report measure of the extent to which participants perceive barriers to seeking mental health treatment. It comprises 25-items divided into eight subscales (25 items,  $\alpha = .71-.89$ ). Past research shows that, compared to White participants, African Americans report greater

scores on the following subscales: Stigma (discomfort with seeking psychological treatment due to fears of judgement from others and oneself), Participation Restrictions (physical and logistical barriers to treatment) and Availability of Services (general accessibility and awareness of resources; Mohr, Ho, et al., 2010), indicating that these are particularly salient barriers that need to be addressed.

Responses are scored on a 5-point Likert scale (1 = Not difficult at all to 5 = Impossible) ranging from 25 – 125. If any item is rated as “extremely difficult” or “impossible”, then the respective subscale can be labelled as a “substantial barrier”, regardless of the scores on other items of the subscale (Mohr et al., 2006). The PBPT was validated on a large sample of primary care patients ( $N= 658$ ) representing a diverse ethnic demographic, and the measure and its subscales demonstrate good to excellent reliability ( $\alpha = .71-.89$ ; Mohr, Ho, et al., 2010). The PBPT demonstrated excellent internal consistency in the present sample ( $\alpha = .92$ ).

*Demographics Questionnaire.* A 22-item demographics questionnaire was developed for the current study using items from the Standardized Data Set from the Center for Collegiate Mental Health at Penn State University (CCMH, 2017). These questions were developed with input from over 100 college counseling centers in the U.S. describing approximately 150,000 university students seeking mental health treatment and assessed age, sex, sexual orientation, education, finances, relationship status, and religious/spiritual preference.

*Depression, Anxiety, and Stress Scale—21 Item (DASS-21; S. H. Lovibond & Lovibond, 1993).* The DASS-21 is a validated measure of psychological symptoms comprised of three subscales: depression, anxiety, and stress. Participants rate each item on a 4-point Likert scale, and scores range from 0-126, with higher scores indicating greater distress. The DASS-21 was normed on a non-clinical sample, and it shows good psychometric properties across racial

groups, including among African Americans (Norton, 2007). The DASS-21 demonstrated excellent internal consistency in the present sample ( $\alpha = .92$ ). The DASS-21 is positively correlated with rates of treatment-seeking (Magaard et al., 2017).

*Mental Health Treatment Experience.* Participants' experience using both face-to-face and Internet-based mental health services was measured using a series of Likert-type self-report items developed for this study (e.g., "Have you ever received face-to-face psychotherapy or counseling?", "If so, how helpful were these services"). Questions solicited information regarding both past and current experiences with mental health treatment.

### **3.3.3 Procedure**

Participants were recruited by undergraduate and graduate research assistants canvassing public locations (i.e., parks) throughout the metropolitan area and from the university participant pool. Undergraduate participants enrolled for course credit were provided access to the survey link to complete the study at their leisure on their own personal web-enabled devices. All data were collected online and will be made available upon reasonable request. This study was conducted in compliance with the university Institutional Review Board Protocol #H18341 and preregistered with the Open Science Framework (<https://osf.io/2gyqx>).

Following informed consent, all participants were randomly assigned via Qualtrics (1:1 allocation) to read either a treatment rationale or a definition of iCBT, eliminating the possibility of experimenter bias. Participants completed questionnaires assessing demographic information, symptoms of depression, anxiety, and stress, and barriers to psychological treatment. Participants then read about iCBT, the content of which varied according to experimental condition (described below), completed the questionnaire on attitudes towards iCBT (APOI) and indicated their likelihood of using iCBT if recommended/prescribed by an authority figure or not.

### **3.3.3.1 *Experimental Condition: Treatment Rationale***

Participants who were randomly assigned to read a text-based treatment rationale received a description of iCBT, a brief summary of research evidence supporting the efficacy of such treatments, and a Frequently Asked Questions (FAQ) section designed to ease common concerns about iCBT based on the literature (Travers & Benton, 2014; see Supplemental Materials S1 for details). The treatment rationale uses evidence-based persuasion techniques as outlined by Cialdini (2006), including leveraging the appeal of authority figures (rationale is presented by a White, middle-aged, female licensed clinical psychologist) and social proof (assuring the reader that iCBT programs are used and effective). An explanation of technical language (e.g., iCBT) was also incorporated, as it has been shown to increase confidence in psychotherapy (Constantino et al., 2012). After being provided the treatment rationale, each participant answered three questions about iCBT, which served as a manipulation check ensuring that participants read and understood the treatment rationale. This treatment rationale was designed as part of a larger study (Molloy, Ellis, Su, & Anderson, in press) incorporating elements of persuasion that could be delivered in a text/image format to a diverse audience.

Participants not assigned to receive a rationale were provided a brief definition of Internet-delivered, cognitive-behavioral therapies (See Supplemental Materials S2 for details).

## **3.4 Analytic Plan**

H (1) An Analysis of Covariance (ANCOVA) was proposed to test the hypothesis that participants who receive a treatment rationale would report greater acceptability of iCBT compared to those who do not receive a rationale (<https://osf.io/2gyqx>). This analysis was modified to a 2 x 2 ANCOVA (Rationale\*Recruitment Source with DASS-21) to account for the

potential influence of participant recruitment source. Some proposed covariates including length of time spent using the Internet, were not used due to experimenter error in data collection.

H (2) Pearson's  $r$  correlations were proposed to test the hypothesis that participants' self-reported barriers to mental health treatment (PBPT) will be positively related to acceptability of iCBT (APOI).

H (3) Multiple regression analyses were proposed to examine the moderating effect of barriers to treatment (PBPT) on the relationship between the treatment rationale (yes, no) and self-reported acceptability (APOI) towards iCBT. First Block: Covariates - mental health symptomatology (DASS-21). Second Block: Treatment rationale (yes/no) and perceived barriers to treatment (i.e., stigma, participant restrictions, and availability of services). Third Block: Interaction effects - treatment rationale  $\times$  barriers to treatment.

H (4): Paired samples  $t$ -tests were originally proposed to examine whether there is a significant difference between participants' self-reported willingness to use iCBT and the type of authority figure making the endorsement for iCBT (i.e., health professional vs. spiritual leader). This analysis was modified to a Repeated Measures ANOVA to account for a third level of the independent variable (i.e., ratings made based on no authority endorsement at all).

### **3.5 Results**

Participants who did not answer all three questions assessing comprehension of the treatment rationale correctly (which served as a manipulation check;  $n = 41$ ) or who completed the survey under 5 minutes ( $n = 1$ ) were excluded from data analyses to maximize internal validity, resulting in a sample of  $N = 268$  (University = 139; Community = 129). University participants were 2.77, 95% CI [1.30, 5.92] times more likely to pass the manipulation check than community participants.

### 3.5.1 Descriptive Statistics

Table 1 shows a variety of participant characteristics within the sample. Most participants self-identified as female (67%), heterosexual (83%), single (64%), and reported that religion was important to them (73%). Participants recruited from the university participant pool were, by definition, currently in college. Almost a third of participants recruited from the community were currently in college or had a professional degree, but, because of an error in data collection, it is not known what proportion had graduated from college.

There were no differences between the experimental conditions on any of the key variables, including attitudes towards iCBT, depressive and anxious symptom severity, nor barriers to treatment (all  $p$ 's  $> .05$ ). As shown in Table 2, relative to participants recruited from the community, participants recruited from the university reported they had more barriers to treatment ( $M$  diff = 6.63,  $t$ -score = 3.45,  $p = .001$ ). Over one third (36%) of participants recruited from the community reported receiving therapy, compared to 25% of participants recruited from the university, although this difference was not significant ( $p = .05$ ).

Table 3 shows the means, standard deviations, and intercorrelations for key variables. Less than half the sample (44.6%) indicated they would “likely” or “definitely” use an iCBT with 1.3% of participants having used an online mental health program in the past. Responses to the *Depression, Anxiety, and Stress Scale – 21* indicated that participants did not endorse clinical levels of mental health symptoms ( $M = 29.90$ ,  $SD = 21.06$ ) based on the suggested cutoff of 60 for severe mental illness (P. F. Lovibond & Lovibond, 1995).

As suggested by the authors (Mohr et al., 2006), each item on the Perceived Barriers to Psychological Treatment Scale was classified as a “substantial barrier” (i.e. “extremely difficult” or “impossible”) or not. The majority of participants (59.9%) reported at least one substantial

barrier, 43.5% endorsed at least two substantial barriers, and 31.6% of participants endorsed three or more substantial barriers to psychological treatment. As shown in Table 4, “cost of psychotherapy” was the most frequently reported substantial barrier to treatment (39.2% of participants). Average scores on the subscales of the PBPT are as follows: Total score ( $M = 42.71$ ,  $SD = 15.08$ ), Stigma ( $M = 11.87$ ,  $SD = 5.48$ ), Participation Restrictions ( $M = 5.59$ ,  $SD = 2.35$ ), and Availability of Services ( $M = 3.99$ ,  $SD = 2.13$ ).

### ***3.5.2 Does using a treatment rationale lead to greater acceptance of iCBT?***

A 2 x 2 ANCOVA (Rationale\*Recruitment Source with DASS-21 as covariate) was conducted examining the effect of treatment rationale for participants recruited from the university and surrounding community on attitudes of acceptability toward iCBT while controlling for depression and anxiety symptom severity. There was not a significant 2-way interaction between receiving the treatment rationale and recruitment source,  $F(1, 220) = 0.09$ ,  $p = .76$ , partial  $\eta^2 < 0.001$ , nor a main effect of recruitment source,  $F(1, 220) = 0.002$ ,  $p = .96$ , partial  $\eta^2 < 0.01$ , on attitudes of acceptability toward iCBT. Contrary to the hypothesis, there was not a main effect of treatment rationale,  $F(1, 220) = 2.35$ ,  $p = .13$ , partial  $\eta^2 = 0.01$  on attitudes of acceptability toward iCBT.

### ***3.5.3 Do participants who report more barriers to treatment show greater acceptance of iCBT?***

Pearson’s  $r$  correlations tested the hypothesis that the number of self-reported barriers to mental health treatment would be related to more positive attitudes toward iCBT. Contrary to hypotheses, there was no relation between acceptability of iCBT and the total number of barriers,  $r(219) = -.09$ ,  $p = .18$ , nor the stigma,  $r(231) = -.08$ ,  $p = .21$ , participant restrictions  $r(231) = -.08$ ,  $p = .24$ , or availability of services subscales,  $r(231) = -.01$ ,  $p = .91$ .



### 3.5.4 *Do treatment barriers moderate the relation between receiving a treatment rationale and acceptance of iCBT?*

A series of multiple hierarchical regressions using bias-corrected 95% confidence intervals calculated from 5,000 bootstrapped samples with the SPSS PROCESS macro (Hayes, 2012) was used to test the hypothesis that barriers to treatment moderates the relation between receiving a treatment rationale and attitudes towards iCBT. This analysis was conducted separately for the barriers to treatment total score, as well as the stigma, participant restrictions, and availability of services subscale scores. For each regression, recruitment source (university, community) and depression and anxiety symptom severity (DASS-21) were entered in the first step, treatment rationale (yes, no) and barriers to treatment were entered in the second step, and the interaction between treatment rationale and barriers to treatment was entered in the third step.

As hypothesized, there was a significant interaction between treatment rationale and barriers to treatment for the total scale score,  $\Delta R^2 = .06$ ,  $F(1, 205) = 12.70$ ,  $p < .001$ ,  $b = -.21$ , 95% CI  $[-.32, -.09]$ ,  $t(204) = -3.56$ ,  $p < .001$  and for the stigma subscale score,  $\Delta R^2 = .06$ ,  $F(1, 226) = 14.67$ ,  $p < .001$ ,  $b = -.57$ , 95% CI  $[-.87, -.28]$ ,  $t(217) = -3.83$ ,  $p < .001$ . There was not, however a significant interaction between receiving a treatment rationale and the participant restrictions subscale score,  $\Delta R^2 = .01$ ,  $F(1, 216) = 2.40$ ,  $p = .12$ , nor the availability of services subscale score,  $\Delta R^2 = .01$ ,  $F(1, 216) = 2.79$ ,  $p = .10$ .

Simple slope analyses (unstandardized beta coefficients) tested the nature of the significant interactions and showed that compared to the no rationale condition, participants who received a rationale reported more favorable attitudes towards iCBT, but, unexpectedly, this was only among those participants who reported fewer total barriers, (1 *SD* below mean),  $b = 4.51$ , 95% CI  $[2.06, 6.97]$ ,  $t(205) = 3.62$ ,  $p < .001$ . There was no difference in attitudes towards iCBT

after receiving a treatment rationale among participants reporting average (at the mean),  $b = 1.40$ , 95% CI [-.29, 3.10],  $t(205) = 1.63$ ,  $p = .10$  or higher levels of total barriers (1  $SD$  above mean),  $b = -1.71$ , 95% CI [-4.08, .67],  $t(205) = -1.42$ ,  $p = .16$  (see Figure 1). An identical pattern was found for stigma subscale scores: compared to the no rationale condition, participants who received a treatment rationale reported more positive attitudes towards iCBT if they endorsed relatively low levels of stigma,  $b = 4.38$ , 95% CI [2.12, 6.64],  $t(217) = 3.82$ ,  $p < .001$ , but not at average or higher levels of stigma;  $b = 1.49$ , 95% CI [-.16, 3.14],  $t(217) = 1.78$ ,  $p = .08$  and  $b = -1.73$ , 95% CI [-4.03, .57],  $t(217) = -1.48$ ,  $p = .14$ , respectively (see Figure 2).

The effects of recruitment source and depression and anxiety symptom severity were non-significant in all models.

### 3.5.5 *Does endorsement from an authority figure increase the likelihood of using iCBT?*

Repeated measures ANOVA tested the hypothesis that participants would report being more likely to use iCBT if recommended by a spiritual authority figure or if prescribed by a health professional relative to no endorsement by an authority figure. Mauchly's test,  $\chi^2(2) = 10.26$ ,  $p = .006$ , indicated a violation of sphericity, therefore a Greenhouse-Geisser correction was applied ( $\epsilon = 0.96$ ). Results indicated a significant main effect,  $F(1.92, 468.62) = 23.09$ ,  $p < .001$ ,  $\eta^2 = .09$ . Bonferroni-corrected pairwise comparisons showed that participants were more likely to use iCBT if prescribed by a health professional ( $M = 3.62$ ,  $SD = 1.13$ ) than if referred by a spiritual leader ( $M = 3.26$ ,  $SD = 1.16$ ;  $M$  difference = .36,  $p < .001$ ), or in the absence of an endorsement by an authority figure ( $M = 3.29$ ,  $SD = 1.12$ ;  $M$  difference = .32,  $p < .001$ ).

Participants reported being no more likely to use iCBT if referred by a spiritual leader than in the absence of an endorsement by an authority figure ( $M$  difference = .04,  $p > .05$ ).

### 3.6 Discussion

Overall, the results of this study did not support hypotheses: providing a treatment rationale did not improve acceptability toward iCBT and there was not a direct positive relation between barriers to treatment and acceptability of iCBT. Barriers to treatment did moderate the relation between a treatment rationale and acceptability towards iCBT, although in an unanticipated direction, in that the rationale only improved attitudes towards iCBT among people reporting fewer barriers to treatment. Finally, the recommendation of spiritual leader was not associated with a greater likelihood of using iCBT, but the prescription of a health professional was.

These null results contradict previous studies, which demonstrated the positive impact of presenting a treatment rationale or psychoeducation on participants' feelings of credibility, expectancy-for-improvement, and likelihood of using iCBT (Ebert et al., 2015; Mitchell & Gordon, 2007; Soucy et al., 2016). One reason for this null result may be the construction of the treatment rationale itself. The length of the presented rationale was approximately 800 words. Some research has indicated that although rationale content is important, length does matter, with shorter descriptions (approximately 250 words) more effective for enhancing expectations of therapeutic success (Horvath, 1990).

In line with previous research, participants in this study endorsed several barriers to mental health treatment with cost being a substantial impediment for 40% of the sample. Furthermore, 43% of participants reported more than one substantial barrier to treatment reflecting both structural and attitudinal obstacles to face-to-face therapy. Therefore, the lack of relation between barriers to treatment and attitudes toward therapist-assisted iCBT was surprising given the oft-touted benefits of using iCBT to circumvent barriers such as cost,

stigma, and treatment availability. Indeed, participants frequently endorse advantages of iCBT in reducing stigma, lack of motivation, availability, and cost of treatment (Choi et al., 2015; Travers & Benton, 2014), despite expressing an overall preference for face-to-face therapy over Internet-based therapy. This may reflect nomothetic appraisals for the benefits of iCBT in general, but an individual preference to engage in traditional therapy when addressing personal mental health concerns. Another possible explanation is that barriers to traditional mental health treatment may also apply to iCBT. This may be especially true for attitudinal barriers. For example, stigma-related concerns of “being judged” or “counseling means I can’t solve problems myself” may equally hinder participants regardless of whether they are seeking a therapist in person or via the Internet. Indeed, previous research has indicated that although Black Americans are more likely to face structural and logistical barriers (e.g., cost and transportation) in the pursuit of therapy (Alegria et al., 2012; Snell-Johns et al., 2004), attitudinal and evaluative barriers toward psychotherapy often prove to be the biggest obstacle (Mojtabai et al., 2011; Sareen et al., 2007). One’s impression of the cost and convenience benefits of iCBT may be muted by attitudinal barriers, such as stigma.

Participants recruited from the university subject pool reported more barriers to treatment than participants in the community, which is interesting given that all university students have access to no-cost mental health treatment via the University Counseling Center and low-cost mental health treatment via the University Psychology Clinic. This finding is comparable to prior literature indicating that young adults endorse greater barriers to treatment than older adults (Andrade et al., 2014; Pepin et al., 2009), but inconsistent with studies finding no differences between student and community samples (Forbes et al., 2017; Segal et al., 2005). If this finding is replicated it will be important to understand why participants recruited from the

university report more barriers to treatment than participants recruited from the community - differences between university participants and community participants could reflect differences in age, accumulated wealth, or perceived resources, though further study is needed. Regardless, this finding highlights the importance of outreach to Black students about the availability of mental health treatment.

The proportion of participants in this study who indicated they would “likely” or “definitely” use iCBT (45%) is comparable to prior literature reporting that participants would either “possibly” or “definitely” be interested in using iCBT (35% - 55%; Choi et al., 2015; Mohr, Siddique, et al., 2010a; Wootton et al., 2011) and better than other studies in which perceptions of iCBT were ‘poor’ or ‘neutral’ or intentions to use iCBT were low (Carper et al., 2013; Musiat et al., 2014; Travers & Benton, 2014). Similar to previous estimates (Klein & Cook, 2010; Mitchell & Gordon, 2007b; Neal et al., 2011; Soucy et al., 2016), a negligible proportion of our sample (1.3%) had any experience using iCBT. Low familiarity with iCBT may breed more perception of risk and aversion, especially given the more popular option of face-to-face therapy (Mohr, Siddique, et al., 2010; Musiat et al., 2014).

Participants expressing a greater likelihood of using an iCBT program if prescribed by a health professional than if recommended by a spiritual leader or no one at all was interesting given that 73.1% of the current sample rated their religious or spiritual preference as “Important” or “Very important” to them. Studies have shown that church-based mental health promotion initiatives have significant influence on health behaviors among African Americans (Campbell et al., 2007; Peterson et al., 2002). Given that clergy in the Black religious community are often gatekeepers to broader mental health access via pastoral care and external referrals (Avent et al., 2015; Blank et al., 2002; Taylor et al., 2000), this surprising finding deserves further

investigation. However, results of the study suggest that leveraging the prescriptive authority of medical professionals may be an effective method for improving treatment dissemination and access to iCBT among Black Americans.

### ***3.6.1 Strengths and Limitations***

This is the first experimental study to explore barriers to treatment and attitudes of acceptability for non-treatment seeking Black participants. This is important because much of the existing literature that has examined acceptability toward iCBT have used treatment-seeking samples (which may not be as generalizable to the broader population) and very few have recruited Black participants; a community that disproportionately faces barriers to treatment and may stand to benefit from the advantages afforded by iCBT (e.g., cost-savings, accessibility, and reduced stigma). Furthermore, this study is the first to examine actionable strategies for improving attitudes toward iCBT among Black Americans.

Despite the study's strengths, there are limitations that warrant attention. Over 70% of participants had some level of college-education, which is not surprising, given that about half of participants were recruited from the university subject pool and almost a third of participants recruited from the community were in college or had a professional degree. Unfortunately, the proportion of participants who were recruited from the community who graduated from college was not measured. This may have implications for measuring attitudes toward Internet-based mental health treatments as educational attainment has been linked to mental health treatment-seeking (Steele et al., 2007; see Broman, 2012, for evidence of the inverse relationship of education on Black American treatment-seeking). Furthermore, the treatment rationale was designed for a parent study (Molloy et al., 2021) that included a demographically diverse and varied population and the primary speaker was that of a White clinical psychologist. The lack of

cultural-tailoring and cross-racial presentation of the speaker may have impacted acceptability for a Black participant sample. Cultural mistrust is associated with negative views and expectations of White mental health providers (Cuevas et al., 2016; Whaley, 2001a, 2001b) and research has generally supported stronger preferences for mental health treatment from racially-concordant providers among Black Americans (Cabral & Smith, 2011; Ellis et al., 2019; Malat et al., 2010). Additionally, the distinction between a treatment rationale and a brief definition, although conceptually important for providing the minimum information needed to provide an informed opinion towards a still nascent technology (i.e., iCBT), may have been perceived as functionally identical between participants in each condition. Essentially this may have reflected a comparison between an experimental condition and active control. Lastly, although attitudes towards treatments are predictive of treatment-seeking behavior (Beatie et al., 2016; Hammer & Spiker, 2018) they do not equate to treatment-seeking behavior, and it is imperative that future research investigate actual uptake of iCBT.

### **3.6.2 *Future Directions***

The need to increase the diversity and inclusion of minority and underrepresented populations in the literature concerning attitudes and utilization of Internet-delivered therapies is paramount. Mental health disparities persist in Black and African American communities (Gaston et al., 2016), and these communities stand to disproportionately benefit from the opportunities afforded through this novel medium. Indeed, 40% of participants in the present study reported cost being a prevailing barrier to mental health treatment with nearly half of participants endorsing more than one substantial barrier. If barriers to treatment are multi-faceted, this requires a multi-faceted solution. We cannot simply reduce structural barriers of

cost and accessibility without also addressing attitudinal barriers such as stigma. iCBT is well-suited to address these therapeutic needs.

Furthermore, although research has widely supported the efficacy and effectiveness of iCBT interventions in reducing mental health symptoms for majority populations (Andrews et al., 2018; Hedman et al., 2012) it has largely neglected examining the efficacy and acceptability of these treatments for Black populations, save for select few studies (Jonassaint et al., 2017, 2020). Even less attention has been given to understanding the extent to which communities of color perceive the benefit of Internet-delivered therapies in mitigating barriers to therapy such as stigma, lack of faith in treatment, affordability, and convenience. This is an important gap in the literature that deserves further investigation.

It would behoove researchers to further invest in the development of acceptance-facilitating interventions for iCBT. Key moderators such as attitudinal barriers to treatment, mental health distress, and treatment history, are also poised for further investigation. Additionally, a behavioral measure of intent and use of iCBT would be informative for elucidating the link between attitudes of acceptability and treatment-seeking behavior as the two are not inherently equal (Diala et al., 2000).

Lastly, it could be argued that a deliberate attention to tailoring treatment rationales to a given audience may prove fruitful. Research has demonstrated the efficacy of culturally-tailored mental health interventions for minority populations (Barrera et al., 2013; McCall et al., 2019; Rathod et al., 2018) but thus far none have been created for Black Americans regarding the use of iCBT. Investigating the potential impact of speaker identity, background, racial-matching, and endorsement on iCBT treatment-seeking attitudes deserves further study for identifying the optimal delivery of treatment rationales to Black Americans, which is a highly heterogeneous



group. Ultimately, for Internet treatments to be effectively integrated into routine practice, they will need to achieve “equivalence in terms of clinical outcomes, efficiency in terms of resource use and costs, and **acceptability** of ‘minimal interventions’ to patients and therapists” (Bower & Gilbody, 2005, p. 11). The previous three decades have demonstrated our capacity to design, evaluate, and deploy efficacious Internet-based therapies. It is now time that we devote our efforts to understanding and improving the public’s desire to actually use them, especially among underserved and minority communities.

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**Table 4** *Demographic characteristics for participants recruited from the university participant pool and from the surrounding community for each experimental condition*

Demographics		Rationale Condition <i>n</i> = 115 (%)		Definition Condition <i>n</i> = 153 (%)		Total <i>N</i> = 268 (%)
		University Px <i>N</i> = 64 (%)	Community Px <i>N</i> = 51 (%)	University Px <i>N</i> = 75 (%)	Community Px <i>N</i> = 78 (%)	
Age	Mean Age ( <i>SD</i> )	20.0 (3.8)	37.5 (16.0)	20.6 (5.4)	33.9 (15.2)	27.59 (13.6)
Sex	Male	9 (14.1)	13 (25.5)	19 (25.3)	46 (59.0)	87 (32.5)
	Female	54 (85.9)	37 (72.5)	56 (74.7)	32 (41.0)	179 (66.8)
	Did not disclose	1 (1.6)	1 (2.0)	0 (0.0)	0 (0.0)	2 (0.4)
Sexual Identity	Heterosexual	56 (87.5)	44 (86.3)	64 (85.3)	58 (74.4)	222 (82.8)
	Lesbian, Gay, Bisexual	8 (12.5)	5 (9.8)	11 (14.7)	14 (17.9)	38 (14.2)
	Self-Identify	0 (0.0)	2 (3.9)	0 (0.0)	4 (5.1)	6 (2.2)
	Did not disclose	0 (0.0)	0 (0.0)	0 (0.0)	2 (2.6)	2 (0.7)
Current Education Status	High School	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.3)	1 (0.4)
	Some College / Currently in College	63 (98.4)	15 (29.4)	72 (96.0)	26 (33.3)	176 (65.7)
	Graduate / Professional degree	1 (1.6)	3 (5.9)	0 (0.0)	2 (2.6)	6 (2.2)
	Non-degree student / Other	0 (0.0)	0 (0.0)	3 (4.0)	1 (1.3)	4 (1.5)



	Non-student*	0 (0.0)	33 (64.7)	0 (0.0)	48 (61.5)	81 (30.2)
Religiosity	Very Important	26 (40.6)	27 (52.9)	31 (41.3)	38 (48.7)	122 (45.5)
	Important	19 (29.7)	11 (21.6)	26 (34.7)	18 (23.1)	74 (27.6)
	Neutral	13 (20.3)	7 (13.7)	11 (14.7)	16 (20.5)	47 (17.5)
	Unimportant	3 (4.7)	3 (5.9)	5 (6.7)	6 (7.7)	17 (6.3)
	Very unimportant	3 (4.7)	0 (0.0)	2 (2.7)	0 (0.0)	5 (1.9)
	Did not disclose	0 (0.0)	3 (5.9)	0 (0.0)	0 (0.0)	3 (1.1)
Relationship Status	Single	45 (70.3)	29 (56.9)	45 (60.0)	53 (67.9)	172 (64.2)
	Serious dating or committed relationship	16 (25.0)	7 (13.7)	23 (30.7)	11 (14.1)	57 (21.3)
	Civil union, domestic partnership or equivalent	0 (0.0)	2 (3.9)	0 (0.0)	0 (0.0)	2 (0.7)
	Married	3 (4.7)	4 (7.8)	3 (4.0)	7 (9.0)	17 (6.3)
	Separated/ Divorced/ Widowed	0 (0.0)	9 (17.6)	2 (2.7)	7 (9.0)	18 (6.7)
	Did not disclose	0 (0.0)	0 (0.0)	2 (2.7)	0 (0.0)	2 (0.7)

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*Note* \*reflects current non-educational status but does not indicate highest level of education completed (i.e., may include college graduates)

**Table 5** *Measures of acceptability of iCBT, symptoms of depression and anxiety, and barriers to treatment across participants recruited from the university and the community and by experimental group*

	University Px	Community Px	Group Differences			Rationale Condition	Definition Condition	Group Differences		
	<i>M (SD)</i>	<i>M (SD)</i>	<i>t-score</i>	<i>df</i>	<i>p</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>t-score</i>	<i>df</i>	<i>p</i>
APOI	50.54 (6.50)	50.85 (5.98)	0.37	232	0.709	51.32 (6.70)	50.22 (5.93)	1.33	232	0.186
DASS	31.80 (20.37)	27.80 (21.70)	1.51	252	0.132	31.87 (21.27)	28.45 (20.86)	1.28	252	0.202
PBPT	45.79 (15.43)	39.16 (13.90)	3.45	235	0.001	43.55 (14.84)	42.14 (15.27)	0.71	235	0.48

*Note.* University Participants ( $N = 127 - 139$ ) and Community participants ( $N = 110 - 125$ ) depending on the pattern of data missingness. APOI = Attitudes Towards Psychological Online Interventions (Therapist-assisted); DASS = Depression, Anxiety, & Stress Scale - 21 item; PBPT = Perceived Barriers to Psychological Treatment Scale

**Table 6** Means, standard deviations, and correlations between attitudes towards Internet-based cognitive-behavior therapy, symptoms of depression and anxiety, barriers to treatment, and history of face-to-face treatment

Variable	1	2	3
1. Attitudes towards iCBT (APOI)	(.89)		
2. Depression and Anxiety Symptom Severity (DASS)	-0.09	(.92)	
3. Barriers to Treatment (PBPT)	-0.09	0.61**	(.92)
<i>M</i>	50.67	29.90	42.71
<i>SD</i>	6.27	21.06	15.08
Range	33-80	0-104	25-94

*Note.*  $N = 219 - 237$  depending on the pattern of data missingness. Entries on the main diagonal are Cronbach's alpha. APOI = Attitudes Towards Psychological Online Interventions; DASS = Depression, Anxiety, & Stress Scale - 21 item; PBPT = Perceived Barriers to Psychological Treatment

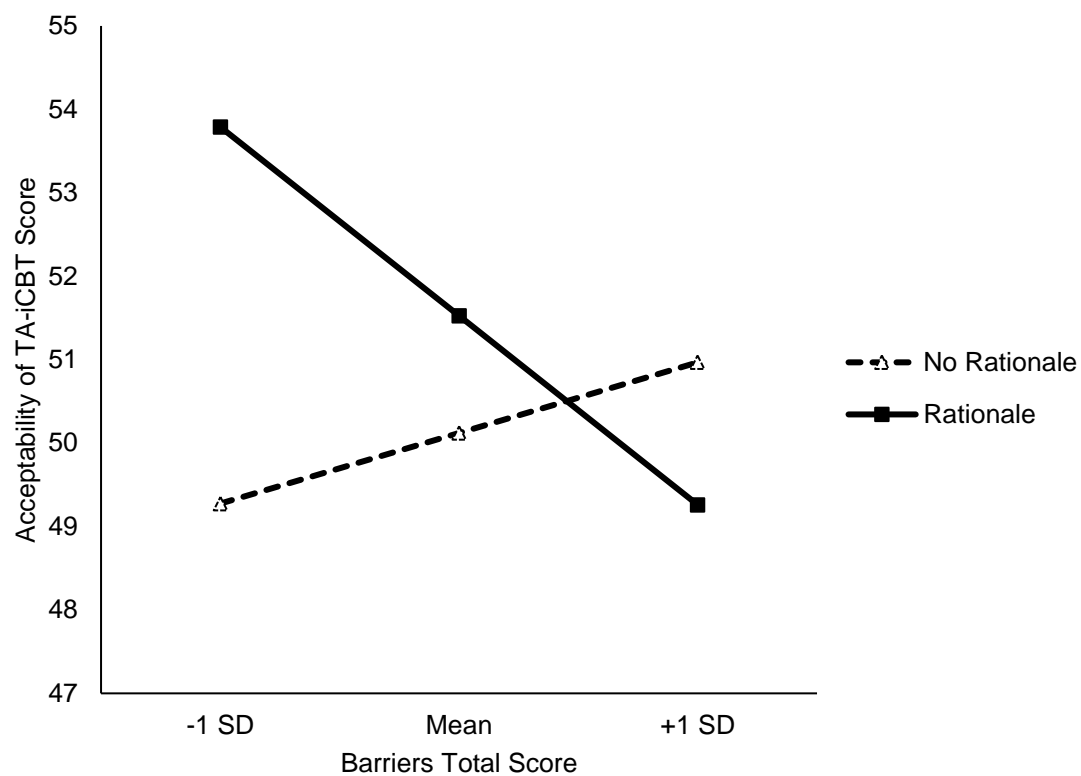
\*\* $p < .001$

**Table 7** Percentage of participants reporting that an item on the Perceived Barriers to Psychological Treatment Scale was a “Substantial” Barrier (as recommended by the authors of the scale; Mohr et al., 2010).

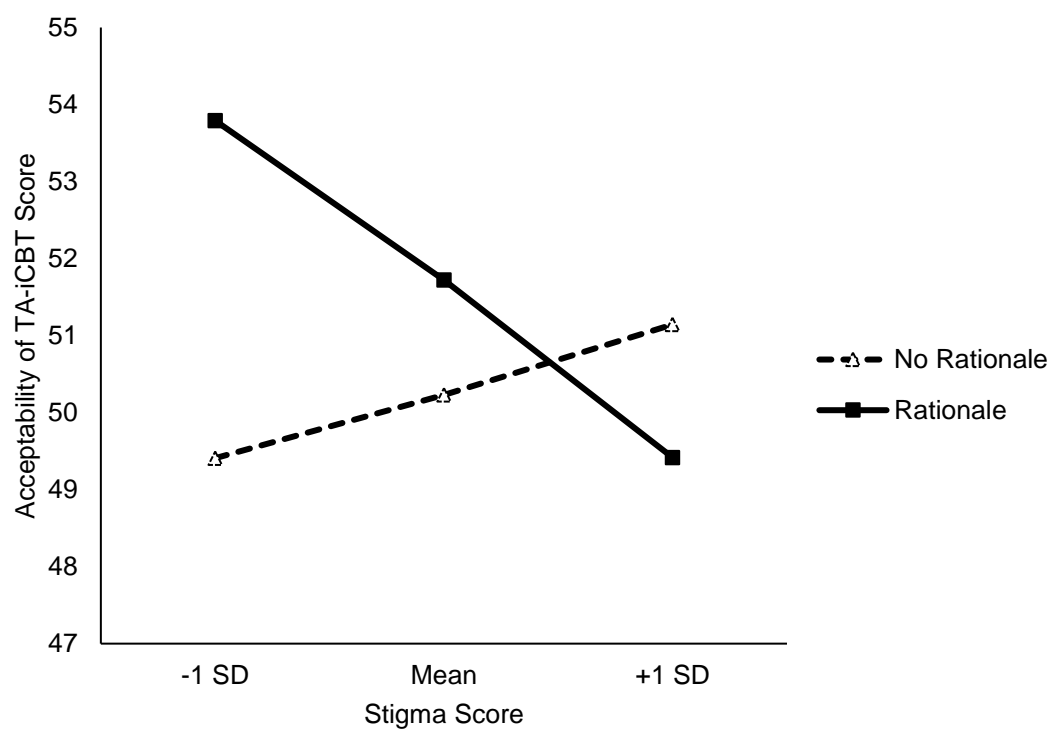
Barrier	University <i>n</i> (% Endorsed)	Community <i>n</i> (% Endorsed)	Total <i>n</i> (% Endorsed)
1. Cost of psychotherapy	63 (45.3)	42 (32.6)	105 (39.2)
2. Interference from daily responsibilities	34 (24.5)	15 (11.6)	49 (18.3)
3. Don't know how to find counselor/therapist	28 (20.1)	15 (11.6)	43 (16.0)
4. Difficulties getting time off work	27 (19.4)	11 (8.5)	38 (14.2)
5. Being seen while emotional	26 (18.7)	8 (6.2)	34 (12.7)
6. Discomfort talking to someone I don't know	21 (15.1)	11 (8.5)	32 (11.9)
7. My problems are not bad enough	19 (13.7)	12 (9.3)	31 (11.6)
8. Problems with transportation	17 (12.2)	12 (9.3)	29 (10.8)
9. Lack of available counseling/psychotherapy	18 (12.9)	11 (8.5)	29 (10.8)
10. Concerns about documentation in insurance	19 (13.7)	8 (6.2)	27 (10.1)
11. Concerns about being judged	17 (12.2)	7 (5.4)	24 (9.0)
12. Lack of energy or motivation	13 (9.4)	8 (6.2)	21 (7.8)
13. Difficulty motivating self	14 (10.1)	5 (3.9)	19 (7.1)
14. Counseling means I can't solve problems myself	15 (10.8)	4 (3.1)	19 (7.1)
15. Stigma of family/friends knowing	14 (10.1)	4 (3.1)	18 (6.7)
16. Would not expect counseling to be helpful	11 (7.9)	6 (4.7)	17 (6.3)
17. Attending counseling would feel self-indulgent	10 (7.2)	6 (4.7)	16 (6.0)
18. Concerns about upsetting feelings in counseling	9 (6.5)	7 (5.4)	16 (6.0)
19. Counselor would not care about me	7 (5.0)	8 (6.2)	15 (5.6)
20. Distrust counselors	5 (3.6)	8 (6.2)	13 (4.9)
21. Talking about problems makes them worse	9 (6.5)	3 (2.3)	12 (4.5)

22. Difficulty walking or getting around	6 (4.3)	3 (2.3)	9 (3.4)
23. Bad experiences with counselors	4 (2.9)	5 (3.9)	9 (3.4)
24. Physical symptoms (fatigue, pain, breathing problems)	3 (2.2)	5 (3.9)	8 (3.0)
25. Illness making it hard to leave home	5 (3.6)	1 (0.8)	6 (2.2)
<hr/>			
Number of Barriers	University <i>n</i> (% Endorsed)	Community <i>n</i> (% Endorsed)	Total <i>n</i> (% Endorsed)
0	45 (35.4)	50 (45.5)	95 (40.1)
1	16 (12.6)	23 (20.9)	39 (16.5)
2	16 (12.6)	12 (10.9)	28 (11.8)
3+	50 (39.4)	25 (22.7)	75 (31.6)

*Note.* *N* = 268. Barriers rated as “extremely difficult” or “impossible are classified as “substantial barriers” (Mohr, Hart, & Marmar, 2006). Percentages do not total 100% as participants may rate more than one barrier as being “substantial”.



**Figure 3** Line graph indicating that overall barriers to psychological treatment moderates the relationship between treatment rationale and acceptability toward therapist-assisted iCBT



**Figure 4** Line graph indicating that stigma significantly moderates the relationship between treatment rationale and acceptability toward therapist-assisted iCBT

## 4 STUDY 3

**Ellis, D. M.,** Anderson, P. L. (in prep). Cross-cultural validation of the Attitudes towards Psychological Online Interventions Questionnaire among Black Americans.

### 4.1 Abstract

Acceptability of digital mental health interventions is a significant predictor of treatment-seeking behavior and engagement. However, acceptability has been conceptualized and operationalized in a variety of ways, which decreases measurement precision and leads to heterogeneous conclusions about ‘acceptability.’ Standardized self-report measures of acceptability have been developed, which have the potential to ameliorate these problems, but none have demonstrated evidence for validation among Black communities, which limits our understanding of attitudes towards these interventions among racially minoritized groups. The present study aims to examine the psychometric validity and reliability of one of the first and most widely used measures of acceptability, *The Attitudes Towards Psychological Online Interventions Questionnaire* (APOI, Schröder et al., 2015) among a Black American sample. Participants ( $N = 254$ ) were recruited from a large southeastern university and surrounding metropolitan area and completed the self-report measure via online survey. A confirmatory factor analysis using mean and variance-adjusted weighted least squares (WLSMV) estimation was conducted to examine the validity of the underlying, hierarchical four-factor structure proposed by the scale’s original authors. An alternative, hierarchical two-factor structure model and bifactor model was examined for comparative fit. Results indicated that the bifactor model demonstrated superior fit ( $CFI = .96$ ,  $TLI = .94$ ,  $SRMR = .03$  and  $RMSEA = .09$ ), suggesting that within a Black American sample there may be greater utility in interpreting the APOI



subscales as attitudinal constructs distinct from a global “acceptability” factor. Theoretical and practical implications for culturally responsive measurement are discussed.

**Keywords:** Acceptability, Black Americans, iCBT, Confirmatory factor analysis

## 4.2 Introduction

Black communities face persistent barriers to mental health treatment, including cost, accessibility, and stigma (Alegria et al., 2002; Ayalon & Alvidrez, 2007; Gaston et al., 2016). Internet-based psychological interventions, which implement techniques including psychoeducation, behavioral activation, mindfulness strategies, and symptom tracking (Andersson et al., 2019) may prove useful for improving equitable access to mental health treatment as they are often more cost-effective (Gerhards et al., 2010; Hedman et al., 2011), private (Carolan & De Visser, 2018), and readily accessible (Borghouts et al., 2021). Digital interventions that are empirically driven and incorporate elements of cognitive-behavioral therapy, are typically referred to as iCBT (Himle et al., 2021). People benefit from iCBT when paired with therapist support or used alone, although the magnitude of effect is often higher for programs with therapist assistance (Johansson & Andersson, 2012; Linardon et al., 2019; for more conservative findings on the comparative benefit of therapist support with iCBT, see Bernstein et al., 2022). Although iCBT programs are effective for a variety of anxiety, mood, and substance use disorders (Andrews et al., 2018; Barak et al., 2008) studies consistently report underutilization by the general public (Apolinário-Hagen, Kemper, et al., 2017; Waller & Gilbody, 2009).

### 4.2.1 *Acceptability of iCBT*

Studies examining this research-to-practice gap have revealed a complex picture of user acceptability toward digital mental health interventions. Therapist-supported iCBT is generally rated as more acceptable than self-guided programs (Casey et al., 2013; Mitchell & Gordon, 2007). However, overall willingness to use iCBT is quite low. In one study, 16% of non-treatment-seeking adults reported a willingness to consider using a digital mental health

intervention to address a mental health concern (Travers & Benton, 2014), and another study reported that only 12% of participants were “definitely interested” in internet-based treatment (Mohr et al., 2010). Overall, people report that they significantly prefer for face-to-face therapy over iCBT and other digital mental health interventions (Choi et al., 2015; Mohr et al., 2010).

A problem in this budding literature is that the construct of acceptability has been defined in a variety of ways, which may contribute to heterogenous results regarding consumer attitudes towards iCBT (Molloy et al., 2021). Retrospective study outcomes, such as treatment satisfaction, usability, and feasibility are often used interchangeably with acceptability (Ng et al., 2019). Other researchers propose more prospective metrics, conceptualizing acceptability as “cognitively based, positive attitudes towards such interventions” that aim to predict treatment-seeking behavior (Schröder et al., 2015, p. 137). Acceptability has sometimes been operationalized with measures of similar constructs, such as outcome expectancy — the expectation that one will benefit from treatment (Deville & Borkovec, 2000). In some studies, acceptability is operationalized using single Likert-scale items measuring willingness to use an intervention (Handley et al., 2015; Mohr et al., 2010; Wootton et al., 2011), and in other studies, researchers develop their own measure of acceptability (Apolinário-Hagen, Vehreschild, et al., 2017; Travers & Benton, 2014). The lack of precision in conceptualization and measurement may help explain why conclusions about the acceptability of iCBT varies widely across studies.

Six self-report measures of consumer acceptability towards digital mental health interventions now exist, with evidence for their psychometric properties and factor structure (Clough et al., 2019; Gómez Penedo et al., 2020; Miloff et al., 2020; Miragall et al., 2015; Schröder et al., 2015; Teles et al., 2021). However, reflecting existing heterogeneity in the literature, these measures operationalize “acceptability” in varied ways too. The Attitudes

towards Psychological Online Interventions Questionnaire (APOI; Schroder et al., 2015) conceptualizes acceptability as a set of positive and negative appraisals and is designed to be used with various forms of digital mental health interventions. The e-Therapy Attitudes and Process Questionnaire (eTAP; Clough et al., 2019) includes items specifically related to user's anticipated engagement and short-term adherence to digital interventions. The Online Psychoeducational Intervention – Brief Attitudes Scale (OPI-BAS; Teles et al., 2021) is an abbreviated measure of attitudes (5 items) that makes the conceptual distinction that attitudes towards online psychoeducational interventions should incorporate elements of both psychotherapy and learning methods. Additionally, three measures have been developed that assess working alliance in different digital contexts, akin to the therapeutic alliance fostered in face-to-face therapy (Horvath & Bedi, 2002). The Working Alliance Inventory for guided Internet interventions (WAI-I; Gómez Penedo et al., 2020) measures the perception of an emotional attachment or collaborative bond with a digital mental health intervention, and the Working Alliance Inventory applied to Virtual and Augmented Reality (WAI-VAR; Miragall et al., 2015) measures participant comfort and trust in the virtual environment. Similarly, the Virtual Therapist Alliance Scale (VTAS; Miloff et al., 2020) measures perceptions of the therapeutic alliance with digital therapist avatars common to automated virtual reality exposure therapies.

#### ***4.2.2 Racially Minoritized Communities are Underrepresented in Acceptability Research***

Further complicating matters, concerns the dearth of acceptability research that is inclusive of ethnically or racially minoritized communities. In one meta-analysis, 62 of 64 randomized controlled trials examining the efficacy and acceptability of iCBT did not include (or did not report) racial minorities in their studies (Andrews et al., 2018). All but one (Miragall et

al., 2015) of the existing measures of consumer attitudes towards digital mental health interventions have collected data from White majority (and predominantly European-language) samples (Clough et al., 2019; Gómez Penedo et al., 2020; Miloff et al., 2020; Schröder et al., 2015; Teles et al., 2021), including the first and most highly cited measure of acceptability toward digital mental health interventions, the Attitudes towards Psychological Online Interventions Questionnaire (APOI; Schröder et al., 2015). The APOI was developed with German-speaking participants who reported mild to moderate depression ( $N = 1013$ ) and were recruited from outpatient clinics, online health forums, and health insurance referrals.

No research to date has evaluated the reliability or validity of the APOI scale among racially or ethnically minoritized communities, including Black Americans. This is highly problematic because even though Black communities may disproportionately benefit from the advantages afforded by iCBT and related digital mental health interventions, we do not know if the APOI shows good psychometric properties with this population.

#### **4.2.3 Present Study**

The present study addresses this problem by assessing the psychometric properties of the Attitudes towards Psychological Online Interventions Questionnaire among a sample of Black Americans. Using confirmatory factor analyses, this study examined whether the APOI demonstrates reliability and construct validity within a Black population. In the present study, two measurement models are examined using the 16 ordered categorical (ordinal) response items retained in the exploratory factor analysis of the APOI. The first model presents a two-factor, hierarchical measurement model (positive and negative subfactors) distinct from the four-factor hierarchical model proposed by Schröder et al. (2015). Given considerations for equivalent

models (Kline, 2016; McDonald & Ho, 2002) modification indices will be reviewed to examine new and replicative factor structures to illuminate the underlying construct of “Acceptability.”

### **4.3 Methods**

#### **4.3.1 Participants**

Participants were self – identified Black / African American adults ( $N = 254$  participants). The participants ranged in age from 18 to 85 ( $M = 27.11$ ,  $SD = 13.40$ ), were predominantly women (68%), single (66%), and highly educated (at least 70% had some college education; see Table 1 for full participant characteristics). Student participants were recruited from the participant pool of a southeastern university in an urban setting and received course credit for their participation. Community participants were recruited in public places throughout the metropolitan area (e.g., parks) and had the opportunity to enter a raffle for a \$25 Amazon gift card.

#### **4.3.2 Measures**

*Attitudes Toward Psychological Online Interventions Questionnaire* (APOI; Schröder et al., 2015) is a measure of attitudes toward digital mental health interventions that, for the purposes of the current project, was modified to reference therapist-assisted iCBT. Development of the APOI included both exploratory and confirmatory factor analyses to identify clustering of latent constructs, resulting in 16 items comprising four subscales measuring attitudes towards psychological online interventions: (i) Skepticism and Perception of Risk (SKE), which measures negative attitudes concerning the efficacy and security of a psychological online intervention, (ii) Confidence in Effectiveness (CON), which measures positive attitudes concerning the utility and credibility of a psychological online intervention, (iii) Technologization Threat (TET), which measures negative attitudes towards the lack of personal

contact and remote nature of the intervention, and Anonymity Benefits (ABE), which measures positive attitudes related to increased privacy. Participants rate their agreement with each item (e.g., “I have the feeling that iCBT can help me.”) on a 5-point Likert scale (1 = Totally agree to 5 = Totally disagree). Positively valenced items are reverse-coded. Total scores range from 16-80 with higher scores indicating more positive attitudes towards iCBT. The APOI demonstrated strong overall internal consistency ( $\alpha = .77$ ) and showed evidence for construct validity within a sample of 1013 participants (Schröder et al., 2015).

*Depression, Anxiety, and Stress Scale—21 Item* (DASS-21; S. H. Lovibond & Lovibond, 1993). The DASS-21 is a measure of mental illness that comprises three subscales: depression, anxiety, and stress. Participants rate each item on a 4-point Likert scale (0 = Never to 3 = Always). Sum scores are computed by adding the scores across items and multiplying by 2. Scores for the total DASS-21 scale range between 0 and 126, with higher scores indicating more distress or impairment. Scores for each subscale are determined by summing the scores for the relevant 7 items and multiplying by 2 (range: 0 – 42). The DASS-21 demonstrates strong convergent validity with both the Beck Anxiety Inventory (BAI;  $r = .81$ ) and Beck Depression Inventory (BDI;  $r = .74$ ) indicating satisfactory ability to discriminate between both anxiety and depressive symptoms (P. F. Lovibond & Lovibond, 1995). The DASS-21 was normed on a non-clinical sample ( $N = 717$ ), and subsequent research has supported the validity and reliability of the DASS-21 across racial groups, including among African Americans (subscales:  $\alpha = .81-.88$ ; Norton, 2007).

#### **4.3.3 Procedure**

Participants completed a survey developed via the *Qualtrics* online platform. The survey included measures assessing attitudes towards internet-delivered mental health treatments along

with key demographic variables. Participants were randomly assigned via Qualtrics (1:1 allocation) to read either a treatment rationale or a definition of iCBT (see Ellis & Anderson, 2021 for full details). The APOI was then administered as the primary measure of acceptability. The Depression, Anxiety, and Stress Scale – 21 was used to characterize the sample, as experiences of depression and anxiety have been linked to mental health treatment seeking attitudes (Magaard et al. 2017), and to provide comparative evidence to Schröder et al. (2015) who recruited participants with mild to moderate depression.

All data were collected online and will be made available upon reasonable request. This study was conducted in compliance with the university Institutional Review Board Protocol #H18341 and preregistered with the Open Science Framework (<https://osf.io/y3r2p>; Ellis & Anderson, 2022).

#### **4.3.4 Analytic Plan**

The variables used for this analysis are summarized in Table 2. See Table 3 for the interitem correlation matrix.

Confirmatory factor analyses were performed using *Mplus* version 8.4 with a sample of Black American adults ( $N = 254$ ) to examine the cross-cultural equivalence of the factor structure derived from the final set of 16 items indicated by Schroder et al. (2015). Descriptive statistics showed whether the assumptions of CFA were met. The mean and variance-adjusted weighted least squares (WLSMV) estimation method analyzed the covariance matrix structure of the ordinal items. Several indices were used to evaluate model fit: the discrepancy chi-squared statistic ( $\chi^2$ ), the standardized root mean squared residual (SRMR), root mean square error of approximation (RMSEA), comparative fit index (CFI), and Tucker-Lewis index (TLI) which are commonly recommended (Fan et al., 1999; Hu & Bentler, 1999). Latent variables were scaled by



fixing the latent variances to 1 which allowed for all indicator factor loadings to be estimated. Lastly, reliability analyses of the APOI were conducted by calculating internal consistency (Cronbachs  $\alpha$ ) and corrected item-total correlations (discrimination) to facilitate comparisons with reliability metrics reported in the original publication.

In Model 1, I examined a two-factor, hierarchical confirmatory measurement model (two first-order factors loading on one second-order global factor). I posit that the set of attitudes endorsed on the APOI will indicate a “positive attitudes towards internet-based treatments” latent factor as well as a “negative attitudes towards internet-based treatments” latent factor. Indicators drawn from the Confidence in Effectiveness (CON) and Anonymity Benefits (ABE) subscales comprise positive attitudes toward iCBT and will be tested to examine significant loading onto the “Positive” latent factor. Indicators derived from the Skepticism and Perception of Risks (SKE) and Technologization Threat (TET) subscales of the APOI comprise negative attitudes and will be tested for significant loading onto the “Negative” latent factor. Both “Positive” and “Negative” first-order factors will load onto the second-order global factor (termed “Acceptability” for the purposes of the present study; see Figure 1).

In Model 2, I attempt a replication of the four-factor, hierarchical confirmatory measurement model (four first-order factors loading on one second-order global factor) proposed by Schröder et al. (2015). Indicators drawn from the four subscales were modeled per the provided CFA specifications (Schroder et al., 2015). All four first-order factors (CON, ABE, SKE, TET) will load onto the second-order global factor “Acceptability” (see Figure 2).

If neither hypothesized Model 1 nor Model 2 demonstrates adequate model fit, modification fit indices provided by the WLSMV estimation will be reviewed and the comparative fit of a third, alternative model (Model 3) will be examined.

## 4.4 Results

### 4.4.1 Sample Characteristics

A total of 268 participants were enrolled and completed the survey. Fourteen participants were excluded as they did not complete the APOI questionnaire, yielding a sample of 254 participants. Participant ratings suggested experiences of mild symptoms of anxiety ( $M = 8.35$ ,  $SD = 7.10$ ) and stress ( $M = 11.96$ ,  $SD = 7.88$ ), and normal levels of depressive symptoms ( $M = 9.00$ ,  $SD = 8.49$ ) according to standard thresholds of the DASS-21 (Lovibond & Lovibond, 1995).

### 4.4.2 Construct Validity

The two proposed models explored the construct of acceptability towards psychological online treatments as a hierarchical, two-factor model comprising “positive attitudes” or “negative attitudes” towards therapist-assisted iCBT, or as a hierarchical, four-factor model comprising four distinct domains of attitudes towards iCBT (Confidence in Effectiveness, Anonymity Benefits, Skepticism and Perception of Risks, and Technologization Threat). See Table 4 for full description of model fit indices. Neither model had perfect absolute model fit, according to the chi-square test [Model 1  $\chi^2(103) = 1,579.76$ ,  $p < .001$ ; Model 2:  $\chi^2(101) = 595.30$ ,  $p < .001$ ]. There was variation in absolute values of correlation residuals, as residuals frequently exceeded .10 in Model 1 ( $M = .14$ ,  $SD = .01$ ), contrary to recommendations for ordered categorical variables (Kline, 2016). Correlation residuals were largely below .10 in Model 2 ( $M = .07$ ,  $SD = .01$ ). Model 1 indicated poor fit according to the CFI (.65), TLI (.59), SRMR (.12), and RMSEA (.24, 90% CI = .23 - .25). Model 2 demonstrated better fit estimates with a CFI (.88), TLI (.86), SRMR (.08), and marginally improved RMSEA (.14, 90% CI = .13 - .15). As neither Model 1 nor Model 2 demonstrated adequate fit indices, an alternative bifactor Model 3 was examined as

it retains theoretical similarity to the structure proposed by Schröder et al. (2015). This is because hierarchical models (i.e., Model 2) have more parameter constraints and are nested within less constrained bifactor models (i.e., Model 3; Markon, 2019; Rijmen, 2010; Yung et al., 1999). In Model 3, the four factors (CON, ABE, SKE, and TET) were specified as orthogonal (instead of hierarchical) to the global factor of “Acceptability” (see. Figure 3). Chi-square tests did not indicate absolute model fit:  $\chi^2(82) = 248.74, p = <.001$ , although the  $\chi^2/\text{degrees of freedom}$  ratio was 3.03, which is within the recommended range between 2 and 5 (Marsh & Hocevar, 1985). Furthermore, Model 3 indicated better estimates with a CFI = .96, TLI = .94, SRMR = .03 and RMSEA = .09, 90% CI [.08 - .10]. Overall, Model 3 demonstrated adequate to good fit according to accepted thresholds (McDonald & Ho, 2002) and the absolute values of correlation residuals did not exceed .10 ( $M = .03, SD = .002$ ). Other equivalent models were investigated (informed by significant modification indices) but none demonstrated both structural fit and conceptual interpretability and parsimony.

As Models 1, 2, and 3 were nested, comparisons were conducted to verify statistically improved model fit, by examining the change in chi-square statistic. As the scaled chi-square value for WLSMV cannot be used for traditional chi-square difference testing, the DIFFTEST option in Mplus was used (Satorra & Bentler, 2010). Comparisons indicated a significant chi-square change,  $\Delta\chi^2(2) = 327.715, p = <.001$ , suggesting that Model 2 was significantly better than Model 1. Similarly, there was a significant chi-square change,  $\Delta\chi^2(19) = 231.94, p = <.001$ , suggesting that Model 3 was significantly better than Model 2. Model 3 was the best fitting model and is described in more detail below (see Table 5 for full factor loadings).

When examining the standardized factor loadings of the bifactor model, the absolute value of loadings for the categorical indicators ranged from .52 - .87 on their original four

factors. Consistent with findings by Schröder et al. (2015), all indicators significantly loaded onto their respective latent factors (CON, ABE, SKE, and TET) supporting the theory that these four domains are a valid indicator of attitudes toward internet-delivered treatment. Furthermore, the two positively valenced latent factors (CON, ABE) significantly covaried as similar yet distinct factors ( $\psi = .54, p < .001$ ) as did the two negatively valenced latent factors (SKE, TET;  $\psi = .70, p < .001$ ).

The relationship between the 16 ordinal indicators and the global “acceptability” factor was more complex as the absolute value of loadings ranged from .004 - .70. Although the factor loadings for both CON and ABE indicators were positively correlated with the Acceptability global factor, only CON indicators demonstrated adequate strength (.35 - .70), whereas loadings for ABE items ranged from .02 - .28 suggesting a relatively weak relationship with the global factor. One item of the ABE subscale (ABE3) “I would be more likely to tell my friends that I use a POI than that I visit a therapist.” did not load significantly on the global factor at all ( $\lambda = .016, p = .83$ ). Furthermore, there was significant heterogeneity in factor loadings for both SKE and TET indicators on the global factor. Despite its conceptualization as “negative attitudes”, factor loadings of indicators of SKE ranged from (.15 - .20) and were *positively* correlated with the Acceptability global factor. Conversely, factor loadings of indicators of TET ranged from (.39 - .64) and were negatively correlated with the Acceptability global factor. One item of the TET subscale (TET4) “I do not understand therapeutic concepts as well with a therapist-assisted iCBT as I do with a live therapist” did not load significantly on the global factor at all ( $\lambda = .004, p = .95$ ).

Overall, these results indicate that the bifactor model structure of the APOI provides evidence that the four factors proposed by Schröder et al. (2015), exhibit an orthogonal

relationship to the global factor of Acceptability. In addition, positively valenced factors were confirmed to be positively related to one another, and negatively-valenced factors were also positively related to one another. Furthermore, this bifactor model demonstrates that the majority of the sixteen items of the APOI are both significant (albeit heterogenous) indicators of the global factor, and that when controlling for the common variance shared by the global factor, each item is a significant indicator of four underlying group factors, comprising four distinct subscales.

#### **4.4.3 Reliability**

The APOI demonstrated excellent internal consistency for the total scale (Cronbach's  $\alpha = .89$ ) and retained good to excellent reliability across subscales ( $\alpha = .84$  for ABE,  $.85$  for TET,  $.87$  for SKE, and  $.90$  for CON). Furthermore, the corrected item-total correlations for the APOI total scale were within the range of  $0.45 - 0.68$ , with a mean adjusted correlation of  $0.55$ . Across subscales, the corrected item-total correlations ranged from  $.59 - .83$ , with a mean adjusted correlation of  $.71$  indicating good item discrimination.

#### **4.5 Discussion**

The aim of the current study was to examine the psychometric properties of the most robust measure of acceptability toward online psychological treatment available — the Attitudes towards Psychological Online Interventions Questionnaire (Schröder et al., 2015) within a Black American sample. I attempted to replicate the factor structure of the APOI to examine evidence for the reliability and construct validity of the scale within a racially minoritized community. The APOI demonstrated good to excellent internal consistency in the current sample, both as a total score and across subscales ( $\alpha = .84 - .90$ ). These findings were comparable to and indeed higher than the original publication ( $\alpha = .62 - .77$ ). However, the hierarchical, four-factor structure

(Model 2) proposed by Schröder et al. (2015) did not adequately replicate in the current sample of Black Americans, as evidenced by relatively poor goodness-of-fit indices. Further examination of a bifactor model fit well, suggesting that although a global factor of acceptability is meaningful, it may be orthogonally related to the four factors (i.e., subscales): Confidence in Effectiveness, Anonymity Benefits, Skepticism and Perception of Risks, and Technologization Threat. Indeed, strong, positive correlations between positively-valenced factors (CON, ABE) and negatively-valenced factors (SKE, TET), and negative correlations across oppositely-valenced factors provides compelling evidence that the subscales retain meaningful discriminant validity and interpretation in their own right. Findings indicating the lack of fit of the hierarchical (higher-order) model comprising four first-order factors loading on one second-order global factor was surprising, given the positive results from the original CFA within a fairly large sample of  $N = 305$  participants (Schröder et al., 2015). However, these results are consistent with prior literature that has found that bifactor models fit better than their equivalent higher-order model in more than 90% of comparisons for mental abilities test batteries (Cucina & Byle, 2017) and can be particularly valuable in evaluating the plausibility of subscales (Reise et al., 2010, 2018).

Discrepancies in model fit are likely attributable to the nature of the coefficients of the factor loadings and the overall structure. Modeling both positive and negatively valenced factors onto a unitary, higher-order construct (i.e., Acceptability) can prove difficult, especially when variance exists among indicators of lower order constructs. Factor loadings between the 16 indicators and the global acceptability factor varied significantly, with several indicators across the ABE, SKE, and TET subscales exhibiting relatively weak or nonsignificant relationships with acceptability. Items related to the ABE subscale in particular have demonstrated a

paradoxical relationship and can be both a facilitator and barrier to engagement with digital interventions given user's conflicting perceptions of digital privacy and confidentiality (Borghouts et al., 2021). Furthermore, indicators of the SKE subscale exhibiting a positive relationship with acceptability was contrary to hypotheses, although this is interpreted with caution given their weak correlations.

Discrepancies in model fit may also be related to a difference in samples (the original publication recruited all German speaking adults) as well as modification of the questionnaire target from "psychological online interventions" more broadly to "therapist-assisted iCBT" specifically. As the concept of acceptability continues to be refined, alternative conceptualizations of the model may make for an even better, more parsimonious fit, by potentially including unexplored factors or consolidating indicators to reduce conceptual overlap. As discussed in prior research, this apparent discrepancy may in fact be a consequence of the heterogenous nature and definition of "acceptability" toward digital mental health treatments (Molloy et al., 2021; Schröder et al., 2015). Results of this study suggest a more nuanced conceptualization of the nature of "acceptability" and corroborates the limited utility of using single item measures to operationalize this heterogenous construct. Furthermore, this data suggests that within a Black American population there is greater utility in interpreting the APOI subscales as attitudinal constructs distinct from a global acceptability factor. As higher order models are nested within the bifactor model (Markon, 2019; Rijmen, 2010; Yung et al., 1999), these models are not necessarily at odds with one another. Ultimately, these results provide support for the underlying validity of the four factors proposed in the APOI but eschews traditional practices of prioritizing the calculation of a single "acceptability score", at the

expense of adequately measuring each relevant dimension of acceptability and reporting them in tandem with the global score for contextualization.

#### ***4.5.1 Strengths and Limitations***

This is the first study to investigate the psychometric properties of the Attitudes towards Psychological Online Interventions Questionnaire among a racially minoritized population. Furthermore, in modifying the target treatment from “psychological online interventions” to “therapist-assisted iCBT”, this study provides preliminary evidence for the utility of the APOI for diverse digital interventions of varying degrees of specificity. This study is also the first to provide evidence for the cross-cultural equivalence of the APOI among Black Americans. This is a notable contribution to the literature as the vast majority of randomized controlled trials examining the efficacy and acceptability of iCBT do not include (or do not report) racial minorities in their studies (Andrews et al., 2018) and existing measures of consumer attitudes towards digital mental health interventions (Clough et al., 2019; Gómez Penedo et al., 2020; Miloff et al., 2020; Miragall et al., 2015; Schröder et al., 2015; Teles et al., 2021) have predominantly been developed and examined for validation within White majority (and predominantly European-language) samples.

Despite the study’s strengths, there are limitations that warrant attention. The sample consisted of participants with minimal symptoms of depression, anxiety, or stress. This was distinct from the participants who reported moderate levels of depression in Schröder et al. (2015) and generalizability to those with greater depression severity or other diagnoses will need to be examined in future studies. Additionally, participants were predominantly young, adult females, and there is evidence that these demographics are more likely to use digital mental health interventions, and the relative impact of positive and negative attributes of digital mental



health intervention is likely to differ across diverse populations (Borghouts et al., 2021).

Furthermore, measurement invariance was not formally assessed across different subgroups within the sample (e.g., male vs. female), due to significant imbalances in sample size, which minimized power to detect potential differences between groups. Lastly, convergent validity of the APOI with other measures of acceptability within a Black American sample cannot be determined as no other measures of acceptability existed at the time of data collection for this study.

#### **4.5.2 *Future Directions***

Future research would benefit from modifying the APOI for other digital mental health interventions (e.g., virtual reality exposure therapies, massively open online interventions) and translating the measure into additional languages (e.g., Spanish) to further examine cross-intervention and cross-cultural equivalency. Moreover, it would be compelling to investigate the criterion validity of the APOI to examine whether positive attitudes towards digital mental health interventions predict willingness to use or actual use of digital mental health interventions among racially and ethnically minoritized participants. Consistent with the Theory of Planned Behavior (Ajzen, 1991) which emphasizes the relationship among beliefs, attitudes, and behavioral intentions, positive attitudes of acceptability would be expected to be the strongest predictor of behavioral intention, which in turn is the immediate determinant of actual treatment-seeking behavior. Additionally, investigations of potential relationships between attitudes towards iCBT and the effectiveness of such interventions should be conducted, as those with more positive attitudes might derive greater clinical benefit from iCBT interventions. Lastly, although studies examining the convergent validity of the APOI with related measures of acceptability toward digital mental health interventions have been recently conducted (Clough et al., 2019; Gómez

Penedo et al., 2020; Teles et al., 2021), these studies did not intentionally recruit participants from racially and ethnically minoritized communities and their results are based on predominantly White and/or European samples. This is concerning, as racially and ethnically minoritized communities may be positioned to benefit the most from the treatment accessibility advantages afforded by digital mental health interventions (Schueller et al., 2019) and therefore understanding these communities' attitudes towards these treatments is paramount.

#### **4.5.3 Conclusion**

The Attitudes towards Psychological Online Interventions Questionnaire appears to be a valid and reliable measure of attitudes towards therapist-assisted internet-based cognitive-behavioral therapy among Black Americans, although some of the indicators were only weakly associated with the global factor of acceptability and a bifactor model demonstrated better goodness-of-fit than the hierarchical, four-factor structure proposed by the original authors. This provides strong evidence that the APOI demonstrates multidimensionality and that there is greater utility in interpreting the APOI subscales as attitudinal constructs distinct from a global “acceptability” factor. Indeed, attitudes of acceptability comprise both positive and negative attitudes to uptake of digital mental health interventions and must be evaluated in tandem to effectively understand the nuanced attitudes consumers may hold towards these interventions. This is the first study to examine the psychometric properties of any measure of consumer attitudes towards digital mental health interventions among Black participants. Demonstrating the reliability, validity, and cultural equivalency of existing measures of attitudes towards these interventions is needed to improve our understanding of the drivers and barriers for using digital treatments among minoritized communities. If the full potential of digital mental health

interventions for improving equitable access to mental health treatment is to be realized, more adequate representation of minoritized communities must be achieved.

#### **4.6 Data Transparency Statement**

The data in this paper is a secondary analysis of Ellis and Anderson (2021). This paper contains original secondary analyses of a previously published experimental survey study.

## 4.7 References

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**Table 8** *Demographic and clinical characteristics of participants*

Variables	<i>N</i>	Descriptive statistics
Age (years), <i>M</i> ( <i>SD</i> )	254	27.11 (13.40)
Sex ( <i>n</i> , %)		
Male	254	82 (32.3)
Female		172 (67.7)
Sexual Identity ( <i>n</i> , %)	252	
Heterosexual		210 (83.3)
Lesbian, Gay, Bisexual		36 (14.3)
Self-Identify		6 (2.4)
Current Education Status ( <i>n</i> , %)	254	
High School		1 (0.4)
Some College /		
Currently in College		173 (68.1)
Graduate / Professional degree		5 (2.0)
Non-degree student / Other		3 (1.2)
Non-student*		71 (28.0)
Relationship Status ( <i>n</i> , %)	252	
Single		166 (65.9)
Serious dating or committed		
relationship		55 (21.8)
Married / Civil Union		16 (6.4)
Separated / Divorced /		15 (6.0)
Widowed		
Symptom Severity, <i>M</i> ( <i>SD</i> )		
DASS - Total	243	29.58 (20.84)
DASS - Depression	250	8.99 (8.49)
DASS - Anxiety	249	8.35 (7.10)
DASS - Stress	250	11.96 (7.88)

*Notes.* *M* = mean; *SD* = standard deviation; *DASS* = Depression, Anxiety, and Stress Scale

\*reflects current non-educational status but does not indicate highest level of education completed (i.e., may include college graduates)

**Table 9** *Names and descriptions of measures and items examined*

Measure/Item Name	Description
Attitudes Toward Psychological Online Interventions Scale – <b>APOI (TA-iCBT)</b>	<i>Measures the extent to which someone finds therapist-assisted iCBT appealing or acceptable</i>
Confidence in Effectiveness Subscale <sup>a</sup>	<i>Measures positive attitudes concerning the efficacy and credibility of therapist-assisted iCBT</i>
<b>CON1</b>	“A therapist-assisted iCBT program can help me to recognize the issues that I have to challenge.”
<b>CON2</b>	“I have the feeling that a therapist-assisted iCBT can help me.”
<b>CON3</b>	“A therapist-assisted iCBT program can inspire me to better approach my problems.”
<b>CON4</b>	“I believe that the concept of therapist-assisted iCBT programs makes sense.”
Anonymity Benefits Subscale <sup>a</sup>	<i>Measures positive attitudes related to the privacy and confidentiality of using a therapist-assisted iCBT</i>
<b>ABE1</b>	“A therapist-assisted iCBT program is more confidential and discreet than visiting a therapist.”
<b>ABE2</b>	“By using a therapist-assisted iCBT program, I can reveal my feelings more easily than with a therapist.”
<b>ABE3</b>	“I would be more likely to tell my friends that I use a therapist-assisted iCBT program than that I visit a therapist.”
<b>ABE4</b>	“By using a therapist-assisted iCBT program, I do not have to fear that someone will find out that I have psychological problems.”
Skepticism and Perception of Risks Subscale <sup>b</sup>	<i>Measures negative attitudes concerning the efficacy and security of a therapist-assisted iCBT</i>
<b>SKE1</b>	“Using therapist-assisted iCBT programs, I do not expect long-term effectiveness.”
<b>SKE2</b>	“Using therapist-assisted iCBT programs, I do not receive professional support.”

<b>SKE3</b>	“It is difficult to implement the suggestions of a therapist-assisted iCBT effectively in everyday life.”
<b>SKE4</b>	“Therapist-assisted iCBT programs could increase isolation and loneliness.”
Technologization Threat Subscale <sup>b</sup>	<i>Measures negative attitudes related to the independent and remote nature of therapist-assisted iCBT</i>
<b>TET1</b>	“In crisis situations, a therapist can help me better than a therapist-assisted iCBT program.”
<b>TET2</b>	“I learn skills to better manage my everyday life from a therapist rather than from a therapist-assisted iCBT program.”
<b>TET3</b>	“I am more likely to stay motivated with a therapist than when using a therapist-assisted iCBT program.”
<b>TET4</b>	“I do not understand therapeutic concepts as well with a therapist-assisted iCBT.”

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*Note:* Response scale (1 = Totally disagree to 5 = Totally Agree). <sup>a</sup>Higher scores represent greater acceptability. <sup>b</sup>Higher scores represent lower acceptability.

**Table 10** *Bivariate correlations between the 16 APOI items*

<b>Variables</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>
1. <b>CON1</b>	1															
2. <b>CON2</b>	.74	1														
3. <b>CON3</b>	.76	.79	1													
4. <b>CON4</b>	.71	.65	.75	1												
5. <b>ABE1</b>	.38	.46	.47	.41	1											
6. <b>ABE2</b>	.37	.42	.43	.44	.72	1										
7. <b>ABE3</b>	.20	.34	.26	.25	.53	.56	1									
8. <b>ABE4</b>	.38	.41	.40	.45	.61	.58	.66	1								
9. <b>SKE1</b>	-.05	-.10	-.07	.01	-.27	-.31	-.15	-.17	1							
10. <b>SKE2</b>	-.01	-.10	-.02	-.02	-.12	-.30	-.29	-.18	.63	1						
11. <b>SKE3</b>	-.15	-.21	-.15	-.03	-.19	-.26	-.22	-.15	.71	.72	1					
12. <b>SKE4</b>	-.09	-.18	-.07	.04	-.22	-.28	-.28	-.25	.63	.60	.75	1				
13. <b>TET1</b>	-.44	-.42	-.50	-.58	-.42	-.41	-.28	-.33	.24	.21	.24	.22	1			
14. <b>TET2</b>	-.36	-.39	-.42	-.33	-.43	-.45	-.39	-.43	.41	.34	.41	.45	.63	1		
15. <b>TET3</b>	-.39	-.34	-.41	-.36	-.47	-.38	-.34	-.41	.38	.25	.30	.38	.66	.72	1	
16. <b>TET4</b>	-.22	-.22	-.29	-.18	-.45	-.50	-.33	-.40	.54	.41	.48	.51	.39	.68	.62	1
M	3.60	3.40	3.62	3.70	3.27	3.24	3.04	3.23	3.13	3.27	3.12	3.18	2.53	2.72	2.64	2.91
SD	1.01	.97	1.00	.99	1.00	.94	1.04	1.06	1.15	1.11	1.05	1.07	.99	.98	1.00	1.05
Skewness	-.41	-.15	-.51	-.50	-.03	.04	<.01	-.08	-.09	-.19	-.07	-.13	.26	.03	.18	.11
Kurtosis	.07	.24	.34	.16	-.02	.09	-.12	-.14	-.50	-.34	-.18	-.33	.30	.16	.07	-.06

Abbreviations: CON = Confidence and Effectiveness; ABE = Anonymity Benefits; SKE = Skepticism and Perception of Risks; TET = Technologization Threat

**Table 11** *Goodness-of-fit indices of models tested in CFA*

Model Name	$\chi^2$	df	<i>p</i>	CFI	TLI	SRMR	RMSEA [CI]	$\Delta\chi^2$	<i>df</i>	<i>p</i>	Note
1. Two Factor	1579.76	103	<.001	.60	.59	.12	.23 [.22 - .24]	—	—	—	
2. Four Factor*	595.31	101	<.001	.88	.86	.08	.14 [.13 - .15]	984.45	2	<.001	vs. Model 1
3. Bifactor*	248.74	82	<.001	.96	.94	.03	.09 [.08 - .10]	346.57	19	<.001	vs. Model 2

*Note.* CFA = Confirmatory Factor Analysis; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Squared Residual

\**DIFFTTEST* command used for WLSMV estimators to test differences in model fit

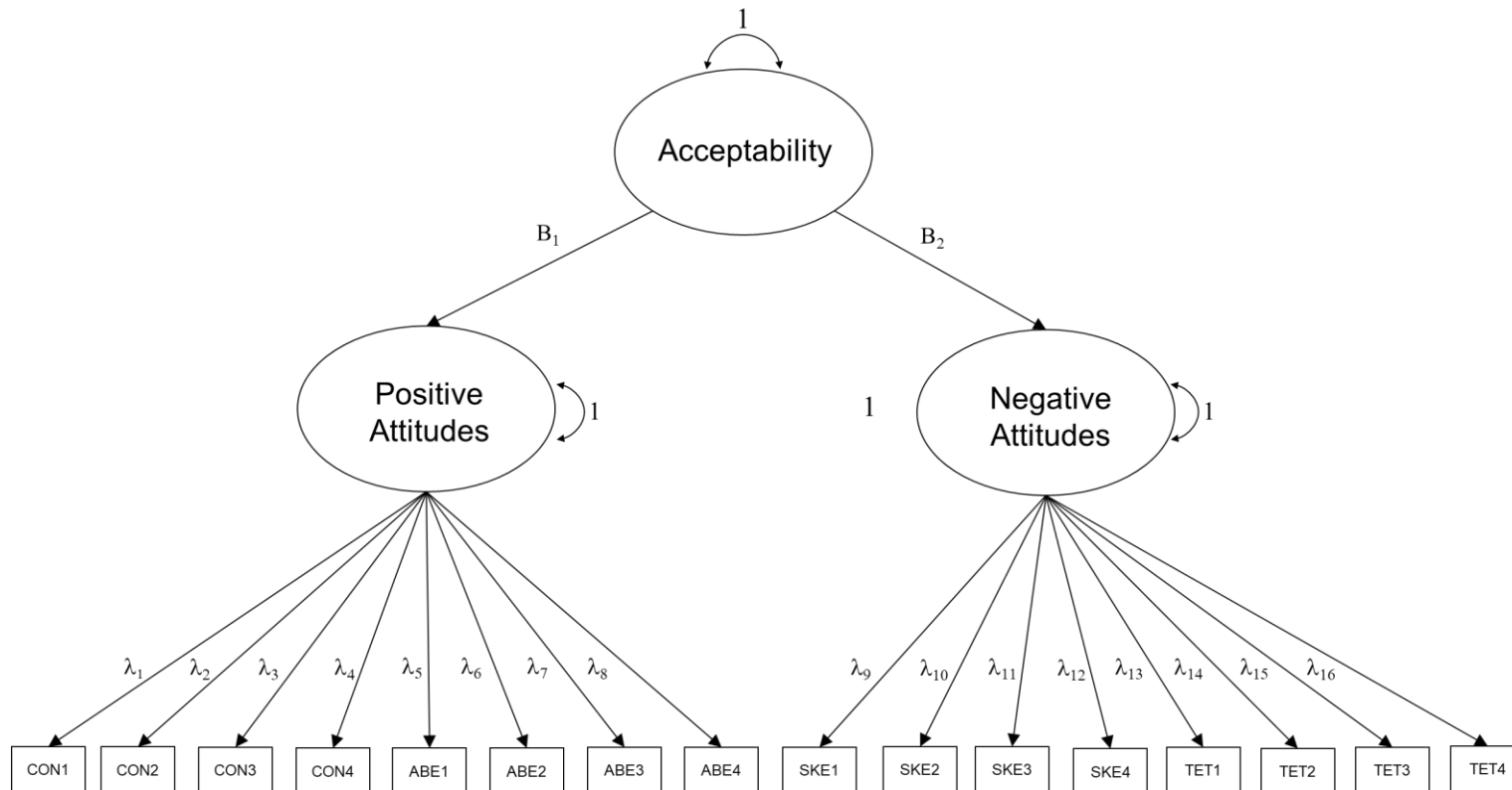


**Table 12** *Model 3 parameters with standardized estimates, standard errors*

Relation/Variable	Estimate	SE	Ratio	<i>p</i>
<b>Loadings</b>				
Confidence in Effectiveness BY				
CON1	0.66	0.06	12.02	<.01
CON2	0.83	0.04	19.84	<.01
CON3	0.72	0.06	12.87	<.01
CON4	0.52	0.07	7.60	<.01
Anonymity Benefits BY				
ABE1	0.77	0.03	25.22	<.01
ABE2	0.83	0.03	26.86	<.01
ABE3	0.75	0.03	23.30	<.01
ABE4	0.75	0.03	23.93	<.01
Skepticism and Perception of Risks BY				
SKE1	0.79	0.02	33.82	<.01
SKE2	0.75	0.03	24.18	<.01
SKE3	0.87	0.02	44.77	<.01
SKE4	0.81	0.02	35.62	<.01
Technologization Threat BY				
TET1	0.54	0.06	8.85	<.01
TET2	0.81	0.03	25.35	<.01
TET3	0.72	0.04	17.68	<.01
TET4	0.86	0.03	30.35	<.01
Acceptability BY				
CON1	0.51	0.07	7.62	<.01
CON2	0.35	0.08	4.35	<.01
CON3	0.54	0.08	7.26	<.01
CON4	0.70	0.07	10.73	<.01
ABE1	0.28	0.07	3.90	<.01
ABE2	0.18	0.08	2.47	0.01
ABE3	0.02	0.08	0.21	0.83
ABE4	0.22	0.07	3.18	<.01
SKE1	0.16	0.06	2.46	0.01
SKE2	0.20	0.06	3.32	<.01
SKE3	0.15	0.06	2.40	0.02
SKE4	0.15	0.06	2.66	0.01
TET1	-0.64	0.05	-11.80	<.01
TET2	-0.31	0.07	-4.21	<.01
TET3	-0.39	0.07	-5.73	<.01
TET4	<.01	0.08	0.06	0.95
<b>Factor Covariances</b>				
Confidence in Effectiveness WITH				
Anonymity Benefits	0.54	0.06	9.38	<.01
Skepticism and Perception of Risks	-0.30	0.05	-5.57	<.01
Technologization Threat	-0.38	0.06	-5.97	<.01

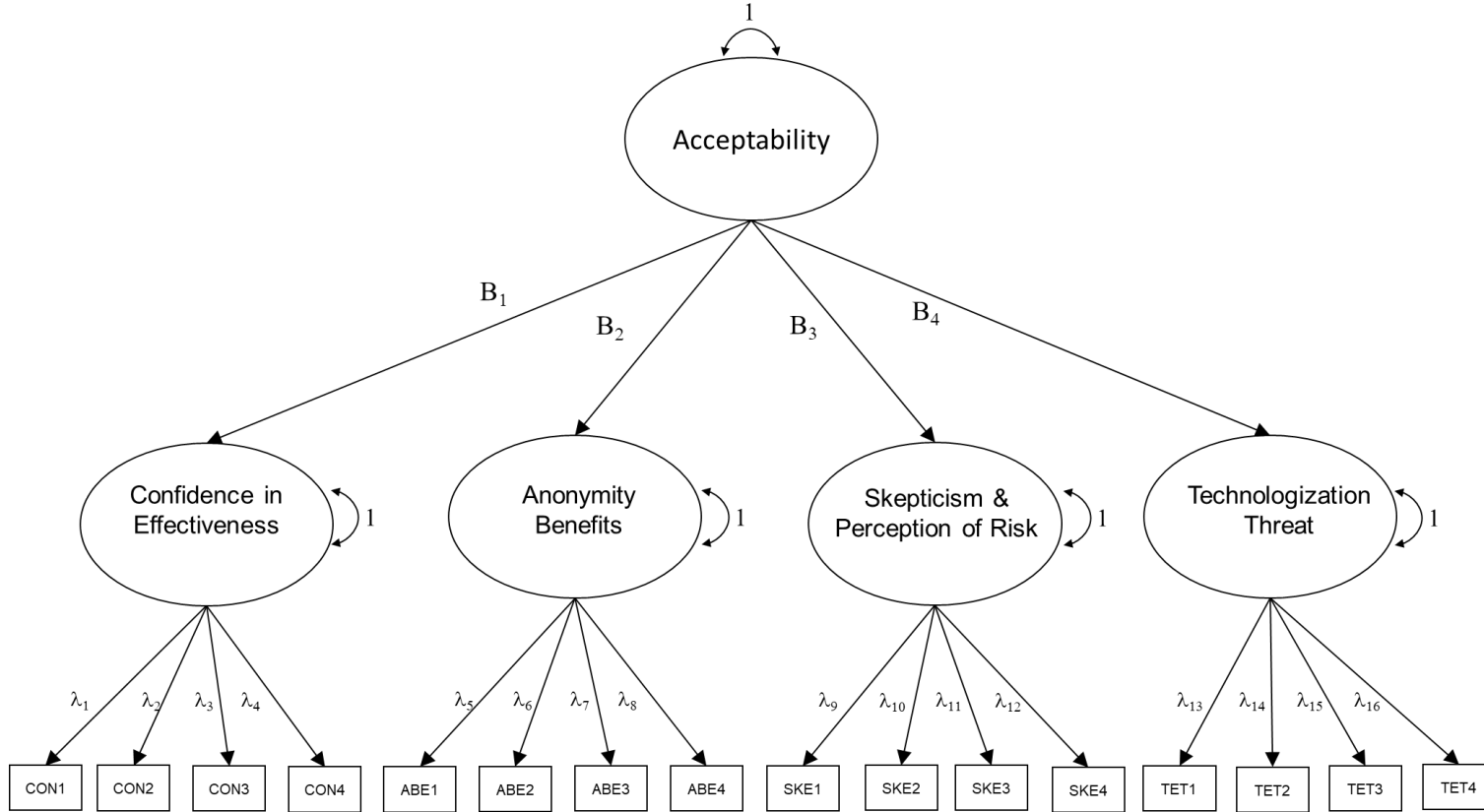
Acceptability	0.00	—	—	—
Anonymity Benefits WITH				
Skepticism and Perception of Risks	-0.41	0.06	-6.75	<.01
Technologization Threat	-0.61	0.05	-13.29	<.01
Acceptability	0.00	—	—	—
Skepticism and Perception of Risks WITH				
Technologization Threat	0.70	0.05	15.24	<.01
Acceptability	0.00	—	—	—
Technologization Threat WITH				
Acceptability	0.00	—	—	—
<b>Variances</b>				
Confidence in Effectiveness	1.00	—	—	—
Anonymity Benefits	1.00	—	—	—
Skepticism and Perception of Risks	1.00	—	—	—
Technologization Threat	1.00	—	—	—
Acceptability	1.00	—	—	—

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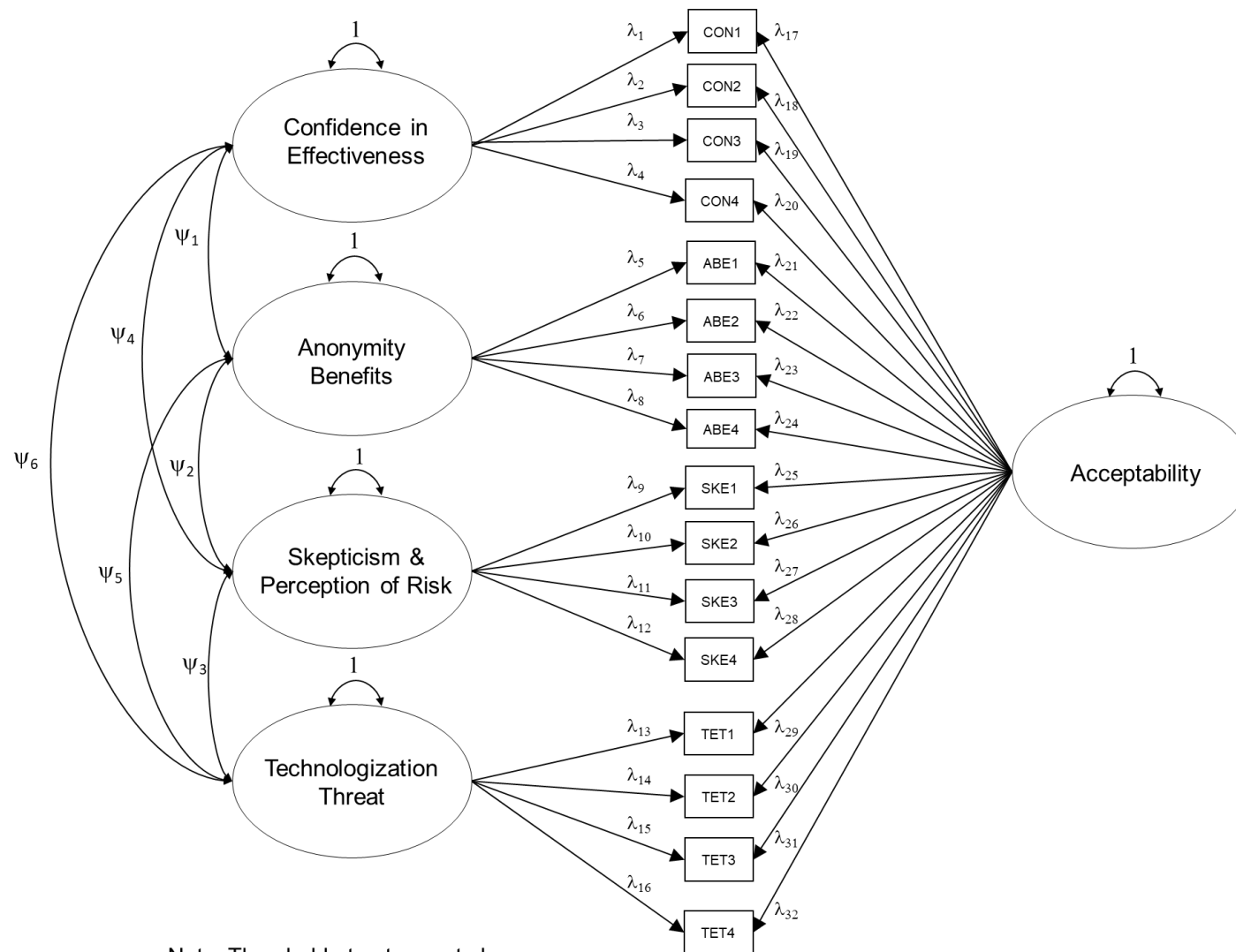
Note. Threshold structure not shown

**Figure 5** Higher-Order, 2-factor model depicting hierarchical relationship among indicators of two latent factors: Positive and Negative attitudes towards treatment loading on a global Acceptability factor.

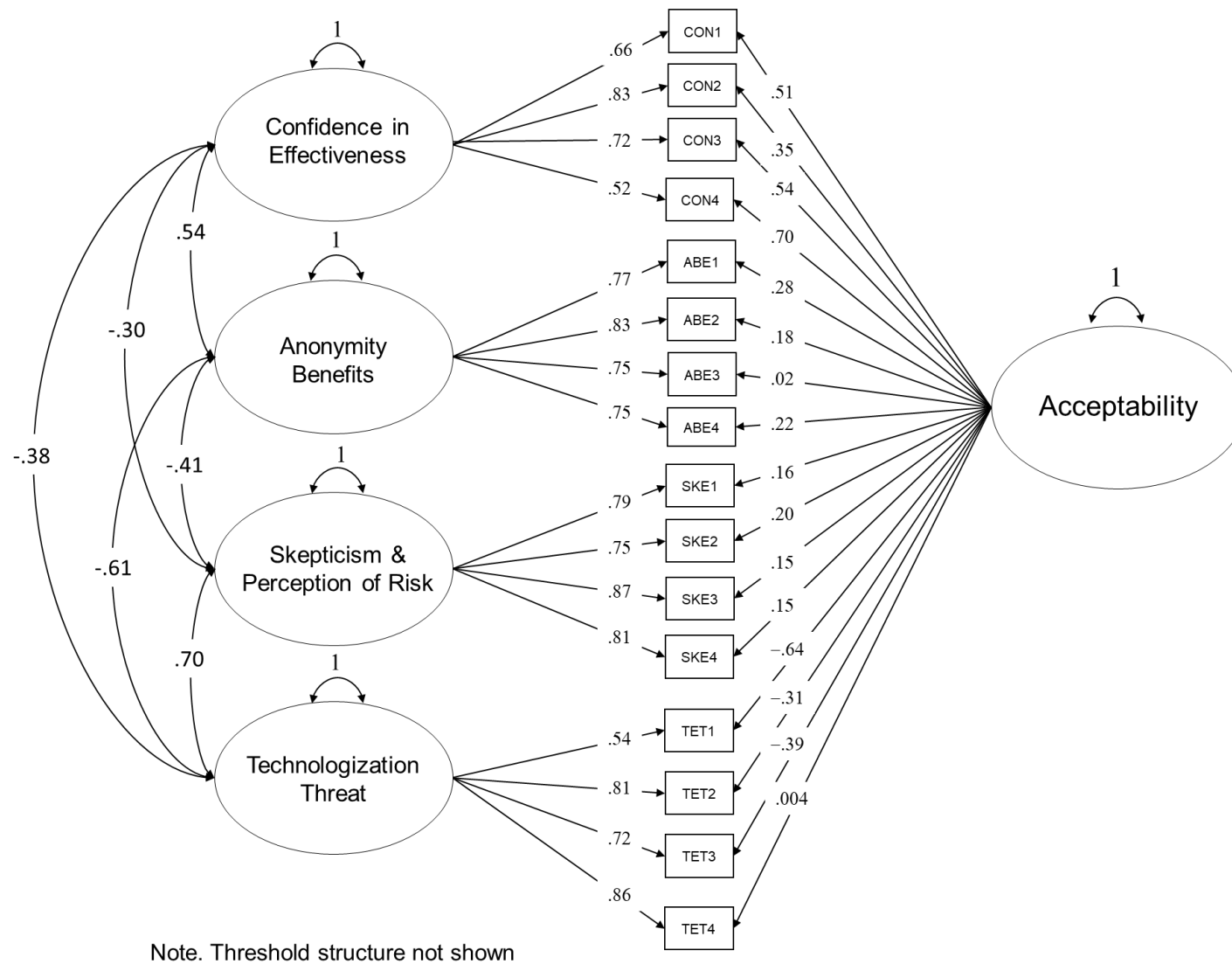


Note. Threshold structure not shown

**Figure 6** Higher-Order, 4-factor model depicting hierarchical relationship among indicators of four latent factors: Confidence, Anonymity Benefits, Skepticism, and Technologization Threat loading on a global Acceptability factor.



**Figure 7** Bifactor model depicting orthogonal relationship among indicators of four latent factors: Confidence, Anonymity Benefits, Skepticism, and Technologization Threat loading alongside a global Acceptability factor.



**Figure 8** Bifactor model depicting orthogonal relationship among indicators of four latent factors: Confidence, Anonymity Benefits, Skepticism, and Technologization Threat loading alongside a global Acceptability factor. Standardized parameter estimates shown.

## 5 CONCLUSIONS

### 5.1 Implications within the Digital Mental Health Interventions Literature

Digital mental health interventions leverage innovative technology for addressing mental health concerns and represent a paradigm shift in mental health service delivery. However, Black, Indigenous, and People of Color have been largely omitted from the prevailing literature examining the efficacy, acceptability, and adherence to these interventions. This is concerning, as BIPOC communities stand to uniquely benefit from the advantages purported by DMHIs including reduced costs and stigma, and improved accessibility and privacy. Taken together, the studies presented in this dissertation suggest that despite the relatively nascent literature, there is promising evidence for the utility of DMHIs among BIPOC communities, and actionable strategies for improving acceptability of these interventions, alongside psychometrically sound measurement of related attitudes. The first chapter of this dissertation provides the most robust evidence to date of the efficacy and acceptability of culturally adapted DMHIs among racially and ethnically minoritized communities across an international context. The second chapter reports the first experimental study to explore the relationship between barriers to treatment and attitudes of acceptability towards DMHIs among Black Americans. This study demonstrated that although a treatment rationale did not significantly improve attitudes of acceptability toward DMHIs, it was found to be impactful for those participants endorsing fewer barriers to mental health treatment. Furthermore, preliminary evidence for the positive impact of health professional endorsement on intentions to use DMHIs is compelling and deserving of further study as an actionable strategy for bolstering uptake of DMHIs. Lastly, the third chapter of this dissertation provides the first documented evidence for the psychometric validity and reliability

of the most highly cited measure of attitudes of acceptability towards DMHIs within a Black population.

These three studies provide substantive contributions to the DMHI literature for several reasons. In the largest meta-analysis of Internet-based cognitive behavioral therapies (iCBT; Andrews et al., 2018), 97% of studies failed to include (or report the inclusion) of racially or ethnically minoritized participants in their sample. This seminal review has been cited 500 times on Google Scholar, a comprehensive web search engine and database aggregator that indexes the full text or metadata of scholarly literature across diverse publishing formats and disciplines. This is concerning for the promulgation of evidence based DMHIs, where the “evidence” reflects largely White majority participant samples, and neglects culturally responsive considerations of the interventions.

The value of culturally adapting psychotherapeutic interventions has been well-established in recent decades (Griner & Smith, 2006; G. C. N. Hall et al., 2016). The first article of this collection was intended to expand on the DMHI literature by investigating the extent to which culturally adapted DMHIs have demonstrated efficacy, acceptability, and promoted adherence among racially and ethnically minoritized communities across the world. Findings of this study were illuminating; culturally adapted DMHIs were efficacious in treating depression, anxiety, stress, and substance use disorders as compared to waitlist control and treatment-as-usual and found to be acceptable across populations. However, consistent with prior literature indicating highly variable attrition rates for these interventions (Christensen et al., 2009; Eysenbach, 2005), more research is needed to determine effective strategies for improving adherence. Furthermore, considerable heterogeneity was present across studies and moderator analyses revealed clinically meaningful considerations. Inconsistent with prior literature



(Johansson & Andersson, 2012; Linardon et al., 2019), intervention efficacy did not differ between DMHIs that incorporated therapist/coach support as compared to fully self-guided DMHIs. However, these findings would appear to corroborate recently emerging evidence that the true impact of therapist-assistance in DMHI trials is significantly more conservative than has been reported in the prevailing literature (Bernstein et al., 2022). This presents an opportunity to revisit frameworks such as the Supportive Accountability Model which posits that when human support is made available and is perceived as trustworthy and benevolent, it enhances intrinsic motivation and performance monitoring that in turn promotes intervention adherence (Mohr et al., 2011). Similarly, the Efficiency Model of Support provides a framework for optimizing the benefit of assisted-DMHIs by identifying common “failure points” and tailoring the type, frequency, quantity, and quality of support provided for the particular needs of a given DMHI and target population (Schueller et al., 2017). Given that the most prevalent form of therapist/coach support found in eligible RCTS in Study 1 comprised the same weekly texts and emails, it is plausible that more attention should be given to tailoring the characteristics of support provided to the unique needs of culturally diverse communities.

There is considerable heterogeneity in how DMHIs are deployed. Whereas some researchers approach their studies using the traditional gold standard of randomized controlled trials, others promote a more innovative dissemination approach such as massively open online interventions (MOOIs, Muñoz et al., 2016) which are open access interventions that leverage the scale and ubiquity of the Internet and examine the natural engagement with the interventions via general online traffic. Although these approaches forgo some procedures to maximize internal validity, they have higher ecological validity. Given that dissemination and uptake are serious problems that diminish the potential of DMHIs to improve mental health and well-being at the

population level, such approaches present compelling narratives for our future consideration of how we define the “utility” and “reach” of DMHIs. Meta-analytic findings in Study 1 supporting the broad efficacy and acceptability of DMHIs across varied communities and clinical presentations provides promising evidence for the continued promotion of targeted interventions for communities that have traditionally been underserved by mental healthcare systems.

The second article of this dissertation was intended to fill the gap in literature targeting Black American attitudes and engagement with these novel interventions (D. C. S. James & Harville, 2017; Jonassaint et al., 2017, 2020). Consistent with this prior evidence, Study 1 verified the lack of Black representation in the DMHI literature, as only one of the 32 studies in the review adapted their DMHI specifically for Black Americans. Accordingly, results of Study 2 provide a nuanced picture of the relationship between barriers to traditional psychotherapy and associated attitudes towards DMHIs among Black Americans. Contrary to hypotheses, providing a treatment rationale did not improve attitudes of acceptability, which is inconsistent with findings that used a diverse sample (Molloy et al., 2021). Furthermore, people with fewer barriers to treatment reported greater acceptability of iCBT following a treatment rationale, which is opposite to the hypothesis that participants with more barriers (including stigma barriers) would report greater acceptability for iCBT. This surprising finding is cause for concern, because DMHI’s are widely viewed as a way to mitigate barriers. It is plausible that the length of the provided treatment rationale, as well as the fact that it was not adapted for Black Americans may explain this finding. Acceptance facilitating interventions (AFIs) are a growing domain of attitudinal research that focuses on methods for modulating, persuading, and improving consumer attitudes towards DMHIs (Cranen et al., 2011; Ebert et al., 2015; Mitchell & Gordon, 2007). Some studies have found that treatment rationales are particularly efficacious

in improving attitudes of acceptability overall, but these studies have uniformly included White majority participants (Ebert et al., 2015; Mitchell & Gordon, 2007; Soucy et al., 2016) and these findings did not replicate in the current study. Further research would benefit from examining the impact of culturally adapted treatment rationales for Black Americans specifically and might employ a community-based participatory research approach in identifying culturally responsive features of the treatment rationale.

Additionally, results provided preliminary evidence for the utility of medical health professional endorsement in improving treatment-seeking attitudes. As authority endorsement was not an experimentally manipulated condition, one cannot conclude that authority endorsement caused improvement in attitudes. However, there is growing evidence of the importance of primary care health professionals as gatekeepers for mental health treatment among Black and other racially minoritized communities, and a robust literature has emerged in the past decade demonstrating the utility of collaborative care models that integrate mental healthcare in primary care settings (Archer et al., 2012; Gilbody et al., 2006; Muntingh et al., 2016; Thota et al., 2012). Considerations for future methods for culturally adapting acceptance facilitating interventions (e.g., treatment rationale, authority testimonials) may provide meaningful guidance for expanding actionable strategies for improving dissemination and uptake of DMHIs among Black communities. Fundamentally, if people are to benefit from these interventions, they must use them. Buy-in is important if the full range of potential of DMHIs for BIPOC communities is to be realized.

To improve attitudes towards DMHIs, we must first measure them. This is crucial, as attitudes towards DMHIs are primary indicators of treatment-seeking behavior and engagement. Indeed, the seminal Theory of Planned Behavior (Ajzen, 1991) posits the link between attitudes,

intentions, and behaviors, with intentions (e.g., “I intend to use a digital program for my mental health”) as the immediate link to behavioral usage of a novel intervention. This theory formed the basis of the Unified Theory of Acceptance and Use of Technology (UTAUT; Venkatesh et al., 2003) which describes the importance of behavioral intention in the acceptability and use of technologies, like DMHIs. The UTAUT in turn proposes four positive predictors for behavioral intention, with evidence suggesting that the predictor “performance expectancy” (belief that an intervention will be beneficial) is the strongest predictor of both patients’ and health providers’ intentions to use DMHIs (Dünnebeil et al., 2012; Li et al., 2013; Philippi et al., 2021).

Performance expectancy has commonly been used as a proxy for overall acceptability. However, the current DMHI literature has been plagued by a lack of consensus of what attitudes are important and what attributes comprise “acceptability”.

Operationalization of acceptability has ranged from behavioral intention (prospective) to treatment satisfaction (retrospective) which results in considerable heterogeneity, and inconsistent results (Molloy et al., 2021). Accordingly, researchers sought to address these concerns by formally developing standardized measures of attitudes towards DMHIs, with the Attitudes Towards Psychological Online Interventions Questionnaire, marking the first (Schröder et al., 2015). Other scales have subsequently been developed to include measures of attitudes *and* behavioral intention (eTAP; Clough, Eigeland, et al., 2019), as well as measures of digital working alliance among DMHIs with therapist support (WAI-I; Gómez Penedo et al., 2020). However, reflecting the broader trend of omitting the presence of racially and ethnically minoritized communities in the development and evaluation of these measures, all but one measure (WAI-VAR; Miragall et al., 2015) has been validated among White (and predominantly European language) samples. This is concerning as communities of color stand to benefit

significantly from DMHIs, but measurement of their attitudes and intentions may not be culturally responsive or equivalent. Study 3 aimed to begin filling the gap in this literature by employing confirmatory factor analysis to examine the psychometric properties of the APOI among a sample of Black Americans. These findings were important, as although internal consistency of the scale was good to excellent, the existing hierarchical model proposed by the measure's original authors demonstrated poor fit. Evidence for an alternative bifactor model was found to be robust, suggesting that the utility of a composite, global factor may have less (or at the very minimum co-equal) utility to the four subgroup factors comprising a set of both positive and negative attitudes towards DMHIs. Perhaps future examinations of “acceptability” should comprise both global and factor specific attitudes at the subgroup level, given their orthogonal relationship to one another. Indeed, improving attitudinal measurement among diverse communities is crucial for understanding both drivers and barriers to using digital treatments among minoritized communities.

The findings of these studies suggest that DMHIs hold considerable promise for reducing the mental health burden of BIPOC communities and affirms the existence of tools for both effectively measuring and promoting positive attitudes towards these interventions. However, concurrent questions regarding the utility of culturally adapted treatment rationales and acceptance facilitating interventions, and the degree to which culturally responsive DMHIs can improve treatment non-adherence in digital health research, have yet to be examined.

## **5.2 Future Directions**

This collection of studies emphasizes the need for future research to consider the multifaceted domains of acceptability, efficacy, uptake, and adherence of digital mental health interventions among BIPOC communities. It is imperative that future studies examine the utility

of DMHIs for mitigating and circumventing barriers endemic to mental health treatment and assess the degree to which oft-touted promises of DMHIs can be realized within these communities.

### ***5.2.1 Global Trends in DMHI Implementation***

Mental health concerns represent a significant threat to the general wellbeing and security of minoritized communities across the world (Whiteford et al., 2013; WHO World Mental Health Survey Consortium, 2004). Depression contributes to the highest global burden of disease as measured by Disability-Adjusted Life Years (Whiteford et al., 2013). Low- and middle-income countries (LMICs) have over 80% of the world's population, but only 20% of the share of mental health resources (A. E. Becker & Kleinman, 2013; Razzouk et al., 2010). More than 75% of people with serious mental illness in nations from the global south do not receive treatment for it (WHO World Mental Health Survey Consortium, 2004; World Health Organization, 2014). In LMICs, mental health access is hindered by both the inequitable concentration of mental health professionals in urban settings and diminished capacity of non-specialists to provide appropriate treatment (Acharya et al., 2017). Given that mental health need outweighs current treatment capacity, shifting mental health specialists to rural settings does not in itself address this problem. This is deeply concerning given the compounding effects of exposure to stigma, human rights abuses, and social hazards that exacerbate vulnerability to poor health (Drew et al., 2010; Patel et al., 2007).

Efforts to address disparities in access to care between high-income countries (HICs) and LMICs by improving the healthcare system's *capacity* have been attempted with the use of DMHIs (C. S. Hall et al., 2014; WHO, 2011). Growing evidence has demonstrated the efficacy of digital health interventions in LMICS as it relates to reducing mental health symptoms (Fu et

al., 2020) and improving treatment adherence, data gathering, and developing support networks for health workers (C. S. Hall et al., 2014). However, a majority of this dissemination research pertains to digital interventions for *physical* health conditions, and LMICs are underrepresented in the large-scale adoption and dissemination of DMHIs (Chakrabarti & Shah, 2016; Naslund et al., 2017; WHO, 2010). This is concerning, as developing and deploying DMHIs in HICs, has largely resulted in the failure to recognize the unique sociocultural factors associated with mobile phone and app usage in LMICs (Agarwal et al., 2015; Albabtain et al., 2014). For the full potential of DMHIs to be realized, they must be intentionally deployed in a culturally responsive manner to optimize consumer uptake and adherence. More research examining the utility of DMHIs in LMICs and among racially/ethnically minoritized communities is needed.

### **5.2.2 Cultural Considerations for DMHIs**

Culturally adapted DMHIs are well-positioned to circumvent barriers to mental health treatment that particularly effect racially and ethnically minoritized communities including stigma, cost, and accessibility. Indeed, an internationally representative survey study across 24 countries demonstrated that attitudinal barriers to treatment were the most prevalent obstacles to both initiating and continuing treatment, with structural barriers of greater importance for those experiencing severe psychopathology (L. H. Andrade et al., 2014). Bernal et al.'s (1995) Ecological Validity Model for cultural adaptation identifies core features including language, persons, metaphors, content, concepts, goals, methods, and context. The importance of culturally responsive care is based on the understanding that context influences psychological functioning (Barrera & Castro, 2006; A. S. Lau, 2006) and that diverse cultures differ in respect to their interpretation and use of health information (Beals et al., 2003; Brandon & Proctor, 2010) and exposure to risk (Bhui et al., 2005; Roberts et al., 2011).

Culturally adapted DMHIs can provide accessibility, convenience, and privacy, all of which may serve to mitigate obstacles exacerbated by the stigma of mental illness. Furthermore, DMHIs traditionally leverage psychoeducation which may combat myths of mental illness in a manner consistent with one's cultural framework of health and mental wellness. However, given the lack of research explicitly examining the relationship between stigma barriers and acceptability of DMHIs (Choi et al., 2012; Sit et al., 2020) more study is needed to ascertain the true benefit of DMHIs in circumventing these barriers to treatment.

There remain several considerations related to *how* cultural adaptations of DMHIs should be conducted. Researchers have deliberated the utility of focusing adaptations on subgroup characteristics (Bernal et al., 2009; Kreuter & Skinner, 2000) as compared to the creation of individually tailored and responsive interventions (Kreuter et al., 1999). Furthermore, considerations for the cost-effectiveness and scalability of culturally adapted DMHIs necessitates reflection. A popular, DMHI for depression developed by the World Health Organization (Step-by-Step; Carswell et al., 2018) has been translated into four languages and deployed across six different racial/ethnic communities. Results from these studies provides evidence for the utility of adapting existing, modular, interventions versus creating them wholesale, as endlessly disseminating culturally targeted variants of DMHIs for various communities may be an unsustainable endeavor. Indeed, although community feedback for designing culturally adapted DMHIs is widely supported, this can range from a single focus group to a costly multi-stakeholder consultation program. Additionally, singular focus on adapting DMHIs to be culturally responsive may prompt superficial or inappropriate adaptations that can compromise intervention fidelity and effectiveness (Castro et al., 2004; Elliott & Mihalic, 2004). Lastly, although there is evidence supporting that more extensive adaptations are correlated with greater



clinical improvement (Harper Shehadeh et al., 2016), a true dose-response relationship of adaptation elements within DMHIs remains unclear and is deserving of further study.

Intentionality in cultural adaptations is paramount, and further research is needed to determine the appropriate balance of cultural responsiveness, resource expenditure, and dissemination of culturally adapted DMHIs.

### **5.2.3 *Modern Models of DMHI Delivery***

To achieve their full potential in reducing mental health disparities, DMHIs must be integrated into routine clinical care. DMHIs have been proposed as an integral component of the Stepped Care approach, which Kenicer et al. (2012, p.1) define as “a flexible model of healthcare delivery in which patients can begin their treatment with a low intensity intervention requiring only limited practitioner support such as guided self-help.” Evidence suggests that stepped-care models can achieve clinical improvements for nearly two thirds of primary care patients with common mental disorders while using fewer therapist resources (Nordgreen et al., 2016; Salomonsson et al., 2018; Stiles et al., 2019). Integrating DMHIs in routine practice could mitigate barriers to treatment access and affordability. Self-guided DMHIs can be offered as the first stage of care as an alternative to waiting periods or collaboratively determined in treatment plan designs. This could benefit patients both in terms of convenience and accessibility of care and be particularly advantageous for racially and ethnically minoritized patients who may be reluctant to seek treatment due to stigmatization, or patients in LMICs that lack sufficient care infrastructure.

When organized efficiently, stepped care models can enable therapists to more efficiently allocate valuable time and resources in settings with high demand. One study comparing a stepped care model ranging from therapist-assisted DMHIs (i.e., 10-minute weekly therapist

phone support) to face-to-face therapy found that most patients who reached clinically significant improvement, did so before reaching the later stages of the stepped care treatment that would have required higher demand on therapist time and resources (Nordgreen et al., 2016). It is worth noting however, that a significant proportion of patients in this stepped care condition (41%) did not complete the treatment as planned and dropped out at the iCBT step. This attrition rate is consistent with a robust DMHI literature noting relatively high attrition rates that appear endemic to DMHI trials (Christensen et al., 2009; Eysenbach, 2005), a fundamental problem that must be addressed if DMHIs are to have a meaningful impact.

Stepped care approaches may be especially useful when integrated with collaborative care models of treatment delivery (CoCM). The collaborative care model is an integrated healthcare approach that has been rigorously tested and helps address both the lack of mental health specialists and high population burden of illness (Archer et al., 2012; Gilbody et al., 2006; Muntingh et al., 2016; Thota et al., 2012). However, there are limited data from implementation research studies of collaborative care models among LMICs (Rimal et al., 2021), despite a clear need for evidence to inform the scale-up of effective DMHIs among racial and ethnically minoritized communities. This presents a large and growing frontier for modern mental healthcare delivery, that will require dedicated attention to sociocultural adaptations necessary to promote implementation and uptake among communities that stand to benefit the most.

Research further suggests that the adoption of stepped care models could yield incremental cost-effective ratios over \$2200 USD per disability-adjusted life year in comparison to treatment as usual (Stiles et al., 2019). Additionally, some evidence indicates that organizations might quickly recover high initial costs of technology adoption (Blaya et al., 2010; Burns & Pauly, 2012). However, caution is warranted as some research has indicated that the

literature on economic evaluations of DMHIs may fail to capture all relevant available evidence and comparators, ultimately leaving the true cost-effectiveness of DMHIs inconclusive (Jankovic et al., 2021). More rigorous economic evaluation data of both culturally adapted and unadapted DMHIs will be necessary for promoting their implementation at institutional levels where administrative buy-in and cost/benefit analyses are drivers of routine care and policy decisions (Ramsey et al., 2016).

#### ***5.2.4 Leveraging Strengths and Mitigating Weaknesses of DMHIs in Implementation and Dissemination Research***

A feature unique to DMHIs compared to face-to-face therapy is their potential ubiquity. Current estimates indicate that approximately 85% of Americans own a smartphone and that racially minoritized communities have smartphone ownership at equal or greater rates to White counterparts and are more likely to use smartphones as their primary access to broadband internet (Perrin & Turner, 2019; Ray et al., 2017). This increasingly egalitarian access to internet connectivity creates a crucial opportunity for intervention delivery via digital and other mobile devices.

However, there remains a tendency to repackage traditional evidence-based practices and deliver them wholesale via digital mediums. This impulse is understandable as promoting evidence-based treatment is an ethical imperative. However, rigid adherence to existing paradigms of treatment may obscure opportunities for leveraging the unique features of technology in often new and culturally responsive ways (Mohr et al., 2017). For example, attention bias-modification (a common mechanism implicated in the maintenance of anxiety, mood, and related disorders) can utilize gamification methods built directly into a smartphone app (Dennis & O'Toole, 2014). Using native functions like well-timed push-notifications for

psychoeducation, electronic activity monitors, and geo-location based events for exposure exercises are just some ways that the traditional approach to psychotherapy can be flexibly adapted to consumer needs (Miloff et al., 2015). Furthermore, studies consistently demonstrate that participants rarely complete a full sequence of manualized/modularized iCBT treatment, and yet demonstrate statistically and clinically significant improvements in clinical outcomes. Some researchers have suggested that perhaps there should be greater consideration of shorter or adhoc digital intervention frameworks that follow manualized treatments, but allow people to engage in in a flexible manner consistent with how they would naturally use their consumer devices (Lindegaard et al., 2019).

Although the evidence for the comparative benefit of human supported DMHIs compared to un-assisted interventions remains mixed (Bernstein et al., 2022; Johansson & Andersson, 2012; Linardon et al., 2019), there are compelling opportunities for employing support strategies within DMHIs. For example, the use of artificial intelligence or conversational agents like chat bots or avatars can promote engagement and adherence, and have demonstrated preliminary potential (Bendig et al., 2019). There is a wealth of innovative directions that could be pursued in rethinking the packaging and delivery of evidence-based practice through digital mediums. In doing so, prioritizing a culturally responsive user experience must be at the forefront for making DMHIs widely accessible and acceptable to mental health consumers, especially those from minoritized backgrounds. Overall, evidence-based science is necessary, but insufficient for broader dissemination if the programs are not intuitive, attractive, flexible, and secure (N. Lau et al., 2021; Schueller & Torous, 2020). Concurrently, digital mediums can promote rapid and scalable opportunities for adaptations through culturally responsive digital avatars,

languages/dialects, and cultural idioms and metaphors. All of which can be designed with modularity, flexibility, and adaptability in mind.

There also needs to be concerted attention to the dual presence of positive and *negative* features of DMHIs. Schröder et al.'s (2015) APOI captures a meaningful breadth of attitudes across the emotional valence spectrum and a growing body of evidence has revealed a nuanced landscape of attitudes towards DMHIs (Borghouts et al., 2021). For example, it has been frequently reported that anonymity/privacy benefits may provide opportunities for discretion in mental health treatment while also eliciting concerns over confidentiality of personal information being transmitted over digital platforms (Borghouts et al., 2021; Carolan & De Visser, 2018). Additionally, in one study of workplace implementation of DMHIs, participants shared their perceptions that although DMHIs offered opportunities for convenience and flexibility, they could also result in difficulty prioritizing time and ensuring a temporal and spatial separation between work and therapy. Attention to these varied factors is essential, and efficacious strategies for managing consumer expectations remains limited. Similarly, among clinical providers, there can be interest in the cost-effectiveness of deploying a new DMHI that is counterbalanced by concerns that there will not be commensurate levels of training, infrastructure, and ongoing technical support which can perpetuate existing reluctance for broader adoption in routine care (E. M. Becker & Jensen-Doss, 2013; Ramsey et al., 2016). All these considerations are exacerbated as it relates to BIPOC communities as values, attitudes, and barriers to treatment can be qualitatively different than their majority White counterparts, upon whom most design, evaluation, and implementation decisions have been based.

Furthermore, other researchers have proposed expanded models of efficacy evaluation, including the micro-randomized trial which posits a process of study where *treatment*

*components* (e.g., behavioral activation push notification) may be delivered multiple times during the day and week and fluctuates as a function of near-term proximal outcomes (e.g., step count within past 30 minutes) and decision points which are moments in time at which a treatment component might be delivered (Walton et al., 2019). This approach may not only be more responsive to the dynamic nature of DMHIs but can provide meaningful insights into the iterative development of current and new interventions. Additionally, hybrid trial designs that integrate simultaneous testing of treatment effects and implementation models (Curran et al., 2012) may prove beneficial as traditional randomized controlled trials often bear little resemblance to the clinical settings in which the intervention will be deployed. By prioritizing pragmatic approaches that emphasize the usefulness, applicability, and feasibility of new interventions, efforts to fully integrate DMHIs into routine care settings may be realized (Glasgow, 2013) .

As the studies reported in this dissertation indicate, research on DMHIs for racially and ethnically minoritized communities can be expanded by considering the acceptability, efficacy, uptake, and adherence of DMHIs at multiple levels of investigation, including individual, group, and system levels. We must be bold and creative in our use of innovative technologies in the treatment of persistent mental health challenges and entrenched health disparities between racially and ethnically minoritized communities and their majority counterparts. Anything less is untenable and an abdication of our scientific and clinical integrity as mental health researchers and practitioners.

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