EXAMINING MENTAL HEALTH APPS POTENTIAL IN PROVIDING EQUITABLE ACCESS TO CARE IN THE GLOBAL NORTH AND GLOBAL SOUTH: A SCOPING REVIEW

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ABSTRACT

Promising, ongoing research on online mental health interventions or mental health applications (MHAPPs) has presented the global mental health care community with a potential solution to fill in the gaps in access to mental health care. Many of the MHAPPs have focused on conditions of depression and anxiety. Yet, it remains unclear whether such interventions can address the access to care gap in an equitable manner by reaching the diverse communities both in the global North and global South. The countries of Canada and United States were chosen as exemplars for the global North and China and India as exemplars for the global South. Using Arksey and O'Malley's methodical framework, a scoping review was conducted on academic and grey literature published since 2015. Under critical social paradigm, the synthesis of review studies employed the social determinants of health lens along with role of macro forces like neoliberalism and collectivism-individualism. The results reveal that MHAPPs for depression and anxiety have been shown to be efficacious in studies both in the global North and global South, though few of the efficacious apps have been made freely available. Further, the guided-online interventions in the global North and global South are also found to facilitate program adherence, especially in rural settings. However, the review reveals that several barriers exist in the global South to make online interventions widely available and accessible. The identified barriers include mental health stigma and discrimination, financial and social challenges, difficulties in using the technology-based applications, and cultural barriers to 'self-management'. In conclusion, this review has identified the potential of MHAPPs in broad settings; however, there is a need to design

these programs by incorporating the social determinants of health framework to better address the structural barriers to access care. Policy makers should be cautious in steadily implementing MHAPPs in disadvantaged communities, as broader policies are needed to address the logistical capabilities of accessing online mental care. Further studies on MHAPPS are also needed with a bottom-up approach to adapt to various cultural context and reach marginalized communities. Given the specific focus of the presented review on Canada and United States as global North and China and India as global South, the findings need to be interpreted carefully. Further work by including additional geographic regions is needed to advance the scholarly understanding.

Key Concepts: *Online mental health interventions, Telemedicine, Mental health apps, eHealth, mHealth, Mobile Health, Global mental health care, Global North, Global South, Mental health access*

INTRODUCTION

Increasingly research has shown that the incidence of mood disorders like depression and anxiety is continually rising in the global South and North (World Health Organization, 2018). This is raising concerns amongst policy makers, healthcare providers and researchers for the global mental health. The term global North here refers to high-income countries (HICs) and the global South refers to the low-middle income countries (LMICs) while global mental health refers to the mental health needs in both. Evidence shows the burden of mental illnesses faced by the global South is much higher compared to the global North. It is estimated that more than 80% of people who have mental disorders are residing in the global South, and mental illnesses and substance abuse disorders account for 8.8% and 16.6% of the total burden of disease in LMICs, respectively (Rathod et al, 2017, p. 1). One reason for the high burden in the global South is the population density. For example, 1.37 billion individuals in India represent 17.8% of the world population (Worldometers, 2019). Experts also associate the socioeconomic challenges and suboptimal living conditions (which could be reasonably linked to growing global hold of neoliberalism) in the global South with compromised mental health (Lund et al, 2010, p. 16). Another challenge is the limited access to mental health care. As an example, the mental health workforce in India (per 100,000 population) include limited number of psychiatrists (0.3), nurses (0.12), psychologists (0.07) and social workers (0.07) (World Health Organization India, 2019). As a result, mental illnesses especially mood disorders have become a crucial aspect of the international health agenda including the goals set by the World Health Organization.

In 2013, the World Health Organization (WHO) established the Mental Health Action Plan to recognize the essential role of mental health in achieving the health for all people. The stated goal of the Action Plan for 2013-2020 is "To promote mental well-being, prevent mental disorders, provide care, enhance recovery, promote human rights and reduce the mortality, morbidity and disability for persons with mental disorders" (World Health Organization, 2013, p. 32). The Action Plan states that it will be guided through six cross-cutting principles – universal health coverage, human rights, evidence-based practice, life course approach, multisectoral approach and empowerment of person with mental disorder and psychosocial disabilities (World Health Organization, 2013, p. 32-33). Yet, scholars like Nigel Cox and Lucy Webb's critique the approach taken by the WHO, and argue that requiring the mental health care to be delivered in a culturally appropriate manner is very simplistic and, hence, problematic because pronouncements remain to be framed through the normative assumptions of the Westernized psychiatric model and its western worldviews (2015, p. 686). Cox and Webb believe that global mental health care should allow for more nuanced approaches to mental health care based on local cultural knowledge and practices that already exist for centuries in the global South and in the global North, such as among First Nations (2015, p. 686). Others critique that local or indigenous forms of healing can be overlooked if framed as 'alternatives' or 'complementary' compared to bio-medical psychiatry (Mills and Fernando, 2013, p. 190-191).

The latest way of packaging such bio-medical care is possibly influencing the creation of online mental health interventions. There is an emphasis in research with

online tools on delivering western counselling models (e.g. Cognitive Behavior Therapy or CBT and Acceptance Commitment Therapy or ACT). Although studies report their efficaciousness in the HIC for conditions like anxiety and depression, the studied samples rarely include adequate number of participants from minority cultures (Bockting et al, 2016, p. 3). There are even fewer rigorous evaluations of online mental health interventions in LMICs and only three randomized-controlled trials were found by the year 2016. At the same time, such online mental health interventions delivered via digital devices or mental health apps (MHAPPs) are increasingly viewed as a viable option in closing the availability, access, and uptake gaps in mental health care for both global North and global South alike. The proponents base their arguments on the basis of a steady increase in the use of Internet and the ownership of smartphones among emerging and developing economies (Poushter et al, 2018, p. 4), especially when many LMICs are failing to have the capacity for face-to-face therapy. To date, it is unclear what role and capacity, if any, MHAPPs will take on in addressing global mental health care.

RESEARCH GOALS AND OBJECTIVES

The overarching goal of the comprehensive literature review for the Major Research Paper (MRP) is to better understand MHAPPs capacity in global mental health care. To enhance specificity of the review and ensuing recommendations, Canada and United States are chosen as representing the global North while China and India as representing the global South. Further, depression and anxiety are chosen to examine the MHAPPs as these are the most prevalent mental health disorders (Ritchie and Roser, 2019). The specific research questions examined are: *1) What is the potential of MHAPPs*

for treating depression and anxiety in the global North and South for equitable access to care? and 2) What are the related challenges/facilitators for mental health in the global North and South?

For this purpose, a scoping review of published literature was undertaken using Arksey and O'Malley's (2005) framework. The analytic synthesis of the literature employed a health equity lens operationalized through a focus on the social determinants of health. The term health inequity here is viewed as health differences (e.g. in access to care or health status) that are shaped by people's economic and social circumstances (e.g. race/ethnicity, religion, socioeconomic status, gender, mental health, cognitive, sensory, or physical disability, sexual orientation, geographic location, or other characteristics historically linked to discrimination or exclusion) which are generally avoidable and their presence can be seen as unjust (Braveman, 2014).

The findings generated by the MRP are likely to inform policy, practice and research in global mental health care. The development of online mental health interventions is a budding area with continually increasing research, more so in the global North than in the global South. With studies stating that MHAPPs have a great potential in filling gaps in mental health access in LMICs and marginalized communities, it is important that MHAPPs are examined for relevance to the local populations in question. The insights gained through MRP are likely to inform intervention developers and policymakers about the design and effectiveness of MHAPPs across the identified demographic regions along with barriers and facilitators that must be addressed to successfully implement them. It is anticipated that the dissemination of the generated

findings to the identified communities could be beneficial in raising their awareness and possibly meaningful access of MHAPPs for depressive and anxiety symptom.

METHODOLOGY

This section provides an overview of the researcher's worldview or paradigm, the theoretical framework and the methods employed for the comprehensive review of literature.

1.Research Paradigm

The overarching research paradigm that informs the research questions and approach is critical social theory with the ontological belief in historical realism, dialogic epistemology, and a focus on social justice by challenging the status quo (Lincoln & Guba, 2005, p.195). Scholars informed by this paradigm view reality as being shaped by social, political, cultural, economic, ethnic and gender values. In terms of epistemology, the critical social scholars generate knowledge in a dialogic manner where both subjective and objective evidence is valued. These tenets have informed my research questions and inquiry process throughout. For instance, I started by focusing on the global South but later decided to include the global North to examine contextualized reality. This has also informed my choice of the review method and I opted for the scoping-review (Arksey & O'Malley, 2005) as it allows inclusion of both quantitative and qualitative evidence. The dialogic emphasis in the critical social theory paradigm has also led me to incorporate the social determinants of health framework for the critical

review of literature and aid the interpretation of findings by taking into account the cultural dimensions (individualism and collectivism) and political forces (neoliberalism).

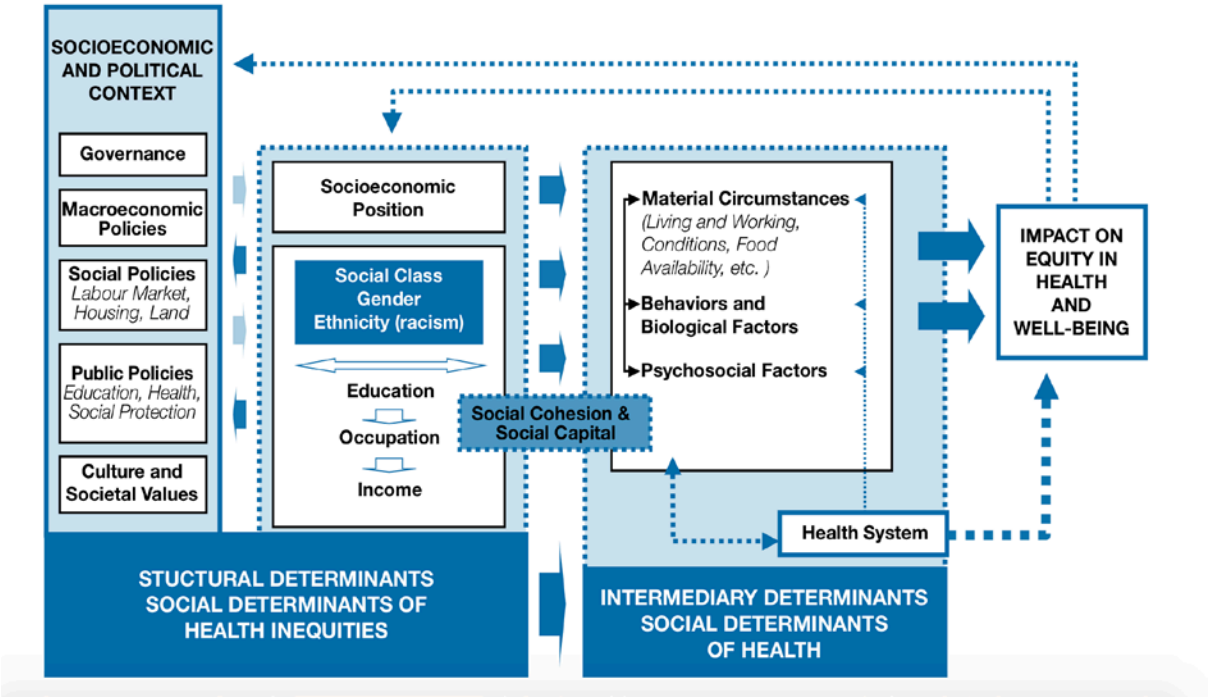
Further, per critical social theory, the researcher's subjectivity is acknowledged, and findings are viewed as value-mediated through researcher's interpretive lens. This has led to a process of reflexivity in my research process where I asked how my social position – being a member of racialized community with access to university education – might impact the choices in selecting this area and interpreting the emergent findings. Indeed, my South Asian descent has influenced my choice of countries that represent the global South in this research. Ultimately, a critical social theorist wishes to promote social justice and has a transformative aim. These scholars when examining human suffering ask questions of "what ought to be" and "where should we go from here" (Kincheloe & McLaren, 2005, p. 309). After the completion of the MRP, I wish to disseminate the generated knowledge to enhance health equity in policy and practice for global mental health. However, proximity of the researcher to the study focus, population or participants has its drawbacks in that it could be perceived to lack objectivity. In order to overcome such critique, I have employed self-questioning throughout the search and synthesis process to reduce the researcher bias.

2.Theoretical Framework

A key theoretical framework that guides the MRP is the social determinants of health (SDOH) framework of the WHO titled *A Conceptual Framework for Action on the Social Determinants of Health* (2010, p. 6). It has been used both to problematize the interpretation of the review findings. The conceptual social determinants of health

(CSDH) framework, refer to Figure 1, shows how social, economic and political mechanisms give rise to a set of social positions, whereby populations are stratified according to income, education, occupation, gender, race/ethnicity and other factors; these socioeconomic positions in turn shape specific determinants of health status (intermediary determinants) reflective of people's place within social hierarchies; based on their respective social status, individuals experience differences in exposure and vulnerability to health-compromising conditions (World Health Organization, 2010, p. 5).

Figure 1



Source: World Health Organization. (2010). *A conceptual framework for action on the social determinants of health: debates, policy & practice, case studies.*

Per this framework, the "context" is broadly defined to include, "all social and political mechanisms that generate, configure and maintain social hierarchies, including: the labour market; the educational system, political institutions and other cultural and societal values" (World Health Organization, 2010, p. 5). The most powerful of which is the presence or lack of presence of a country's welfare state and redistributive policies (World Health Organization, 2010, p. 5). In addition, I argue that localities (i.e. culture/societal values) also play a crucial role in how a population interprets mental health and, thus, impacts the manner in which a population uptakes mental health care. The terms "structural mechanism" refers to mechanisms that "generate stratification and social class divisions in the society and that define individual socioeconomic position within hierarchies of power, prestige and access to resources" (World Health Organization, 2010, p. 5). It is notable that per WHO the most important structural stratifiers and their proxy indicators include: Income, Education, Occupation, Social Class, Gender, Race/ethnicity (World Health Organization, 2010, p. 6). These identifiers have been incorporated in the synthesis of the findings of the scoping review.

Together, the context, the structural mechanisms and the resultant social position of individuals are "structural determinants" of health and health inequity (World Health Organization, 2010, p. 6). These along with "intermediary determinants" of health (i.e. material circumstances, psychosocial circumstances, behavioral and/or biological factors, and the health system) work to shape a population's health outcomes (World Health Organization, 2010, p. 6). In addition, the concepts of social cohesion and social capital cut across the structural and intermediary dimensions as it has features linking both -

meaning that the state should take responsibility in developing flexible systems that facilitate access and participation on the part of the citizens (World Health Organization, 2010, p. 7). This distinction in the CDSH model will be a key in recognizing that mental health systems should be collaboratively formulated from a bottom-up perspective that takes in to consideration the broad social determinants impacting the respective communities focused in the scoping review.

For the interpretation, I have further explored the cultural aspects and political forces by drawing from individualism-collectivism and neoliberalism lenses. Individualism-collectivism is one of four dimensions of national culture identified by Hofstede, which shapes an individual's "mental program" from early childhood (1980, p. 16, 150). It is the degree to which people in a society are integrated into groups or prefer individual needs (Hofstede, 1980, p. 150). Collectivist cultures are defined as being parts of groups, having goals that overlap that of their in-group members and having strong ties to their relationships (Triandis et al, 1995, p. 243-244). Whereas Individualistic cultures focus on self-concepts that are autonomous from groups, have personal goals distinct from ingroup members and their attitudes are based on one's own internal processes (Triandis, 1995 et al, p. 243-244). However, it is important to recognize that these defining attributes of cultures are best thought of as fluctuating pressures or tendencies, which may or may not be true of a particular individual or context and may change overtime (Triandis et al, 1995, p. 243).

The key tenets of neoliberalism are free economic enterprise, cutting public expenditure for social services, deregulation, privatization and replacing public good with

individual responsibility (Martinez & Garcia, 1997). Neoliberalism is a new form of liberalism first incited by Adam Smith in 1776, when he called for the abolition of government intervention in economic matters (Martinez & Garcia, 1997). This was based on the notion that free trade was the best way for a nation's economy to develop (Martinez & Garcia, 1997). Neo-liberalism has increasingly become a set of economic policies used globally in the past several decades (Martinez & Garcia, 1997).

3. Scoping Review Method

In terms of methods, a scoping-review methodological approach proposed by Arksey and O'Malley (2005) was adopted due to the broad nature of the research questions being asked. Often the aim of a scoping review is to rapidly map the key concepts underpinning a research area and the main sources and types of evidence available, quite possibly leading to stand-alone projects when novel areas are identified (Arksey & O' Malley, 2005, p. 121). In most of the scoping reviews, the need for a comprehensive coverage of the available literature (breadth) takes precedence over depth; thus, the degree of depth in information extracted and reported in scoping reviews would vary from study to study (Arksey & O' Malley, 2005, p. 121). Nonetheless, this approach for the MRP was considered advantageous over other traditional systematic reviews (e.g. Cochrane review) because it allows inclusion of both qualitative and quantitative research designs and multiple sources of information that may even include scholarly reports and discussion articles. A review of such body of published literature through MRP is anticipated to make recommendations for a wider set of audience in the field of global mental health policy while identifying relevant gaps in research and practice.

The five steps employed for the scoping-review, as outlined by Arksey and O'Malley (2005, p. 122), are: (1) developing a research question, (2) searching literature by using inclusion and exclusion criteria, (3) selecting articles, (4) charting of data extracted from included articles, and (5) collating, summarizing, and reporting the findings. The optional sixth step (2005, p. 128) —expert consultations— was not employed as it was not very essential for the scope of this paper and due to limited resources. To move beyond the descriptive nature of the Arksey and O'Malley approach for scoping review, a theoretical lens was incorporated.

a. *Search Strategy*

The search strategy was developed and finalized by iteratively examining its success in identifying potentially relevant abstracts. The focus on North was operationalized by searching for literature specific to Canada and the US while the focus on South was operationalized by focusing on China and India. Here China is defined as including Hong Kong and Taiwan as well. The selection of these countries was based on the level of research capacity whereby Canada and the US represent the upper-income and China and India the middle-income strata of countries.. In addition, the focus is on countries; thus, Chinese or Indian populations from other countries outside the inclusion criteria are excluded from the review. China and India were interchangeably searched with asterisk (*) symbol, so it was searched like Chin* for China and Chinese and, Indi* for India and Indian. Drawing from Arjadi et al's 2015 systematic review of online interventions for mental health in LMICs, the keywords included were 'online', 'web', 'internet', 'internet-based', 'app', 'apps', 'application*', 'tablet*', 'ipad' 'depression',

‘depressive disorder’, ‘melancholia’, ‘major depressive disorder’, ‘anxiety’ ‘exp anxiety disorders’, and ‘anx*’. These keywords were searched interchangeably with terms selected for the countries (described above) by using the search operators ‘OR’ and ‘AND’. MEDLINE, PsycINFO, Sociological Abstracts, Social Science Abstracts were the electronic databases that were searched and for the year 2015 to the year June 15th, 2019. The Journal of Medical Internet Research (JMIR) was independently evaluated with broader search terms to be more inclusive. The grey literature was searched via Google and Google Scholar using the previously identified key terms and the first 6 pages were reviewed to identify relevant articles. A total of 2,157 sources were identified from all search strategies.

b. Inclusion and Exclusion Criteria

These criteria were applied (by RR) for selection of full-text articles. Articles were selected if they (1) were published from the year 2015 to June 15th 2019, (2) were in the English language, (3) were available in full-text, (4) included adult population (18 years of age or over), (5) were with primary (or embedded) population residing in India, China, Canada, or the United States, (6) focused on online intervention that utilizes a digital device to deliver mental health care, either therapy assisted and/or non-assisted, and (7) aimed to understand how online interventions can treat and manage all forms of depression and/or all forms of anxiety, including reducing depressive symptoms and/or anxiety symptoms. The year 2015 to 2019 were chosen as the years of publication to ensure findings are not outdated and due to MHAPPs relative research infancy. There were no restrictions applied with respect to the study designs. The exclusion criteria were

studies that had incomplete or proposed study designs, prior systematic or scoping reviews, and thesis or discussion papers. Also, studies that used online mental health interventions as screening tools (rather than treatment or symptom management tools) were excluded. Based on these selection criteria, 31 articles were retrieved and on their close review the number of eligible articles narrowed down to 19. The reference list of reviewed studies was also manually searched, where one new abstract met the inclusion and exclusion criteria for further review. Thus, 20 articles formed the sample for the full review and synthesis (see Appendix B for Flow Chart).

c. Data Extraction and Analysis

These activities took a systematic approach. Zotero was used to archive and record necessary information of the 20 articles selected for the full review. For the extraction and summarization of the findings and data from the 20 articles, a scoping review summary table was formulated to record the journal article's title, author(s), year of publication, study location and setting, intervention type/study design type, duration of study, objective(s), instrument(s) and/or methodological approach(es), outcome measure(s), study population and size and relevant finding(s). A separate Microsoft Word document was made to highlight, and record overlapping findings and key differences found in the literature between the global North and South.

In order to synthesize the findings, an inductive thematic analysis approach was undertaken. Thematic analysis involves the identification of prominent or recurrent themes in the literature and summarizing the findings of different studies under thematic headings (Dixon-Woods et al, 2005, p. 47). Furthermore, an inductive approach was

opted for rather than a deductive approach, as this allows for findings to be discussed in a data-driven manner. The inductive approach allowed for the data to be extracted at descriptive level (e.g. study designs, main objectives and the population characteristics) and at analytical level by identifying dominant themes/sub-themes, interconnecting themes and critically reviewing for the structural determinants and social determinants based on CDSH framework (discussed above). Social determinants were used to critically review the results sections of the findings, whereas the structural determinants were used to critically review key points from the discussion section of the articles.

FINDINGS AND DISCUSSION

This section will first provide a descriptive summary of the reviewed studies followed by dominant and unique themes identified and critically analyzed.

1. Descriptive Analysis

Of the 20 full-text articles identified, six studies involved Canadian populations, five involved United States populations, six involved Chinese populations and three involved Indian populations. Seven of the nineteen were randomized control trials, three were cross-sectional survey/questionnaire studies, two were exploratory studies, two were overview studies on apps, one was a non-randomized pilot study, one was a non-randomized open trial, one was a mixed methods study, one was a qualitative interview study, one was a retrospective cross-sectional analysis study and one was a non-randomized propensity score method study. Seven of the nineteen studies had a broad focus on the adult population, four were focused on college/university and/or young

working adults, two were focused on Veterans in the United States, two were on rural adult populations in India, specially Andhra Pradesh, one was of working men in Canada, one was focused on women with maternal depression, one was focused on the older adult population in Saskatchewan, Canada, one was on reviewing mental health apps for depression available on the Google Play Store for Indian users and one was on reviewing mental health apps publicly available for Canadians. Please see Appendix B for the full charting of the data extracted from these articles.

2. Thematic Analysis and Critical Interpretation

The synthesis of findings is presented here in three parts covering the global North, the global South, and a broad comparative look to answer the posed questions. Each part presents the dominant and unique themes along with critical interpretation, especially by employing constructs of income, education, gender, ethnicity and geographic location (urban/rural).

Part 1: Global North and MHAPPs

There were eleven studies identified as being a part of the global North (six Canadian and five US based) and their synthesis led to identification of themes of effectiveness, access to care, delivery mode, engagement of users and personalization, quality of content and awareness among users.

a. Effectiveness of the MHAPPs

Effectiveness in improving depressive and/or anxiety symptoms was a key focus for seven studies (Arean, 2016; Hadjistavropoulos et al, 2016a; Hadjistavropoulos et al, 2016b; Howells et al, 2016; Jones et al, 2016; Mohr et al, 2017; Pugh et al, 2016). All

seven of these studies showed to have significantly improved depressive and/or anxiety symptoms amongst the study participants in some capacity. For instance, Pugh et al's study found that symptoms of postpartum depression for women in Saskatchewan, Canada, decreased more for participants in a Therapist Assisted Internet-Cognitive Therapy (TA-ICBT) group compared to those participants in a waitlist-control group and these results were clinically significant and maintained at four-week follow-up (2016, p. 7). Similar findings were found in a study with veterans in Minnesota, United States by Mohr et al where participants showed substantial reductions in the Patient Health Questionairee-9 (PHQ9) scores and Generalized Anxiety Disorder-7 (GAD7) scores when using a coach-assisted version of a MHAPP called IntelliCare (2017, p. 10). In addition, another study found that faster improvements in symptoms of anxiety and depression were observed for participants in an Internet Cognitive Behavioural Therapy (ICBT) condition relative to the waitlist-control, with large between-group effect sizes on the GAD7 and the PHQ9 obtained at post-treatment (Jones et al, 2016, p. 7). Six studies reported on the ethnicity and/or race of the participants and all showed that Caucasians were the predominant participants (Arean, 2016;. Hadjistavropoulos et al, 2016a; Hadjistavropoulos et al, 2016b; Howells et al, 2016; Mohr et al, 2017; Pugh et al, 2016). Typically, this ranged from 80% to as high as 97% of the participants being Caucasians. The outcome results were not sub-analyzed by ethnicity. Similarly, income, education and geographic location were not sub-analyzed in terms of MHAPP effectiveness. However, gender was independently analyzed in the reviewed studies instead of comparatively between genders. There was only one study that focused specifically on

females and the effectiveness of a MHAPP (Pugh et al, 2016). Although one study focused specifically on males, it did not report on the effectiveness of the MHAPP (Wang et al, 2016). It is unclear if there are differences in the effectiveness of MHAPPs between genders as there was no such study identified.

These findings, on one side, show a promising development to address a growing need around depressive and anxiety symptomology, Yet, on the other side, it reveals inadequate attention to the population diversity, such as by ethnicity. Equitable access to care would occur when MHAPPs technologies can bridge gaps in access to care experienced by racialized communities who have been historically marginalized from care. Further studies need to be done on diverse racialized communities with larger sample sizes in order understand how the social determinant of one's race and/or ethnicity may be influencing the ways in which they access MHAPPs. That being said, the positive impacts of MHAPPS found in the reviewed studies corroborate with other studies conducted with online MHAPPS in the Western developed countries (Spijkerman et al, 2016, p.108-109). However, it is still unclear what factors need to be considered for their successful implementation at a larger scale to improve population-based equitable access to mental health care. Many of these interventions are in a "test incubator" and next steps for people's real access and funding are unclear.

b. Access to Care

Five of the reviewed studies reported accessibility advantages and disadvantages of online MHAPPs (Abel et al, 2018; Pugh et al, 2016; Wang et al, 2016; Arean et al, 2016Hadjistavropoulos et al, 2016a). In terms of advantages, Pugh et al posited in their

discussion that the effectiveness and use of TA-ICBT to address postpartum depression among economically-disadvantaged women with young children provides evidence for a different approach to overcome the barrier of face-to-face treatment that woman may encounter due to time constraints (Pugh et al, 2016, p. 9). Wang et al's study focused only on working men; but they found that high-risk, working Canadian men were statistically more significant in endorsing the importance of accessing health resources on the Internet than low-risk men (Wang et al, 2016, p. 132). The authors concluded that this finding suggests that the personal privacy inherent with e-health programs makes it a promising tool for men's mental health as they may be less likely to disclose such information via face-to-face therapy (Wang et al, 2016, p. 132). In one study's discussion section, the potential for mobile apps to reach many people was highlighted by emphasizing their efficacy for more moderate levels of depression that makes them beneficial for communities that have scarce mental health resources (Arean et al, 2016, p. 9). The study by Abel et al in US with veterans who had a mental health diagnosis (e.g. depression and anxiety) reports several statistically significant variations in the use across sub-groups. For instance, they found that low-income patients who could receive free care were significantly less likely to use online MHAPPs known as My HealtheVet and/or Clinical Video Telehealth than those who did not (Abel et al, 2018, p. 8). They also found that Latin- and African-American were less likely than White-American to use either of these tools, while women were more likely to use My HealtheVet or both than men (Abel et al, 2018, p. 8). In terms of veterans in rural areas, they were less likely to

adopt My HealtheVet compared with urban veterans but much more likely to engage with Clinical Video Telehealth or both tools (Abel et al, 2018, p. 8).

The disadvantages of MHAPPs use were also reported by some. In 2016, Hadjistavropoulos et al (2016a, p. 161) reported that those who were of younger age, lower education, taking psychotropic medication, being in receipt of psychiatric care and had lower comfort with written communication were associated with either fewer program starts or lower symptom improvement in one of the two online mental health programs. Based on this finding, the author concluded that monitoring response to Internet Cognitive Behavioural Therapy (ICBT) may be particularly important in patients with these characteristics. Likewise, Wang et al's 2016 study on working Canadian men revealed that privacy issues around information, perceived stigma, ease of navigation, personal relevance, and lack of personal interaction, time, and knowledge were identified as barriers to the use of e-mental health programs in working men who were at high risk of a major depressive episode.

Overall, these findings point towards both pros and cons in accessing MHAPPs and existence of digital divide even in developed countries. The social position of the users - gender, age, income, education, occupation, race and geographical location - emerged as having an influence on the degree to which individuals may have differential access to online mental health care. Part of this is due to stigma and discrimination towards people who seek out mental health support, as indicated by Wang et al's study. These insights align with CSDH framework where social position and societal values and norms both are determinants of health and ought to be addressed for better access to care

(World Health Organization, 2010, p. 5). It is also noteworthy that the role of multiple determinants in accessing online MHAPPs was examined by only one of the reviewed studies, conducted by Abel et al in 2018; this suggests a need to conduct more of such studies to examine the intersecting barriers. Further, studies should also examine other social determinants, such as sexual orientation, to understand and address related health inequities. It can be concluded that MHAPPs can help overcome some of the barriers associated with face-to-face therapy due to time constraints, geographic location and worries about privacy but digital divide is an area to focus for advancing equitable access.

c. Delivery Mode of MHAPPs

Delivery mode of MHAPPs appeared across four studies as an important feature to understand the impact on management of symptoms of depression and/or anxiety and even program adherence (Arean, 2016; Hadjistavropoulos et al, 2016b; Mohr et al, 2017; Pugh et al, 2016). The findings of these studies suggest that online therapy works best in the presence of or through the guidance of a therapist, with one study having users preferring therapists to guide their online intervention. For example, Pugh et al's study had a high degree of program adherence to their TA-ICBT program (60% completed their program); this was most apparent when there were therapists guiding the program, such as through weekly telephone calls (2016, p. 9). Similarly, Mohr et al's study showed that their online mental health intervention, IntelliCare, provided greater user engagement when coupled with low-intensity coaching compared to only online version (2017, p. 10). In another study there were no differences found in completion rates, satisfaction or

clinical outcomes whether the studied Transdiagnostic-Internet Cognitive Behavioral Therapy (TD-ICBT) was offered by therapists working in a specialized online clinic or non-specialized community clinics (Hadjistavropoulos et al, 2016b, p. 27). Furthermore, no differences were observed whether therapists were registered providers or graduate students or whether therapists were trained in psychology or another discipline (Hadjistavropoulos et al, 2016b, p. 27). In contrast, Arean et al tested self-guided mobile apps without any therapist and with minimal staff contact for outcome assessments for depression (2016, p. 9). The study had high dropout rates with nearly half of the enrolled participants not even downloading their assigned apps (Arean et al, 2016, p. 9).

This finding of the scoping-review in relation to the kind of therapist guiding the MHAPPs treatment, seems to suggest that regardless of clinical setting and/or therapist experience, MHAPPs can still be effective. Yet, complete absence of a therapist has detrimental impact on the use of mobile programs. Possibly, participants without a therapist lack the intrinsic motivation to adhere to the programs and adequately alleviate mental health symptoms. Yet, it is unclear if the finding could be extended to diverse groups experiencing depression or anxiety symptoms. For instance, what impact does social determinants such as income, education, occupation, social class, gender, race/ethnicity have on not only accessing MHAPPs, but therapists who provide service alongside MHAPPs. No such study evaluates how these determinants intersect to influence access to both type of interventions (i.e. with and without therapist) simultaneously to date and should be a focus of researchers moving forward.

d. Engagement of Users and Personalization

Engagement of users and personalization of MHAPPs was identified in five studies as another important feature impacting the use and impact of the interventions (Hadjistavropoulos et al, 2016a; Howells et al, 2016; Lipschitz et al, 2019; Mohr et al, 2017; Wang et al, 2016). User engagement for MHAPPs were greatest when applications were context-sensitive to the needs of the users and the interface of the apps allowed for personalization. Lipschitz et al's 2019 study showed that for individuals with depression and anxiety, over 70% of participants with smart devices reported interest in using apps that facilitate core functions of cognitive behavioral therapy such as cognitive restructuring and behavioral activation (p. 8). In contrast, overall 73% of all participants with smart devices reported interest in features that would promote wellness in areas of behavioral health such as sleep difficulties and inactivity (Lipschitz et al, 2019, p. 8). These findings suggest that this population may be best served by individual apps or suites of apps that target depression and anxiety from multiple angles (Lipschitz et al, 2019, p. 8). Similarly, the study that used the intervention, IntelliCare had higher app usage than other apps with an average of 195 app launches per participant (Mohr et al, 2017, p. 10). This can be attributed to IntelliCare's broad choice of apps in which participants can choose from to their liking, allowing for maximal user novelty and engagement (Mohr et al, 2017, p. 10).

The importance of personalization and context-sensitive software speaks to the multifaceted nature of health and how mental health can be a highly subjective matter to both populations and individuals within a population. At the population level, culture and societal values play a crucial role in how people from a particular demographic region

perceive what mental health means and this in turn may impact how this populous uptake mental health care. At the individual level, although culture and societal values of a region may be highly influential on one's perception of mental health, so is their lifestyle choices and/or preferences. This distinction is key at the micro level of programming as it could explain why personalization and context-sensitive software is so valued to these consumers of online interventions.

e. Quality of Content

Quality of content of the MHAPPs was also studied by some of the reviewed studies. One study by Howells et al suggested that the content of the online mobile intervention matters as it increases the benefits when it is evidence-based and the user enjoyment is also taken in to consideration (2016, p. 173, 175). Their study examined a smartphone-based mindfulness intervention and found that ratings of task enjoyment were positively correlated with positive affect increase, and the author believed this was due to it being combined with the empirical content (Howells et al, 2016, p. 173, 175). In addition to this study, Huguet et al's 2016 systematic review observed a lack of effectiveness/efficacious in studies that did not adhere to principles of CBT interventions within Canadian android apps, with only 10.26% meeting the criteria (p. 7).

The scoping review suggests that MHAPP content works best when it is empirically based and employs intervention like CBT, behavioral activation (BA) or mindfulness. At the same time, it's unclear how generalizable these interventions are for marginalized communities in the global North, such as Indigenous and racialized communities in Canada and the US. These online interventions inherently put the onus on

individuals to manage their own health with less emphasis on the community-specific context while communities not dominated by cultures of individualism practice recovery by often combining locally pertinent knowledge and sensitivities (Cox & Webb, 2015 p. 690). For example, among Aboriginal Peoples in Canada, identity and mental resilience appears embedded in a collective cultural history and the natural environment, with personhood strengthened by the transmission of culture through storytelling, language and ritual (Cox & Webb, 2015 p. 690). This finding has two-fold implications. First, one may argue that further development of MHAPPs need to consider community specific cultural/societal values, which are critical structural determinants in influencing mental health care uptake. Second argument could be that it is also possible that MHAPPs are not the preferred model among certain collectivist communities. In either case, further research is needed with less-researched communities in the global North to understand it further.

f. Awareness among Users

Awareness among users about the potential of MHAPPs was another issue identified in the reviewed studies. Lipschitz et al's 2019 study showed that veterans in Boston felt their most frequent concerns related to using an app for mental illness were lacking proof of efficacy (71.8%), concerns about data privacy (59.1%), and not knowing where to find such an app (51.0%) (2019, p. 4). Participants' ratings of interest in using an app recommended by a clinician were significantly greater than general-interest ratings and even greater when the recommending clinician was a specialty mental health provider (Lipschitz et al, 2019, p. 4). The same study found that access to devices and use

of apps, in general, was high - nearly 80% reported owning smart devices, and of those with smart devices, nearly 90% reported that they use apps in general. Also, interest in using mobile apps for mental illness was high, 70% of the sample, although it was somewhat less than using mobile apps in general.

These findings suggest that public dissemination of information on efficacy of apps for mental illness, such as provider endorsement, could improve user adoption. This could be a useful strategy given that health system and providers working within it are key forces and recognized as intermediary determinant in the CSDH framework. Awareness of patients is likely to empower them to become critical decision-makers in adopting or not-adopting online interventions. Yet, equitable access to care would still demand removing the financial barriers for using MHAPPs (discussed under conclusion).

In summary, the results of the reviewed studies on the global North indicate that MHAPPs can be effective for the treatment of depression and anxiety symptoms amongst adults but more studies are needed with diverse populations to better understand its impact on equitable access to care. MHAPPs can help individuals in overcoming barriers related to face-to-face therapy, but social determinants need to be evaluated from a psychosocial health perspective to understand who need the most support. This means to actively evaluate how gender, income, education, ethnicity and geographical location impacts access and the effectiveness of MHAPPs. Studies suggest that the delivery mode of MHAPPs are best in the presence of or through the guidance of a therapist, even with one study suggesting that clinical experience and clinical setting is not crucial for symptom outcomes. However, it is unclear what this means for broader demographic

groups. User engagement for MHAPPs were greatest when applications were context-sensitive to the needs of the users and the interface of the apps allowed for personalization suggesting that not only cultural/societal values are important, but lifestyle choices and preferences of individuals are as well. Content of online mobile interventions matter as it is more beneficial when it is empirically or evidence-based, but this may not extend to marginalized communities that have traditional forms of healing and knowing such as the Canadian Indigenous community. The general public are not well aware of MHAPPs potential efficacy, thus suggesting the need for endorsement and dissemination of findings by stakeholders. MHAPPs are commercially available via smartphone app stores but many do not employ evidence-informed models. This suggests a need for the private market to be highly regulated by lawmakers and/or for more MHAPPs to be provided through a government funded health care system as there is better oversight and universal access in such a setting.

Part 2: Global South and MHAPPs

There were nine studies identified as being a part of the global South (six in China and three in India). The synthesis of finding across these studies led to identification of several themes which are presented below.

a. Effectiveness of the MHAPPs

Six of the ten studies discussed the effectiveness of these MHAPPs in improving depressive and/or anxiety symptoms (Auyeung and Mo, 2018; Hung et al, 2016; Kishimoto et al, 2016; Mak et al, 2015; Mak et al, 2017; Tewari et al, 2017). All six studies were conducted in China and showed significant improvement in depressive

and/or anxiety symptoms. For example, Auyeung and Mo's 6-day online positive-psychological intervention (PPI) involved writing about the best possible self (treatment group) and an active control group which involved writing about a past event amongst Hong Kong university students. The results of the RCT indicated that PPI improved flourishing and reduced depressive symptoms as an outcome measure compared to the control (2018, p. 11). In addition to this study, Kishimoto et al's 2016 study with adult Chinese population compared self-guided ICBT and therapist-guided ICBT to a wait-list control group for 8-weeks. Based on the outcome measure for social interaction anxiety scale, it was found that after 8 weeks of intervention, both ICBT conditions were superior and that there was no difference between the ICBT conditions (p. 319).

These findings show the potential for MHAPPs to be used, developed and further researched in China where the six identified studies were conducted. More rigorous design would enhance the generalizability given that three out of six studies used RCTs designs. Although the demographics presented in these studies were broad, it would be important to study how the social determinants of education, income and/or gender impact the effectiveness of MHAPPs across diverse groups. Another key point to note is that the scoping review did not identify any study from India with a focus on effectiveness, suggesting differences in the research capacity of these countries. Scholars have identified low research capacity as a barrier to decrease the global mental health treatment gap (Milton Wainberg et al, 2017) and others propose cultivation of in-country research capacity to enhance culturally sensitive, scientifically and ethically sound, and locally relevant research (Baingana et al, 2015, p. 8). This seems a step in the right

direction instead of transporting apps developed in the global North with underlying individualist and biomedically driven western frameworks.

b. Access to Care

Three studies (two in Hong Kong and one in mainland China) highlighted that MHAPPs could potentially bridge gaps in accessing face-to-face therapy, as in the global North. Mak et al's 2017 study observed the outcomes of a mindfulness training program named iMIND versus a cognitive-behavioral training program named iCBT with Hong Kong College students and young working adults. Both iMIND and iCBT were efficacious in improving mental health, psychological distress, life satisfaction, sleep disturbance, and energy level, from pre- to post-assessment, also being sustained after 3-month follow-up (Mak et al, 2017). They concluded that Internet-based mindfulness and cognitive-behavioral training programs with minimal guided support can offer a less costly and highly scalable approach for preventing and promoting mental health compared to face-to-face therapy (Mak et al, 2017). Mak et al's 2015 study evaluated the efficacy of two Internet-based interventions (basic mindfulness and health-action process approach) with a waitlist control and found that the reduction of time-commitment for mindfulness practice provides promising effects on mental well-being of adults in the wider community (p. 8). This could mean that Internet-based mindfulness with reduced time demands may be a viable substitute (Mak et al, 2015, p. 8) for general population. Another study with Chinese outpatient participants who used an online intervention called iHOPE, found only limited Internet package for smartphone (<500 mb per month) predicted higher use of iHOPE as it had offline capabilities (Hung et al, 2016, p. 134).

These findings highlight the potential of MHAPPs for improving mental health care accessibility in the middle-income regions of China and Hong Kong while no such study was found for India. This speaks again about variations in the research capacity of examined countries and need to invest in localized studies.

c. Delivery Mode of MHAPPs

Four studies in the scoping review presented findings related to delivery, dropouts or adherence. Much like global North, MHAPP interventions examined in Hong Kong and mainland China showed that standalone apps may not be enough to instill regular active use among users. Mak et al's 2017 study had high attrition rates throughout study duration (10.12% completed the 3-month follow-up). Participants in Hung et al's 2016 study interacted with an online mental health intervention known as iHOPE for an average of 10.8 days in a period of 8-weeks with a trend of decreased frequency during this time (p. 133). In the same ways as the global North, the presence of an individual guiding MHAPPs could help users adhere to the programming and in turn better improve their symptom outcomes. For instance, Kishimoto et al in their study in China found that the effects of a self-guided ICBT intervention were not different from the effects of a guided ICBT intervention in social anxiety (Kishimoto et al, 2016, p. 319). At the same time, they postulated the lack of difference in improving anxiety was due to the focus of therapist on improving adherence, which probably limited the provision of therapeutic support.

A study conducted in India by Tewari et al in 2017 reveals the need to be contextually specific and use multiple ways to successfully engage participants for online

interventions. This study used a mixed methods design to evaluate a SMART Mental Health Project that utilized online interventions in rural areas of the state of Andhra Pradesh, India. The study participants included the community members, Accredited Social Health Activists (ASHAs – lay health workers), primary care doctors, village leaders and field staff. Interviews with the community members indicated that the knowledge received through the intervention empowered them to approach ASHAs and share their mental health symptoms (Tewari et al, 2017, p. 5). Additionally, the organization of medical camps in the villages helped those seeking care as they did not have to travel and lose out on daily wages (Tewari et al, 2017, p. 11). The authors stated that given the remoteness of this region and poor public transport facilities, the value of the local medical camps was high in the community (Tewari et al, 2017, p. 11). This finding presents that MHAPPs as stand-alone models may work poorly for marginalized population in rural areas where routine healthcare services are much sparser, and they experience multiple challenges due to intersecting social and structural determinants of health.

d. Engagement of Users and Personalization

Analogously to the global North, four of the nine studies highlighted the importance of user engagement and personalization for MHAPPS, but different variables and features are preferred in global South settings (Auyeung and Mo, 2018; Mak et al, 2015; Mak et al, 2017; Patel et al, 2017). One study found a slightly stronger relationship between mindfulness and mental well-being in an online intervention Health Action Process Approach-enhanced group that used supplementary messages in comparison to

the basic mindfulness program (Mak et al, 2015, p. 8). In Auyeung and Mo's study, the effects of an online mental health intervention on depressive symptoms and flourishing were independent of one another, indicating the general utility of the intervention in improving positive well-being irrespective of change in depressive symptoms (2018, p. 12). Both these studies suggest participants positive response towards interactive elements (supplementary messages or flourishing impact). Similar notion is depicted in Mak et al's study of 2017 where high attrition was of concern and authors proposed to work in interdisciplinary teams to increase personalization of Web-based interventions. Another study undertook cultural adaptation of an internet-based intervention for depression prevention for the Project Competent Adulthood Transition with Cognitive-Behavioral, Humanistic and Interpersonal Training (CATCH-IT) for use in Mainland China amongst students and physicians (Patel et al, 2017, p. 1). Both the students and physicians recommended new modules focusing on Chinese-relevant themes like pressure for academic excellence, filial piety, and balancing school and social life (Patel et al, 2017, p. 5-6).

These findings reveal that studies in the global South exhibited preferences informed by their collectivist point of view. There is a desire for more engagement with other individuals and sensitivity towards cultural needs. This indicates the role of cultural/societal values in the global South as a structural determinant, as its utility in MHAPPs is key in garnering greater user engagement. Thus, it seems crucial that cultural and collectivist ideologies are considered in the MHAPPs programming for contextual sensitivity and users' adherence to treatment in the global South.

e. Treatment and Empirical Content

An important element for MHAPPs' overall utility is having clarity about the 'treatment' and 'empirical content' in the global South where resources are scarce. Patel el al's (2017) study showed that a panel of 3 physicians agreed that retaining CBT and BA modules were essential for MHAPP use in China, whereas the panel was more split on the use of Interpersonal Psychotherapy (Patel et al, 2017, p. 5), revealing their challenges. Another study in the scoping review identified the nature of mobile apps available in India for android phone users, who might search for free apps to help them deal with depression (Kumar and Mehrotra, 2017). Of the 278 initially identified apps, 33 apps had features of interactive self-care. Among these specific apps, less than 10% described the scope explicitly or suitability-screening, 12 % provided any guidance for managing suicidal crisis, and one third had content aimed at encouraging professional help seeking when needed. The authors concluded that these apps lacked uniformity in descriptions and labelling while the array of choices of apps available for free can pose a significant challenge for users in dealing with depression.

These findings indicate a need to regulate MHAPPs to ensure they are providing empirically-based support for users. Also, it begs the question whether the mental health interventions employed in MHAPPs meet the expectations of people in the global South. The CBT and Behavioural Activation draw from Western frameworks where individuals themselves are responsible of taking care of their psychological well-being (Cox and

Webb, 2015, p. 692). Such notions of care can be particularly troublesome when translated to a context where different forms of subjectivity and community identity are afforded greater privilege (Cox and Webb, 2015, p. 692), especially in the most culturally distant areas like rural and tribal settings. Indeed, these MHAPPs may not be meeting the needs of collectivist cultures where tight relationships and community identity prevail over individual needs (Triandis, 1995, p. 243-244). Cox and Webb argue that psychological technologies such as CBT and 'Mindfulness' have risen and become desirable not just due to being evidence-based best practices or being cheaper, but due to neoliberal democracies making people obliged to live, work and consume in specific ways of the Global North (2015, p. 692). Thus, in the context of MHAPPs, it is important that key stakeholders like healthcare practitioners should not only reflect upon their own cultural and disciplinary predispositions, but also deeply develop critical methodologies and ways of knowing people's unframed notion of the self. Here the health system in itself acts as a structural determinant dictating what is meaningful treatment for its corresponding population and without proper insights, programs may be implemented void of cultural context. Further studies need to be done on regions in the global South that are most culturally distant to the Western self (rural and tribal settings) in order to understand its compatibility in such settings.

f. Barriers to Accessing MHAPPs

In the scoping review two studies conducted in India examined and reported barriers for the use of MHAPPs.

Practical barriers were identified by Nahar et al in 2017 by examining how realistic it is to use mHealth intervention for diabetes and depression in rural India; the depression related findings are focused here. Nearly all the individuals interviewed, with diabetes or depression, possessed their own mobile phone but these were virtually all cheap 1G or 2G mobiles and only two possessed smart phones (Nahar et al, 2017, p. 9). None of the interviewees said they used apps on their phone though some knew that their children did. In terms of interventions to treat depression, while a patient could contact their psychiatric clinic, in practice it was rare. None of those interviewed with depression spoke of using their mobile phone to call their clinic; it was always the other way around, with clinics providing appointment reminders or when required a 'lifeline' service (Nahar et al, 2017, p. 10). The authors concluded that individuals suffering from depression were perhaps among the least likely people to turn to their mobiles in the first place (Nahar et al, 2017, p. 10). The authors believed that habitual and easy take-up of mHealth applications by patients themselves was inhibited due to 1G or 2G basic phone products along with seasonally erratic electricity-supply or short battery life. Other barriers discussed by Tewari et al (2017, p. 6-7, 11) were stigma and discrimination to receive treatment, financial livelihood and social constraints and gaps in using technology–based applications/IVR messages. This was primarily due to the rural setting's remoteness and poor network coverage (Tewari et al (2017, p. 11). Since the area had poor public transport facilities, they relied heavily on the study's medical camp for treatment (Tewari et al (2017, p. 11).

These barriers are somewhat unique to the global South due to the novelty of mental health as a discourse and the region-specific socioeconomic context with history of colonial experiences. As a result of colonization, immense economic inequality exists between the global South and North. 500 years ago, before European colonization, there was little inequality between poor and rich countries (Acemoğlu & Robinson, 2017). Now the differences are a factor of more than 40, if we compare the richest to the poorest countries in the world (Acemoğlu & Robinson, 2017). The financial and environmental reality of those living in marginalized communities in the global South demonstrates the need for further economic and infrastructural development in these areas. For instance, urbanization rates in China and India have been considerably lower than USA and Brazil since the year 1965 (Chauvin et al, 2016, p. 5-6). There is a need for progressive social policies with redistributive aims to fulfill the living needs and conditions of human welfare including labour market, housing and land, and social services that improve people's access to care. There is also a need at the policy level to explicitly state mental health as an important dimension of health. Moving forward, international organizations such as WHO should work collaboratively with domestic governments in the global South to ensure that these broad policies are well developed and mental health is at the forefront of public health debates, which will allow for a more conducive environment for health care access.

Another barrier identified in the scoping review is the debated self-help focus in MHAPPs and collectivist cultural values of global south. As suggested by Nahar et al, the principle of 'self-management' of one's own health that is encompassed in mHealth

applications, owes much to philosophical assumptions about the self and individuality: as individual notions of managing one's own health are tied to popular western notions of self-actualization; but it also follows the rhetoric of neoliberal reform in finance and governance advocated by international bodies for health systems around the world (2017, p. 11). The applicability of such underlying systems of belief in rural contexts is questionable, as there are more 'relational' notions of the self-present for the wider family in these regions (Nahar et al, 2017, p. 11). Even this statement in itself warrants caution, as previous literature (Lamb, 1997) warns of overdrawing this distinction in India as the 'relational' self and the 'autonomous' self tends to shift over the life-course in a gendered way. Nonetheless, scholarly work demonstrate that India is a country with strong collectivist values where 'we' is given priority over 'I' self (Triandis, 1995).

In summary, the results of the reviewed studies on the global South indicate that MHAPPs can be effective for the treatment of depression and anxiety symptoms amongst adults, however the ecological validity of these studies to broader global South settings is unclear as there is need to conduct more research and build research capacity in many LMICs. MHAPPs can help individuals in overcoming barriers related to face-to-face therapy, especially for communities that do not have capacity to provide professional and/or clinical support with mental illnesses. There is a need for MHAPPs to have offline capabilities as well, if broader global South communities are to overcome face-to-face therapy barriers successfully. The presence of an individual guiding MHAPPs can help users better adhere to the mental health interventions comparably to standalone MHAPP treatments, but for some communities this would mean to build medical centers prior to

the delivery of these services. Incorporating cultural values of the global South and collectivist ideologies into MHAPP programming seem to be beneficial for user engagement and experience. Although there is a shortage of free apps available commercially that are empirically-based, further studies need to be done on what this exactly means in rural and tribal communities that have different models of care and its potential compatibility with MHAPPs. Barriers to treatment identified included stigma and discrimination to receive treatment, financial livelihood and social constraints and gaps in using technology–based applications/IVR messages. This highlights the need for broader policies that address the socioeconomic realities of marginalized communities. Lastly, the very notion of 'self-help' contradicts collectivist notions of the global South found in some settings, bringing doubt in to MHAPPs broader compatibility and the impacts that political systems have on the uptake of mental health care resources.

Part 3: A Broad Comparative look

There was convergence and divergence in findings for the global South and North for access to online mental health interventions. Both global South and North studies showed that foci of effectiveness, access to care, delivery mode of MHAPPs, engagement of users and personalization and quality/empirical-bases of content were important cross-cutting themes. An interesting shared phenomenon across the global North and South is online therapy working best in the presence of or through the guidance of a therapist. It is unclear as to what barriers or facilitators are causing this phenomenon to occur; however, three reasons can be posited based on the findings of this review. Firstly, it could be due to barriers associated with intrinsic motivation as online interventions may not be able to

motivate users in the same way as a therapist can. Secondly, it could be due to various constraints that individuals are facing momentarily that causes participants to prioritize the use of these interventions differently or even inability to access them adequately. Lastly, it could be that a MHAPP's user interface is key for user engagement, in that, if the application is poorly designed it can result in poor user engagement. All three theorized reasons seem possible, but further studies must be conducted to test and evaluate these theories for better understanding.

There were unique regional themes as well. For global North raising awareness amongst users about MHAPPs is a unique focus, whereas high attrition/dropout rates in deliveries of MHAPPs, vast structural barriers to accessing MHAPPs and the contentious nature of "self-help" are unique to the global South. The following section discusses broader forces at play for such regional differences, in particular neoliberalism abating global mental health care and the role of collectivist values in light of individual focused MHAPPs.

Neoliberal policies can impact the uptake of global mental health care as communities could have different systems of beliefs in the global South. Neoliberalism's tenants of shifting the public good to individual responsibility and privatizing care can be particular harmful in the context of collectivist cultures. Mills and Fernando's paper stated that, against the backdrop of neoliberal policies imposed worldwide, health inequalities have actually increased, both within and between countries (2014, p. 193). They contend that political systems determine the way mental health services are organised because political theories affect the way problems of the mind are

conceptualised (Mills and Fernando, 2014, p. 193). That is why when drastic changes are made in governing ideologies there are corresponding changes in the delivery of mental health care (Mills and Fernando, 2014, p. 193). For example, this can result in the medicalization of social and political issues such as gender relations, alcoholism, poverty, or environmental disasters, being psychiatrically reconfigured as 'symptoms of illness' instead (Mills and Fernando, 2014, p. 193). Similarly, in global South settings, the shift to individualizing mental health care may very well be resulting in the reconfiguration of distress from poor economic conditions being a symptom of a severe mental illness. With capitalist and neoliberalist ideologies spreading in to the global South, these drastic politic system changes could be impacting the uptake of mental health care and what the very notion of mental health means to these communities.

MHAPPs may not have a role in settings where individualism is not centric to living, or possibly MHAPPs must be designed to meet collectivist notions instead. Biomedical frameworks are inherently presupposed in a western school of thought and may be incompatible in non-western settings. The review has shown several studies where participants wished for their MHAPPs to be framed in a manner to meet their cultural preferences. This suggests that MHAPPs may need to be based on local forms of living and knowledge if they are to be truly successful. In addition, MHAPPs may not always be compatible with all regions and cultures, regardless of adaptability. For instance, Indigenous communities have local healing approaches that can be seen as a form of mental health care. Thus, local healing may suffice as mental health treatments for these communities. More epidemiological research is needed along with research on

the intersecting nature of political systems and MHAPPs, and how this may impact access to care.

The findings of this study also reveal the need to evaluate MHAPPs from a SDOH perspective in order better understand how effectiveness and access to MHAPPs varies between populations. However, the clinical basis of many of these reviewed studies suggests that MHAPP research is quite distant from the contextual and everyday reality of the studied populations. For instance, majority of the reviewed studies failed to stratify the findings based on gender, income, ethnicity, geographical location and occupation; there was only one study that did so. Through CST lens, the findings suggest that the power of private-industry (driven by financial profit) in current neoliberal world is leading to transfer of MHAPPs to global south, but without bottom-up approach where basic needs of communities (e.g. income, education, health care facilities etc.) and their life context (e.g. collectivist values) are central. This challenges the research community's current research approach and a need to adapt it to the social lives of the studied population. Future MHAPP research should look to challenge the neoliberalist notions of care by building MHAPP programming with a multi-pronged, bottom-up approach that takes social and ecological living in to context.

Furthermore, the assumptions that I had as a researcher before commencing the paper were challenged as well. For instance, I believed that the MHAPPs would not be effective in the global South prior to reviewing the studies; however, all of the studies reviewed suggested effectiveness in the global South as well. Indeed, a reflexive approach in all phases of my inquiry facilitated the rigor of research.

STRENGTHS AND LIMITATIONS

This MRP provides an interdisciplinary focus on health, which evaluates how the individual focused biomedical driven MHAPPs and the social determinants of health come together to influence global mental health care. The review recognizes the multifaceted nature of health as a key approach in understanding the inequities and challenges at play in global mental health care, which is a novel approach in problematizing MHAPPs. Taking on such a theoretical approach allowed for mental health to be evaluated and thought of from many dimensions and or angles from the various localities observed in this study via CDSH framework while exploding the cultural aspects and political forces through individualism-collectivism and neoliberalism lenses. Future studies should look to incorporate a similar framework, especially structural determinants such as governance, broader socioeconomic policies, cultural values and societal values.

At the same time, the interpretation of the scoping-review should be met with caution as there may be potential limitations to the study. Since the review was conducted by a single reviewer, it is quite possible that the entire breadth of the relevant work may not have been captured. For the scope of this paper, the inclusion criteria only allowed for literature published in the English language, focused on treating depression and anxiety symptoms and the global North and South were defined as being two countries, respectively. This means that some literature could have been missed out and the generalizability of these findings to broader global North and South settings is quite limited. However, the study does its best to capture the search results and inclusion

criteria applied to the databases identified. It is also important to consider that the quality and depth of literature was not appraised as the scope of the paper does not call for it, but the Arksey and O'Malley framework does add rigor to this study and future studies should further build on this paper by expanding on quality assessment.

IMPLICATIONS AND CONCLUSION

There are several implications of the review at policy, practice and research levels. The following sections discuss the implications followed by overall conclusion.

In terms of policy, the findings firstly inform the policymakers and key stakeholders in both global North and South on the need to better develop broad macroeconomic, social and public policies for the redistribution of resources to marginalized communities or regions. Among the examined countries, studies from India documented in particular a lack of logistical capabilities for accessing online mental health care and also general infrastructure shortage for care facilities. Secondly, mental health should become a priority on all global public health agendas as stigma and discrimination associated with mental illness continues to be problematic and is a high-level barrier for marginalized communities and regions. This would also mean a need for policy reform in clinical settings where a lack of timely response to suicidal ideation has consequential legal implications for practitioners. Therefore, a third implication based on the review is the need for creative policies to bridge the policy-practice gap in protecting individual's physical health from suicidal ideation through meaningful professional assistance, if MHAPPs are to ever address these high-risk populations. Finally, given evidence on the effectiveness/efficacy of MHAPPs for depressive/anxiety symptoms

particularly in global North, policymakers should consider provision of therapist assisted MHAPPs as a universal care program with strategies to address digital divide including cultural sensitivities. Those who come from lower socioeconomic backgrounds could access MHAPPs through a universal health care setting more readily as concerns for purchasing a MHAPP are minimized. The review also finds that individuals can have greater trust in the interventions that health care providers recommend as these MHAPPs follow evidence-informed content and are heavily regulated, compared to commercially available apps or those free of cost.

In practice, the evidence in this study suggests the need for key international stakeholders such as WHO and domestic governments, to build programs from the bottom-up perspective in a collaborative manner with their communities. The review of global South studies revealed participants had preference for MHAPPs to be adapted to meet cultural needs and at times, specific individualized needs. However, this requires a great deal of flexibility in terms of what mechanisms are adapted on a MHAPP, including what models of care are used. This would mean to be respectful of alternative forms of local treatment as a viable, equal option to the dominant psychiatric model, as this may be the very case in rural settings globally. It is encouraging to know that as part of WHO's Mental Health Action Plan 2013-2020, accessing "culturally appropriate health and social care in a timely manner to promote recovery" (p. 32) is part of their vision and WHO must build on this vision, if equitable access to mental health care is to occur in these communities. In addition, private mental health clinics should observe such findings with optimism and consider the implementation of similar interventions in their

own clinical practice. Studies across both the global North and South found that MHAPPs are effective in reducing symptoms of depression and anxiety. Thus, private mental health clinics should look at these results with promise, even though more studies are needed for rigor. It is best for these interventions to be used with therapists rather than as standalone treatments. In fact, previous research has shown that Chinese patients that are likely to somatise their mental illness symptoms have no problem reporting psychological symptoms when asked directly (Ahmad et al, 2016, p. 346). Another recent longitudinal study examined a different type of 'human-touch' in MHAPP intervention developed for mothers having a serious mental illness (O'Shea, Kaplan, Solomon, Salzer, 2019). In this study, mothers in the intervention group used Internet-based education and peer support-moderated listserv and were found to have a significant improvement in parental-stress, compared to the control group. Thus, the 'human-touch' elements of MHAPPs could be enhanced in less costly ways (e.g. moderated peer-support online groups) while maintaining the effectiveness though more research across diverse groups is needed. As for publicly insured clinics, they should also look into implementing the same programs, however further research is needed in such settings to address digital divide as only one such study was found.

In research, the findings urge the need for epistemic flexibility when building research capacity globally, especially in the context of global South, where such capacity is lacking and may be designed with western worldviews. Few studies were reviewed on India suggesting the need for more research capacity to be developed in the global South on MHAPPs and beyond. Those who would be most equipped with such knowledge

would be investigators who live and understand the populations that must be studied. Thus, it should be a priority of key stakeholders to build the research capacity with local investigators' leading the research projects. This would allow for the cultural adaptability of MHAPPs to take place, but such adaptations should be explicitly stated in the published studies so that the interventions can be up taken and replicated in similar settings. Lastly, this paper highlights the lack of public awareness of MHAPPs in general and their effectiveness to manage symptoms associated with depression and anxiety. This suggests that those who are in research positions or clinical settings should at least make patients who are seeking out mental health interventions aware of such interventions, if adoption is not feasible at this time.

Beyond developing research capacity, there are key research areas pertaining to MHAPPs that need further research. The following research questions need further investigation both in global North and South: Does guided-online mental health interventions prove to be efficacious even when individuals are not experts and have no psychological knowledge? Do MHAPPs have a capacity for mental health care in settings where there are alternative ways of healing such as Indigenous communities and rural communities? Would MHAPPs be viable when delivered through a government funded universal health care system? Can MHAPPs benefit those suffering from highly severe depression and/or anxiety similarly to moderate levels of depression and anxiety? These questions either were not clearly answered within this review or more rigorous research is needed to thoroughly understand these research questions. Finally, research must be extended beyond Canada, America, China, and India, in order to depict a more accurate

reality of global mental health care as additional findings and narratives may be revealed by expanding the scope of this research. More research is needed on the analytics of MHAPP usage and frequency, in order to better understand the impact of these interventions. As well, the differences in the effectiveness of MHAPPs for depression and anxiety should be further explored as MHAPPs with a therapist present may influence treatment outcomes uniquely for both.

In conclusion, this scoping review that examines online mental health interventions potential in providing equitable access to care in the global North and global South reveals the importance of evaluating health from an interdisciplinary, social determinants of health perspective in implementing and programming MHAPPs. This means to consider barriers and facilitators like stigma and discrimination, financial and social barriers, gaps in using technology-based applications, cultural barriers to 'self-management' and guided-treatment interventions. Future work should evaluate gaps in MHAPP research utilizing similar interdisciplinary frameworks in order to identify potential barriers and/or facilitators that need to be accounted for the broad implementation of such services. This would also mean for programs to be established through the co-construction of participant narratives on the ground, as this will ensure the context relevancy of interventions and how these programs are accessed. The hope is that researchers replicate this study with various countries of the global North and South and further evaluate other forms of mental illnesses as well conditions like post-traumatic stress disorder, attention deficit hyperactivity disorder, schizophrenia and bipolar disorder

given their common occurrence and/or consequences on individuals, families and society at large.

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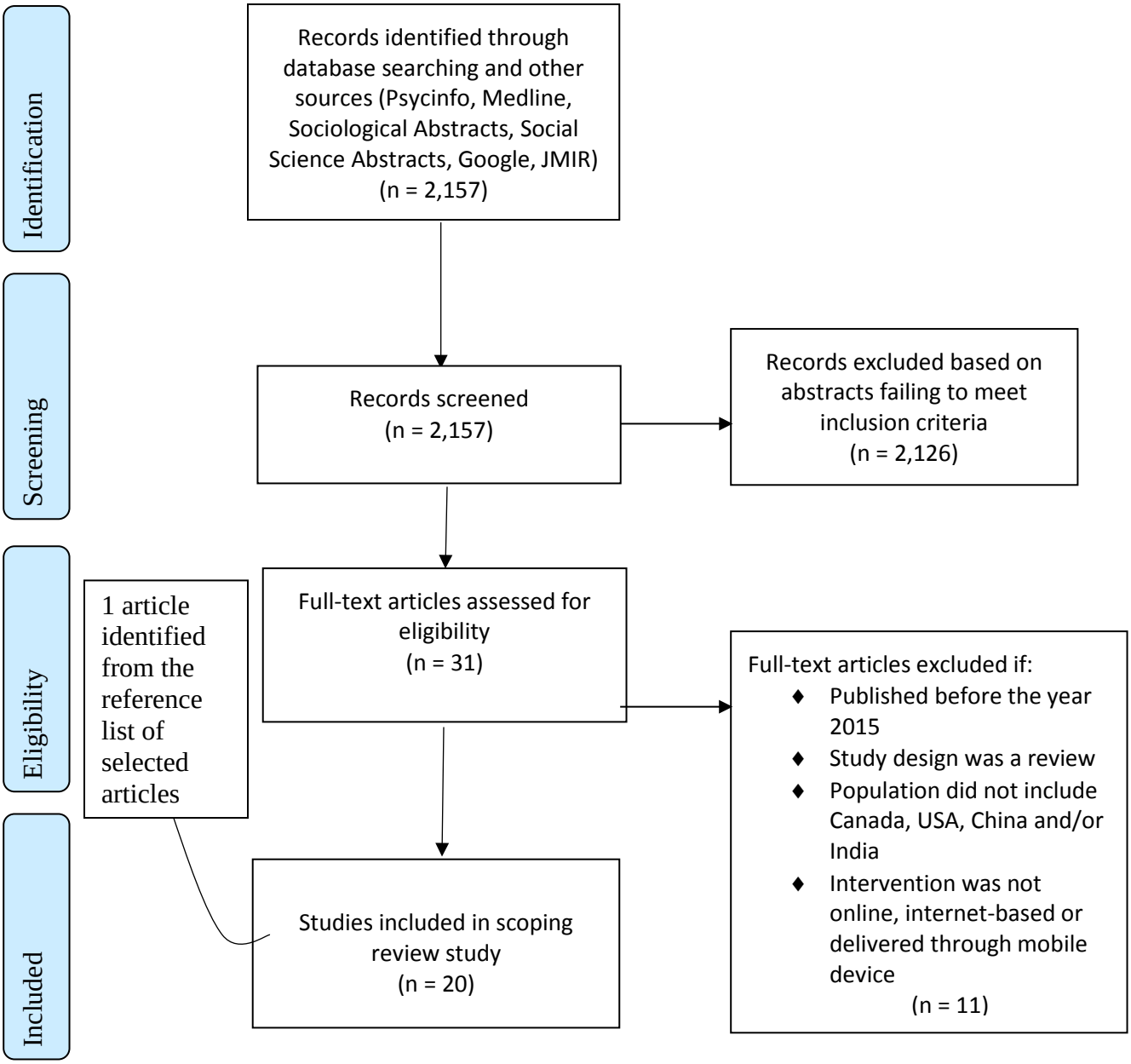
Appendix A – Flow Chart



APPENDIX B – Scoping Review Summary

Title, Author(s), year of publication, study location	Intervention type, and comparator (if any); duration of the intervention	Study populations (carer group; carer recipient group)	Aims of the study	Methodology	Outcome measures	Important Results
A Randomized Controlled Trial of Therapist-Assisted, Internet-Delivered Cognitive Behavior Therapy for Women with Maternal Depression, Pugh et al, 2016, Saskatchewan, Canada.	Parallel-group randomized controlled trial either assigned to therapist assisted-internet cognitive behavioural therapy (TA-ICBT)/ maternal depression online or wait list control conditions, investigated at baseline with a seven to ten-week follow-up, in addition to contact four-weeks after	50 participants in total, 25 in TA-ICBT condition and 25 in waitlist control condition.	To conduct a parallel-group randomized controlled trial to determine the efficacy of (TA-ICBT) for the treatment of postpartum depression (PPD).	*Primary Assessment measures:* Edinburgh Postnatal Depression Scale (EPDS) *Secondary Assessment measures:* Depression Anxiety Stress Scale- Short Form (DASS), Parenting Stress Index-Short Form (PSI-SF) and World Health Organization Quality of Life Assessment BREF (WHOQOL-BREF). *Treatment relevant outcome measures:*	EPDS scores to measure emotional and cognitive symptoms of PPD. DASS scores for measuring assessing dysphoric mood, fear and autonomic arousal, and general nervousness and agitation.	Symptoms of postpartum depression decreased more for participants in the TA-ICBT group compared to those participants in the waitlist control group, and these results were clinically significant and maintained at four-week follow-up (p. 7). TA-ICBT participants

	treatment completion.			Therapeutic Alliance Questionnaire (TAQ), Treatment Satisfaction Questionnaire-Modified (TSQ) and Credibility/Expectancy Questionnaire (CEQ).	PSI-SF scores for assessing parental distress, parent-child dysfunctional interaction, and perception of a difficult child. WHOQOL-BREF for assessing quality of life in four domains: Physical health (e.g., sleep, pain); Psychological health (e.g., self-esteem, concentration); Social relationships (e.g., support,	demonstrated a reduction in postnatal anxiety, general stress, and parental distress, and an increase in psychological and environmental quality of life when compared to the waitlist control participants (p. 8). Findings supports the use of TA-ICBT for economically-disadvantaged women of young children and provides evidence for a different approach to overcome face-to-face treatment barriers (p. 9).

					personal relationships); and Environment (e.g., physical safety, financial resources). TAQ scores for assessing the perceived helpfulness of the ICBT therapeutic relationship. TAS scores for assessing treatment satisfaction. CEQ scores for assessing perception of treatment credibility.	There was a high degree of program adherence (60% completed program) contrary to previous findings on participant involvement for internet-delivered treatments (p. 9). Program adherence was most apparent when there was therapist guiding the program such as through weekly telephone calls (p. 9).
Adoption of Mobile Apps for Depression	Cross-sectional Survey study, no comparator,	Of the 2840 veterans who met this	The aim of this study was to	The survey consisted of 38 questions focused on 6	SF-1 scores for physical and mental	Most participants (79.9%) reported that they owned a

and Anxiety: Cross-Sectional Survey Study on Patient Interest and Barriers to Engagement, Lipschitz et al, 2019, Boston, Massachusetts, United States.	duration of study was until eligible participants mailed back surveys.	inclusion criteria, 400 were randomly selected to be mailed out surveys and a total of 149 surveys were returned.	examine, from the patient perspective, current use and factors that may impact the use of mHealth interventions for mental illness.	domains: (1) sociodemographic characteristics; (2) physical and mental health symptoms assessed using the SF-1 (first item of the 36-item Short Form Health Survey) for overall health, the Patient Health Questionnaire-8 (PHQ-8) for depression symptom severity, and Generalized Anxiety Disorder-7 (GAD-7) for anxiety symptom severity; (3) technology ownership and use; (4) interest in apps for mental illness; (5) reasons for not using apps for mental illness; and (6) interest in specific mental illness app features.	health symptoms assessing for overall health. PHQ-8 scores for depression symptom severity. GAD-7 scores for anxiety symptom severity.	smart device and that they use apps in general (71.1%). Most participants (73.1%) reported interest in using an app for mental illness, but only 10.7% had done so (p. 4), suggesting that access outpaced use (p. 7). Ratings of interest in using an app recommended by a clinician were significantly greater than general interest ratings and even greater when the recommending clinician was a specialty mental health provider (p. 4).

						The most frequent concerns related to using an app for mental illness were lacking proof of efficacy (71.8%), concerns about data privacy (59.1%), and not knowing where to find such an app (51.0%) (p. 4). These findings suggest that public dissemination of information on efficacy of apps for mental illness could improve adoption such as provider endorsement (p. 7-8). Participants expressed interest in a number of app features with particularly high-

						interest ratings for context-sensitive apps (85.2%), and apps focused on the following areas: increasing exercise (75.8%), improving sleep (73.2%), changing negative thinking (70.5%), and increasing involvement in activities (67.1%) (p. 4). For individuals with depression and anxiety, over 70% of participants with smart devices reported interest in using apps that facilitate core functions of cognitive behavioral therapy such as

						cognitive restructuring and behavioral activation. Over 73% of participants with smart devices reported interest in features that would promote wellness in areas of behavioral health such as sleep difficulties and inactivity. These findings suggest that this population may be best served by individual apps or suites of apps that target depression and anxiety from multiple angles (p. 8).
Dual Use of a Patient Portal and Clinical Video Telehealth by Veterans with	Retrospective, cross-sectional analysis of early My HealtheVet adoption and Clinical Video	Data was drawn from a retrospective cohort study evaluating	This study aimed to describe early adoption and use of	MHV adoption was measured using MHV data on registration, authentication, and feature use. The	MHV adoption CVT Engagement	Among 2.17 million veterans with one or more mental health diagnoses, 1.51% were dual users,

Mental Health Diagnoses: Retrospective, Cross-Sectional Analysis, Abel et al, 2018, Bedford, Massachusetts, United States.	Telehealth (CVT) engagement among veterans. Veterans were categorized into four electronic health (eHealth) technology use groups: My HealtheVet (MHV) only, Clinical Video Telehealth only, dual users who used both, and nonusers of either.	technology adoption in the US department of Veterans Affairs Health Administration (VHA) (n=2,171,325).	My HealtheVet and Clinical Video Telehealth among VHA users with mental health diagnoses.	available data included flags for adoption such as MHV registration (ie , the process of creating a personal profile, log-in, and access account to gain access to MHV), authentication (ie, the verification of identity before granting access to personal health information), and MHV feature use, including secure messaging use (ie, ever sent or ever read a secure message) and Web-based prescription refill (ie, ever refilled prescriptions on the Web). CVT engagement was measured by a patient identifying whether they had ever had a CVT visit	Dual usage of MHV and CVT	and 71.72% were nonusers of both MHV and CVT. African American and Latino patients were significantly less likely to engage in CVT or use MHV compared with white patients. Low-income patients who met the criteria for free care were significantly less likely to be MHV or dual users than those who did not. The odds of CVT engagement and dual use decreased with increasing age.

				during the study period. A patient was determined to be a dual user if he or she had adopted MHV and engaged in CVT during the study period; the MHV adoption and CVT engagement did not have to be concurrent.		Women were more likely than men to be MHV or dual users but less likely than men to be CVT users. Veterans with major depression or PTSD were high users of secure messaging as compared with other veterans with other mental health diagnoses. Dual users were younger (53.08 years, SD 13.7, vs 60.11 years, SD 15.83), more likely to be white, and less likely to be low-income than the overall cohort. Although rural patients had 17%

						lower odds of My HealtheVet adoption compared with urban patients, they were substantially more likely than their urban counterparts to engage in Clinical Video Telehealth and dual use. This suggests potential differences in access to technology or the internet at home in urban versus rural settings.
Preferred Features of E-Mental Health Programs for Prevention of Major Depression in Male Workers: Results From a Canadian	Cross-sectional survey, comparator group were low-risk major depressive episode (MDE) working men, duration of study was upon	511 high-risk working men for MDE included in study and 330 low-risk working men for MDE	The objective of this study was to (1) estimate and compare the proportions of Internet use for medical	Open-ended questions using a 5-point Likert scale	Using 5-point Likert scale to measure e-health program usage and features preferences	High-risk men were more likely to endorse the importance of accessing health resources on the Internet than low-risk men. This finding suggests that the personal

National Survey, Wang et al, 2016, 10 provinces in Canada (British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia, Newfoundland, Prince Edward Island)	completion of surveys.		information, preferred design features, and likely use of e-mental health programs; (2) examine factors associated with the likely use of e-mental health programs; and (3) understand potential barriers to the use of e-mental health programs among Canadian working men, who were at high risk of a major			privacy inherent with e-health programs makes it a promising tool for men's mental health. Of the 17 different features assessed, the top three features most likely to be used by high-risk men were: "information about improving sleep hygiene" (61.3%), "practice and exercise to help reduce symptoms of stress and depression" (59.5%), and "having access to quality information and resources about work stress issues" (57.8%).

			depressive episode (MDE).			Compared with men at low risk for MDE, men at high risk for MDE were much more likely to consider using almost every one of the different design features. Differences in preferences for the design features by age among men at high risk of MDE were found only for 3 of 17 features. Differences in preferences for design features between English- and French-speaking participants were found only for 4 out of the 17 features. This finding suggests

						the importance of incorporating these preferred features will lead to more likely use among men of across different demographics. Analysis of qualitative data revealed that privacy issues around information, perceived stigma, ease of navigation, personal relevance, and lack of personal interaction, time, and knowledge were identified as barriers to the use of e-mental health programs in working men who were at high risk of MDE.

IntelliCare: An Eclectic, Skills-Based App Suite for the Treatment of Depression and Anxiety, Mohr et al, 2017, Minnesota, United States.	Single-arm pilot study, no comparator group, Participants had access 14 IntelliCare apps from Google Play and received 8 weeks of coaching on the use of IntelliCare.	There was a total of 99 participants recruited through Minnesota health care web system who initiated treatment.	The overall objective of this study was to pilot a coach-assisted version of IntelliCare and evaluate its use and efficacy at reducing symptoms of depression and anxiety.	Patient Health Questionnaire-9 (PHQ-9) Generalized Anxiety Disorder-7 (GAD-7)	PHQ-9 to measure depression. GAD-7 to measure anxiety.	Participants showed substantial reductions in the PHQ-9 and GAD-7. Participants used the apps an average of 195.4 (SD 141) times over the 8 weeks. The average length of use was 1.1 (SD 2.1) minutes, and 95% of participants downloaded 5 or more of the IntelliCare apps (p. 8). This suggests that approaches that use different constructive toolboxes present potential options and allow individual users to tailor treatment and select options that fit their own

						interests and need (p. 10). IntelliCare had higher app usage than other apps with an average of 195 app launches per participant. This can be attributed to IntelliCare's broad choice of apps in which participants can choose from to their liking allowing for maximal user novelty and engagement. In addition, when coupled with low-intensity coaching, IntelliCare provided even greater user engagement,

						unlike other apps (p. 10).
Putting the 'app' in Happiness: A Randomized Controlled Trial of a Smartphone-Based Mindfulness Intervention to Enhance Wellbeing, Howells et al, 2016, 11 countries represented (predominately Australia, USA, Poland, Switzerland, Malta, Sweden, and Singapore).	Smartphone-based randomized-controlled trial, comparator was a control condition which engaged participants with a neutral task with a list-making application called Catch-Notes, study duration was 10 days.	Participants were recruited through online advertisements. 57 participants used an empirically supported mindfulness intervention and 64 were in the control intervention.	The study explored smartphone methodology, the importance of empirically based content for wellbeing enhancement and the extent to which user experience related to wellbeing gains.	Satisfaction with Life Scale (SWLS) Flourishing scale Positive and Negative Affect Scale (PANAS) Center for Epidemiologic Studies Depression Scale (CES-D)	SWLS for assessing respondents' satisfaction with life Flourishing scale for measuring respondents' social–psychological prosperity PANAS for measuring respondents' positive affect and negative affect CES-D for assessing respondents' presence and duration of depressive symptoms	Statistically significant increases in positive affect with a medium effect size and reduced depressive symptoms with a small effect size, although no statistically significant differences in satisfaction with life, flourishing or negative affect were found. No statistically significant gains were observed in the control condition. (p. 173). Ratings of task enjoyment were

						positively correlated with positive affect increase. (p. 173). Findings support the viability of smartphone-based interventions to significantly enhance elements of wellbeing, underscoring the importance of application content and the role of person-activity fit (derived from task enjoyment and task difficulty ratings). (p. 174-175).
The Use and Effectiveness of Mobile Apps for	Fully remote, randomized clinical field trial comparing 2 active apps	Participants had 211 participants went to	The objective of our study was to document	*Primary:* Patient Health Questionairre-9 (PHQ-9)	PHQ-9 for depression	Mobile apps for depression appear to have their greatest impact on people with

Depression: Results From a Fully Remote Clinical Trial, Arean et al, 2016, United States.	(iPST, Project: EVO) and a control app for mood (Health Tips). Participants were expected to use the assigned apps based on the instructions for 1 month.	iPST, 209 went to Project: EVO, and 206 went to Health Tips. Among the participants, 77.0% had a PHQ-9 score >10 (moderately depressed).	and compare use patterns and clinical outcomes across the United States between 3 different self-guided mobile apps for depression.	Sheehan Disability Scale (SDS) *Secondary:* Generalized Anxiety Disorder 7-item scale (GAD-7) Improving Mood-Promoting Access to Collaborative Treatment (IMPACT)	SDS for functional disability GAD-7 for anxiety IMPACT to assess psychosis and mania	more moderate levels of depression. In particular, an app that is designed to engage cognitive correlates of depression had the strongest effect on depressed mood in this sample. This study suggests that mobile apps reach many people and are useful for more moderate levels of depression, particularly for those where mental health resources are scarce (p. 9). There were high dropout rates with nearly half of enrolled participants not

						downloading their assigned apps (p. 9).
Transdiagnostic Internet-delivered cognitive behaviour therapy in Canada: An open trial comparing results of a specialized online clinic and nonspecialized community clinics, Hadjistavropoulos et al, 2016, Saskatchewan, Canada.	Uncontrolled open trial design, specialized online clinic was treatment group which focused on delivering ICBT and the comparator was nonspecialized community clinics which primarily focused on delivering face-to-face therapy and a small percentage of ICBT, 8-week intervention with 3-month follow-up.	338 patients finished the follow-up questionaire.	To examine the clinical effectiveness of ICBT when deployed in this same province by either therapists in a specialized online clinic or therapists in one of eight nonspecialized community clinics	*Primary:* Patient Health Questionnaire-9 (PHQ-9) Generalized Anxiety Disorder 7-Item Scale (GAD-7) *Secondary:* Kessler 10-item Scale (K10) Sheehan Disability Scale (SDS) Panic Disorder Severity Scale – Self Report (PDSS-SR) Social Interaction Anxiety Scale and Social Phobia Scale – Short form (SIAS-6/SPS-6)	PHQ-9 for symptoms of depression GAD-7 for symptoms and severity of general anxiety K10 for general psychological distress SDS for assessing disruption to work/school, social life and family home responsibilities PDSS-SR for panic disorder symptoms	For both primary measures, significant improvements in scores from baseline to post-treatment and from baseline to 3-month follow-up were shown. There were no significant differences between post-treatment and follow-up scores (p. 25). For all secondary measures, scores improved significantly from baseline to post-treatment and from baseline to 3-month follow-up. Scores on the K-10 and SDS

				Treatment Satisfaction yes or no questions Intervention Usage based on number of days patients participated	SIAS-6/SPS-6 for a total social anxiety score Treatment Satisfaction Intervention Usage	also improved from post-treatment to follow-up (p. 25). No differences in completion rates, satisfaction or clinical outcomes were found whether TD-ICBT was offered by therapists working in a specialized online clinic or non-specialized community clinics. Furthermore, no differences were observed whether therapists were registered providers or graduate students or whether therapists were trained in psychology or another

						discipline. Among those who completed the treatment, there were high levels of treatment completion and treatment satisfaction, underscoring the potential for TD-ICBT in public health settings and also in nonspecialized community settings regardless of therapist experience (p. 27).
A randomized controlled trial of guided internet-delivered cognitive behaviour therapy for older adults	Randomized-controlled trial design with ICBT as the active treatment and a waitlist control as delayed treatment group	Participants were randomized to receive seven modules of ICBT (n=24) or to a waiting list	This study aimed to establish the efficacy of guided Internet-delivered cognitive-behaviour	*Primary:* Patient Health Questionnaire-9 (PHQ-9) Generalized Anxiety Disorder 7-Item Scale (GAD-7)	PHQ-9 for symptoms of depression GAD-7 for symptoms and severity of general anxiety	Faster improvements in symptoms of anxiety and depression were observed for participants in the ICBT condition relative to the

with generalized anxiety, Jones et al, 2016, Saskatchewan, Canada.	and comparing groups using a between-subjects design, seven-to-10 week intervention with one-month follow-up.	condition (WLC; n=22).	therapy (ICBT) for older adults with generalized anxiety disorder (GAD) or subclinical GAD.	*Secondary:* Penn state worry questionnaire-abbreviated (PSWQ-A) Geriatric anxiety inventory (GAI) Geriatric depression scale (GDS) World Health Organization quality of Life-BREF (WHOQOL- BREF) Credibility/expectancy questionnaire (CEQ) Anxiety change expectancy scale (ACES)	PSWQ-A for worry severity in older adults GAI for anxiety symptom severity in older adults GDS is a depression tool for geriatric populations WHOQOL-BREF for assessing quality of life in four domains: Physical health (e.g., sleep, pain); Psychological health (e.g., self-esteem, concentratio	WLC, with large between-group effect sizes on the Generalized anxiety disorder-7 and the Patient health questionnaire obtained at post-treatment (p. 7). Further reduction in generalized anxiety symptoms was reported over the one-month follow-up (p. 7). ICBT group experience changes in scores in all outcome measures except for social quality of life (p. 7). Treatment effects were replicated when control participants subsequently

					n); Social relationships (e.g., support, personal relationships); and Environment (e.g., physical safety, financial resources). CEQ for assessing treatment expectancy and credibility ACES for assessing change expectancy specific to anxiety	underwent treatment (p. 7). Higher ratings of treatment credibility, but not expectancy, prior to ICBT predicted improvements over time (p. 7).
Predicting Response to Therapist-Assisted	Exploratory study that looked into demographic,	Of the 195 patients who were part of the study	The aim of this study was to contribute to	Patient Health Questionnaire-9 (PHQ-9)	PHQ-9 for symptoms of depression in ICBT	Consistent across ICBT for depression or generalized

Internet-Delivered Cognitive Behavior Therapy for Depression or Anxiety Within an Open Dissemination Trial, Hadjistavropoulos et al, 2016, Saskatchewan, Canada.	clinical, and program variables that predicted modules started and symptom improvement within a previously published open dissemination trial, 2 groups with no control (ICBT for depression, ICBT for anxiety), 12-modules delivered by therapists working in six geographically dispersed clinics.	sample, 83 patients were assigned to therapist-assisted ICBT for depression and 112 patients were assigned to therapist-assisted ICBT for generalized anxiety.	the literature and explore predictors of response to therapist-assisted ICBT within the context of an open dissemination trial.	Generalized Anxiety Disorder 7-Item Scale (GAD-7)	depression group GAD-7 for symptoms and severity of general anxiety for ICBT anxiety group	anxiety, starting fewer modules was associated with more phone calls from therapists reflecting that therapists tended to call patients who did not start modules as scheduled (p. 162). In terms of clinical implications, it is possible that therapists could consider using the need to phone clients as a cue that the client may need to be referred for face-to-face services or that therapists may need to use additional strategies to improve

						treatment participation (p. 162). Also consistent for both ICBT programs, greater pre-treatment condition severity and completion of more modules was associated with superior ICBT-derived benefit (p. 162). Younger age, lower education, taking psychotropic medication, being in receipt of psychiatric care and lower comfort with written communication were associated with either fewer program starts or lower symptom

						improvement in one of the two programs (ICBT for anxiety). It is concluded that monitoring response to ICBT may be particularly important in patients with these characteristics (p. 161).
A Systematic Review of Cognitive Behavioral Therapy and Behavioral Activation Apps for Depression, Huguet et al, 2016, Canada.	Review of publicly available apps within Canada by searching literature and the commercial marketplace, no comparator, no study duration but look at apps available on December 2015.	One hundred and seventeen apps were identified after searching both the scientific literature and the commercial market.	This review aims to identify self-help apps available exclusively for people with depression and evaluate those that offer cognitive behavioural therapy (CBT) or	The commercial marketplace and scientific literature were searched for apps then evaluated based on three dimensions.	Usefulness - the validity and accuracy (does the app actually offer CBT or BA?), and effectiveness (is the app clinically effective– with demonstrated improved outcomes- for people	10.26% (n = 12) of these apps identified through our search offer support that seems to be consistent with evidence-based principles of CBT or BA (p. 7). Taking into account the non existence of effectiveness/efficacy studies, and the low level of adherence to the

			behavioural activation (BA).		with depression?) Usability- (can the user easily–or with minimal training- use and understand the app?) Integration and infrastructure- Privacy and safety were evaluated on whether the apps provided users with a privacy policy and whether the apps had any mechanisms in place to handle high	core ingredients of the CBT/BA models, the utility of these CBT/BA apps are questionable (p. 7). The usability of reviewed apps is highly variable, and they rarely are accompanied by explicit privacy or safety policies (p. 15). A call for scientists and/or app developers interested in the opportunities that mobile communication technology offers in terms of improving access to mental health care to test the existing best apps and determine from the outset how to best

					risk of suicidality	implement and sustain the apps over time given that technology is evolving rapidly. (p. 15) Failure to effectively plan for sustainable dissemination of apps as well as the lack of consideration of legal aspects may present significant barriers for using apps. (p. 15).
The Efficacy of Internet-Based Mindfulness Training and Cognitive-Behavioral Training With Telephone Support in the Enhancement of Mental	2-arm, randomized, open-label, parallel positive-control trial involving two Internet-based interventions: a mindfulness training program named iMIND versus a	Eligible participants were randomized into either the iMIND (n=604) or the iCBT (n=651) condition.	The aim of our study was to examine the efficacy of an Internet-based mindfulness training program (iMIND) in comparison	Who 5-item Well-Being Index (WBI) Mental Health Inventory (MHI) Satisfaction with Life Scale (SWLS) Visual Analogue Scale (VAS)	WBI for overall mental well-being MHI for assessing psychological distress AWLS for assessing life satisfaction	Among the 1255 study participants, 213 and 127 completed the post- and 3-month follow-up assessment, respectively. Both iMIND (n=604) and iCBT (n=651)

Health Among College Students and Young Working Adults: Randomized Controlled Trial, Mak et al, 2017, Hong Kong, China.	cognitive-behavioral training program named iCBT, 8-week intervention with 3-month follow-up.		with the well-established Internet-based cognitive-behavioral training program (iCBT) in promoting mental health among college students and young working adults.	Medical Outcomes Study (MOS) Sleep Scale Time (in minutes) spent in the previous week on browsing the website and practicing the assigned homework Credibility or Expectancy Questionnaire (CEQ)	VAS for measuring average level of energy and average level of pain MOS for assessing sleep disturbance Time spent with intervention used to assess usage and satisfaction with intervention CEQ to examine if expectancies or perception of treatment credibility were related to outcomes	were efficacious in improving mental health, psychological distress, life satisfaction, sleep disturbance, and energy level, from pre- to post-assessment, also being sustained after 3-month follow-up. This study shows that incorporating Internet-based mindfulness and cognitive-behavioral training programs with minimal guided support can be a highly scalable in preventing and promoting mental and physical health as their highly accessible comparably to

						face-to-face therapy. There were high attrition rates in the study (10.12% completed the 3-month follow-up) suggesting for refinement in future technology-based psychological programs. However, the wide usage of mobile data shows promise in meeting public health goals of mental health promotion if disseminated widely, given its easily accessible nature. Mental health professionals need to team up

						with experts in information technology to increase personalization of Web-based interventions to enhance adherence.
The Efficacy and Mechanism of Online Positive Psychological Intervention (PPI) on Improving Well-Being Among Chinese University Students: A Pilot Study of the Best Possible Self (BPS) Intervention, Auyeung and Mo, 2018,	Two-arm randomized controlled trial, 6-day PPI which involved writing about best possible self (treatment group) and an active control group which involved writing about a past event, 6-day online intervention with 7th day being post-test assessment	139 participants were randomized with a total of 100 participants completing the whole study (48 in treatment group, 52 in control group).	The primary objective of this study is to examine the outcome efficacy of the BPS intervention in improving well-being (i.e., decreasing depression and increasing flourishing) among Chinese university students.	*Primary:* Flourishing scale (FS) Center for Epidemiologic Studies Depression Scale -shortened version (CESD-10) *Secondary:* Positive and Negative Affect Scale (PANAS) Adult Hope Scale (AHS) Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS)	FS for assessing flourishing CESD-10 assessing depressive symptoms PANAS for assessing positive emotion AHS for measuring positive cognition BPNSFS for measuring psychologica	PPI improved flourishing and reduced depressive symptoms (p. 11). Results showed that positive affects and autonomy satisfaction fully mediated the effect of PPI on flourishing, while increased autonomy fully mediated the effect of PPI on depressive symptoms (p. 12). Moreover, the effects on

Hong Kong, China.				5-point Likert scale for person activity fit	l need satisfaction 5-point Likert scale for person activity fit	depressive symptoms and flourishing were independent of one another, indicating the general utility of PPI in improving positive well-being irrespective of change in depressive symptoms (p. 12). These findings add novel support that increased autonomy satisfaction is an active ingredient that promotes intervention change/outcomes and illustrated that online PPI might serve as a viable well-being intervention for Chinese university

						students (p.15-16).
Smartphone-based ecological momentary assessment for Chinese patients with depression: An exploratory study in Taiwan, Hung et al, 2016, Taiwan, China.	Exploratory study, no comparator, only treatment group (iHOPE smartphone application) 8 weeks.	The study participants comprised of 59 Chinese outpatients with depressive disorder; 5 participants never used iHOPE, so there was a total of 54 active users.	Examined the validity of smartphone-based ecological momentary assessment (EMA) for depression in Chinese patients and explored the determinants of use.	visual analogue scales (VAS) A sliding bar was provided to label one's emotion from perfectly calm/normal to extremely anxious/ depressed Sleep duration was reported by hours and its quality by a 5-point Linkert scale Performance of cognitive test was defined both by the time spent (seconds) and the number of errors made. PHQ-9 HAM-D Short Form of Dysfunctional	VAS for momentary depression and anxiety A sliding bar was provided to label one's emotion from perfectly calm/normal to extremely anxious/ depressed Sleep duration was reported by hours and its quality by a 5-point Linkert scale Performance of cognitive test was defined both by the time spent	In 8 weeks, participants interacted with iHOPE for an average of 10.8 days; a trend of decreased frequency of use was observed (p 133). Scores of HAM-D at baseline was associated with, of the first 2 weeks, scores of PHQ-9, EMA of depression and anxiety, and poorer sleep quality (p. 134). Among the demographic, clinical and smartphone-use variables examined, only limited internet

				Attitude Scale, version 1 (SF1) and 2 (SF2):	(seconds) and the number of errors made. PHQ-9 to measure depressive symptoms HAM-D for severity of depression SF1 and SF2 for self-reported measure for dysfunctional cognition related to depression	package for smartphone (<500 M per month) predicted higher use of iHOPE as it had offline capabilities (p. 134).
Internet-Based Cognitive Behavioral Therapy for Social Anxiety with and without Guidance	Propensity score method study comparing self-guided ICBT and therapist-guided ICBT to a wait-list control group for 8-weeks.	197 met inclusion criteria, 63 were in therapist-guided ICBT, 93 were in self-guided	The aim of the present study was to investigate the effectiveness of an established self-help	*Primary:* Social Interaction Anxiety Scale (SIAS) Social Phobia Scale (SPS) *Secondary:*	SIAS for anxiety SPS for Phobia BDI for depression	SIAS after 8 weeks showed that both ICBT conditions were superior and that there was no difference between the ICBT conditions.

Compared to a Wait List in China: A Propensity Score Study, Kishimoto et al, 2016, China.		ICBT and 41 were in the control condition.	program for increased social anxiety in a Chinese population.	Beck Depression Inventory (BDI		Regarding the SPS, both ICBT conditions were superior to the wait list, and the two active conditions did not differ. For the BDI, the omnibus interaction effect was significant. However, none of the pairwise comparisons were significant. The findings of the present study suggest that social anxiety symptoms can be effectively reduced by ICBT in Chinese people. (p. 319). The effects of a self-guided ICBT intervention were not different

						from the effects of a guided ICBT intervention in social anxiety. Research suggests that adherence is improved when patients are guided by trained coaches. However, despite the guidance by trained therapists, guided and unguided self-help did not differ significantly regarding the number of completed modules in the present study. Since therapist support was mainly focused on improving the adherence to the intervention, it is possible that a more

						intensive therapeutic support would have improved adherence and outcome in the guided condition (p. 319).
Enhancing Web-Based Mindfulness Training for Mental Health Promotion With the Health Action Process Approach: Randomized Controlled Trial, Mak et al, 2015, Hong Kong, China.	Randomized-controlled trial, 2 treatment and 1 control group (HAPA-enhanced mindfulness, basic mindfulness, and waitlist control), 8-week study with 3-month follow-up.	Started with a total of 321 university students and staff, but had 105 in HAPA, 104 in basic mindfulness group and 79 in control group by end of follow-up survey.	The aim of this study was to evaluate the efficacy of two Internet-based interventions (basic mindfulness and Health Action Process Approach enhanced mindfulness) with waitlist control. Health Action	39-item Five Facets Mindfulness Questionnaire (MQ) 5-item World Health Organization Well-Being Index (WBI) Satisfaction with Life Scale (SWLS) with one-item form the Delighted-Terrible (D-T) scale 10-item Perceived Stress Scale (PSS) Short version of the Depression Anxiety Stress Scales (DASS 21)	MQ for examining changes in mindfulness levels WBI to assess mental well-being SWLS with D-T to assess cognitive and affective evaluations of their lives PSS to assess perceived	Significant group by time interaction effect was found. The HAPA-enhanced group showed significantly higher levels of mindfulness from pre-intervention to post-intervention, and such improvement was sustained at follow-up. Both the basic and HAPA-enhanced mindfulness groups showed better mental well-being from

			Process Approach (HAPA) principles were used to enhance participants' efficacy and planning.		personal life stress DASS 21 to gauge severity and frequency of symptoms related to depression, anxiety, and stress	pre-intervention to post-intervention, and improvement was sustained at 3-month follow-up (p. 6-7). Findings supported the reduction of time commitment for mindfulness practice in providing promising effects on mental well-being of adults in the wider community. In light of the fact that the general public may be less motivated and committed to devoting time for their mental health, Internet-based mindfulness with reduced time

						demands may be a viable substitute (p. 8). A slightly stronger relationship between mindfulness with mental well-being was also observed in the HAPA-enhanced group. Results suggested that the supplementary messages intended to increase participants' planning and practice efficacy and the strategies to help them deal with obstacles may enhance the effects of the program for them (p. 8).

Cultural considerations for the adaptation of an Internet-based intervention for depression prevention in Mainland China, Patel et al, 2017, Wuhan, China.	Cross-sectional survey/questionnaire study, Using both expert consultation and student feedback to review CATCH-IT, direct expert consultation for panel using questionnaire and feedback surveys administered after completion of 2-month intervention.	Of the 348 students in the initial intervention, Twenty students were surveyed (age range 19–23 years). The expert panel consisted of three physicians.	This study explored cultural adaptation of the Project Competent Adulthood Transition with Cognitive-Behavioral, Humanistic and Interpersonal Training (CATCH-IT) for use in Mainland China.	A questionnaire developed for this project was distributed to the expert panel. Feedback survey for teens	The main topics covered for the panel were: 1) practicality of Western-based psychotherapies for young adults in China; 2) specific areas of existing Internet-based intervention needing adaptation; and 3) delivery model and implementation in Mainland China. Feedback survey	Both groups recommended new modules focusing on Chinese-relevant themes like pressure for academic excellence, filial piety, and balancing school and social life (p. 5-6). Physicians agreed to retain the cognitive behavior therapy (CBT) and behavioral activation (BA) modules, and were split on the use of interpersonal therapy (IPT) (p. 5). All experts recommended translation of the

					identified facilitators, barriers, and suggestions for improvement of the website. The survey consisted of four questions each on the format (ease of use and discomfort) and socio-cultural relevance (Internet program rationale, content and coping skills helpfulness of the intervention for adolescents and	content into Mandarin and a majority suggested interactive features and less text (p. 5). All agreed the Internet serves well as a delivery model; however, dissemination through schools were preferred (p. 5). The results support cultural adaptation of basic facets of the intervention like language and visuals, and also deeper aspects like IPT and the delivery model (p. 1).

					emerging adults). Some questions included in the survey were “Would the program be suitable if it were in Chinese?” and “What, if anything, would motivate you to use CATCH-IT?”. Socio-demographic information was also collected.	
Process evaluation of the systematic medical appraisal, referral and treatment	A mixed methods pre-post evaluation assessed the intervention using quantitative	The study participants in the process evaluation consisted of community	This paper reports on the mixed methods process evaluation for the SMART	Quantitative service usage analytics Qualitative interviews	Quantitative service usage from the backend data stored on servers, was acquired	Health service use increased significantly at post-intervention, ASHAs could follow-up 78.6% of those who had

(SMART) mental health project in rural India, Tewari et al, 2017, conducted in 30 villages associated with two Primary Health Centers (PHCs), located in a Scheduled Tribe (ST) rural area of the West Godavari district of Andhra Pradesh, India.	service usage analytics from the server, and qualitative interviews with different stakeholders, no comparators, the entire project lasted 24 months.	members, Accredited Social Health Activists (ASHAs – lay health workers), primary care doctors, village leaders and field staff. We included all doctors and field staff in our interviews. However, community members and village leaders were selected purposively.	Mental Health Project in rural areas of the state of Andhra Pradesh, India. SMART had three stages: 1) Mobile technology based electronic decision support systems (EDSS) for screening by ASHAs for patient mental health using PHQ-9 and GAD-7 data. Those who scored 10 or over on either		throughout the intervention to understand frequency and type of services used-type and appropriateness of care provided by doctors, frequency of follow-up of screen positive cases by ASHAs, and numbers and success rate of IVRS calls. Qualitative interviews using focus group discussions	screened positive, and 78.6% of the 1243 Interactive Voice Response System calls made, were successful. Most respondents were aware of the intervention (p. 4-5). They indicated that knowledge received through the intervention empowered them to approach ASHAs and share their mental health symptoms (p. 5). ASHAs and doctors opined that EDSS was useful and easy to use (p. 6). Barriers to treatment

			scale, would be consider screen positive for this project. 2) Interactive voice response system (IVRS) sent out pre-recorded messages to the screen positive individuals to visit the PHC doctor to seek care or continue treatment as advised by the ASHA or the doctor. 3) A Stigma Reduction Campaign was		(FGDs) and in-depth interviews (IDIs) of key stakeholders.	included stigma & discrimination to receive treatment (due to taboo and legal issues around suicide ideation), financial livelihood and social constraints and gaps in using technology–based applications/IVR messages (most of the households had one mobile phone in the family which is often left at home when going out to the fields and poor network issues) (p. 6-7, 11). Organizing medical camps in the villages helped those seeking care, as

			conducted prior to the baseline survey to increase mental health knowledge and reduce stigma in the community for 8 weeks across all villages.			they did not have to travel and lose out on daily wages, and it also saved time. Both expenses and extended travel time to seek care from health facilities are key barriers in rural and remote areas, and given the remoteness of the ST area and poor public transport facilities in the area, the value of the medical camps were greater in this community (p. 11). Most community members and health workers felt that

						the intervention had a positive impact on the community. This was further evident in that there was increased service use and reduced scores on depression and anxiety scales following the intervention (p. 12).
mHealth and the management of chronic conditions in rural areas: a note of caution from southern India, Nahar et al, 2017, rural Andhra Pradesh, in a district, Guntur, which forms part	Data collection in the two villages combined interviews with group discussions, ethnographic conversations and observation, no comparator, field work took 6 months to complete.	A sample of 21 individuals (13 men, 8 women) from rural areas who travelled to either of two clinics in the city of Guntur for psychiatric outpatient consultation	The broad aim is to examine how straightforward it may be to achieve the claimed potential of mHealth intervention for diabetes and depression (only	Qualitative interviews	Semi-structured interviews	To consider the feasibility of mHealth applications in rural settings, it is important to have a picture of current habits of mobile phone use. Nearly all the individuals interviewed, with diabetes or depression, possessed their own mobile

of coastal Andhra in India, specifically the villages of Nagulapadu and Kommuru.		s (17 attended one clinic, four the other).	depression methodology and findings will be reported upon) in rural India.			phone (34); only four of the sample (all women) had no access to a mobile. These were virtually all cheap 1G or 2G mobiles, with only two possessing smart phones (p. 9). None of the interviewees said they used apps on their phone, though some knew that their children did (p. 9). In relation to those with depression, while a patient could in theory contact their psychiatric clinic, in practice it was rare. None of those

						interviewed with depression spoke of using their mobile phone to call their clinic; it was always the other way around, with clinics providing appointment reminders or when required a 'lifeline' service. Individuals suffering from depression are perhaps among the least likely people to turn to their mobiles in the first place (p. 10). In sum, therefore, widespread ownership of basic 1G or 2G products does not (yet)

						translate into a pattern of habitual use which suggests easy take-up of mHealth applications by patients themselves. At present, moreover, basic phones, seasonally erratic electricity-supply, or short battery life, each constrain habits of use, with potential implications for the reliability of access for mHealth communication in the near future (p. 10). The very precept of 'self-management' of one's own health

						that is encompassed in mHealth applications, owes much to philosophical assumptions about the self and individuality: the notional figure of the self-managing individual fits well with popular western notions of self-actualization; but it is equally part of the rhetoric of neoliberal reform in finance and governance advocated by international bodies for health systems around the world (p. 11). This raises the question of how applicable such assumptions are

						to rural context, where a more 'relational' notions of the self may be present for the wider family (p. 11). However, previous literature warns of overdrawing this distinction in India as the 'relational' self and the 'autonomous' self tends to shift over the life-course in a gendered way (p. 12);
Free mobile apps on depression for Indian users: A brief overview and critique, Kumar and Mehrotra, 2017, India.	Overview of free mobile apps on depression for Indian users along with a critique, no comparator, no study duration but look at apps available on	278 apps were identified in the first step and spanning a wide range of categories.	The study aimed at identifying the nature of mobile apps available to Indian android phone users who might search for	The commercial marketplace, Google Play Store, was searched for apps then categorized based on its psychological intervention.	There were 13 categories: Information on depression Information on coping with depression	Information on coping with depression and stand-alone screening tools formed the two largest types of free apps (p. 126).

	October and November 2016.		free apps to help them deal with depression.		(including treatment approaches) Online consultation Social network for dealing with stressful situations Screening tests Different forms of meditation Yogasanas Relaxation (audios and visuals) Hypnosis Alternative approaches (e.g.	Features of interactive self-care apps (N = 33) were reviewed further and this exercise showed that less than 10% of the apps incorporated explicit delineation of their scope or initial screening for suitability (p. 126). Guidance regarding managing suicidal crisis were incorporated in only about 12% of the interactive apps (p. 127). Slightly more than one third of these apps included content aimed at encouraging professional help seeking when needed or an

					acupressure, exercise and prayers) Games Miscellaneous Interactive self-care apps	explicit mention of their theoretical or empirical basis (p. 127). Monitoring moods, thoughts and behaviors were the commonest therapeutic strategies incorporated in these apps, in addition, to a wide range of other strategies such as behavioral activation, identifying and correcting cognitive errors, mindfulness exercises, cultivation of gratitude, and medication management (p. 128). Similar lack of efficacious

						apps found in Canadian study (p. 129).