Jamaican adolescents' receptiveness to digital mental health services: A cross-sectional survey from rural and urban communities

Catherine A. Maloney[a], Wendel D. Abel[b], Hamish J. McLeod[a],*

[a] Institute of Health and Wellbeing, College of Medical, Veterinary and Life Sciences, University of Glasgow, 1st Floor, Admin Building, Gartnavel Royal Hospital, 1055 Great Western Road, Glasgow G12 0XH, United Kingdom
[b] Department of Community Health and Psychiatry, Section of Psychiatry, The University of the West Indies, Kingston 7, Jamaica

A B S T R A C T

Background: Improving access to mental health resources for young people is an urgent healthcare challenge. As the majority of youth live in low and middle-income countries (LMICs) mental ill health can exert substantial adverse impacts on societies that can least afford it. Digital mental health technologies might help close the treatment gap but we need to understand barriers to implementing these strategies, especially in resource constrained contexts such as LMICs.
Methods: We surveyed adolescents (*N* = 107; aged 10–19 years) from Jamaican communities using questionnaires adopted from previous studies conducted in LMICs. The questions addressed mental health help-seeking preferences, expectations of help-seeking effectiveness, and practical and attitudinal barriers to using mobile-phone-based mental health resources. We present descriptive data alongside exploratory analyses of differences in attitudes and preferences expressed by subgroups of respondents.
Results: Adolescents reported very few practical or infrastructure barriers to accessing digital mental health resources. > 90% of the sample had access to a smartphone, 78% expected that digital solutions could benefit adolescents with symptoms of mental distress, and 56% were interested in using mental health apps to monitor their own mental health. Stigma, shame, and embarrassment were major barriers to help-seeking and formal professional help was only preferred for more severe conditions such as psychosis and substance abuse.
Conclusions: Practical barriers are unlikely to impede the uptake of digital mental health resources by Jamaican adolescents. Our data suggest that mental health literacy, stigma, and embarrassment pose more serious blocks to help-seeking.

1. Introduction

Mental illness affects an estimated 10–20% of children and adolescents worldwide, with mental and substance use disorders contributing to the highest proportion of disability adjusted life years among adolescents and young adults (Kieling et al., 2011; Whiteford et al., 2013). Up to 75% of individuals affected by mental illness experience symptoms prior to 24 years of age, with an early age of onset predicting recurring episodes and increased persistence (Gulliver et al., 2010; Kessler et al., 2005; Patel et al., 2007).

Despite the distressing and often long-lasting consequences of adolescent mental illness, many young people do not seek help from formal (e.g. general practitioner) or informal treatment sources (e.g. family, friends, faith healer). Several structural barriers impede help seeking, including lack of available services, high treatment costs, long waiting lists, multiple referral steps, and transportation (Anderson et al., 2017; Gulliver et al., 2010; Murry et al., 2011; Rickwood et al., 2007; Sylwestrzak et al., 2015). Additionally, adolescents experience individual- and community-level barriers, such as poor mental health literacy, unawareness of available resources, a preference for self-

reliance, concerns regarding confidentiality or anonymity, skepticism about resource effectiveness, and stigma (Brown et al., 2016; Gulliver et al., 2010; McCann et al., 2016; Rickwood et al., 2007; Sylwestrzak et al., 2015; Tharaldsen et al., 2017). Epidemiological estimates suggest that 90% of adolescents reside in low-and middle-income countries (LMIC), where treatment access barriers are disproportionately high (Kieling et al., 2011). Therefore, understanding geographical variations in mental health help seeking, both across LMICs and between rural vs. urban settings, is essential in the development of implementable solutions.

1.1. The Jamaican context

Like other LMICs, Jamaica is under-represented in mental health research and there are currently no published studies examining the use of digital technology to meet mental health needs in the Jamaican context. This is an important gap in knowledge as there are consistent data indicating unmet mental illness treatment needs for Jamaican youth. The Jamaica Youth Risk and Resiliency Behavior Survey conducted in 2006 reported that 15.5% of a nationally representative

---

* Corresponding author.
E-mail address: hamish.mcleod@glasgow.ac.uk (H.J. McLeod).

Jamaican adolescent sample (*N* = 1312; aged 15–19 years) experienced depression, operationalized as experiencing suicidal ideation or meeting at least five diagnostic symptoms from the Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV) (McFarlane et al., 2014). Additionally, Lipps et al. (2010) evaluated depression in Grade 10 students in rural and urban Jamaican traditional and non-traditional high schools (*N* = 278; aged 14–16 years), and found 14.4% of the sample had experienced severe depressive symptoms (scored 29+ on Beck Depression Inventory II [BDI-II]), while 26.3% had experienced moderate symptoms (scored 20–28 on BDI-II) (Lipps et al., 2010). Although there should be some caution in extrapolating from these small samples, these data suggest that moderate to severe depressive symptoms could have been experienced by up to 40.7% of Jamaican high school students. Even if this is an over-estimate, it suggests that the rate of depressive symptoms in young Jamaican's far exceeds the estimated global prevalence rate for depressive disorders of 2.8% among adolescents aged 15–19 years (Our World in Data, 2018; Institute for Health Metrics and Evaluation, 2018).

Despite high rates of depressive symptoms among Jamaican adolescents, engagement with formal mental health services is low, with many young people (15–19 years) reporting that they would only seek formal health services support for serious mental illnesses such as schizophrenia (Jackson Williams, 2012, 2014; Palmer et al., 2012). Across all symptoms, adolescents express low expectations of any help source in providing effective treatment (Jackson Williams, 2012). This reluctance to seek formal treatment combined with low expectations that mental disorders are treatable may be related to poor mental health literacy and high rates of stigma. Jamaican youth report a desire for less social contact with individuals who have a "history of mental illness" and Jamaican adults express fear and avoidance towards "people with mental illnesses" (Arthur et al., 2010; Jackson Williams and Heatherington, 2006). These stigmatizing attitudes are also seen in mental health nursing students in Jamaica, who associate mental illness with fear, danger, and violence (Bennett and Stennett, 2015).

It is important to note that some Jamaican adolescents who choose to seek formal mental health services may experience difficulty accessing age-appropriate resources. Although the Jamaican Ministry of Health provides free mental health services through public sectors, few treatment options specifically target children and adolescents (Abel et al., 2012). Nationwide child guidance clinics have been created to address this gap by providing public mental health care to youth, but often have waiting lists 3–6 months long and many clinics only open one or two days per month (Ministry of Health Jamaica, 2016; Virtue, 2013). Hence, structural barriers may also impede mental health treatment seeking.

1.2. Digital mental health services

Digital technologies such as mobile-phone-based digital health services (mHealth) present a possible way of delivering low intensity treatments in a scaleable, sustainable, and minimally stigmatizing way (Muñoz, 2010, 2019). Low intensity mHealth treatments are designed to improve access to evidence-based practices through self-help approaches, with or without support from a mental health professional (Dalton et al., 2017; National Collaborating Centre for Mental Health, 2011). Some data support the efficacy of various mHealth resources, including automated messages containing self-help strategies, interactive apps to self-monitor symptoms, and video consultation or text messaging between clinician and client (Fitzpatrick et al., 2017; Khoja et al., 2015; Morgan et al., 2012, 2013; Rangaswamy et al., 2008; Schlosser et al., 2017). Current systematic review data on digital interventions for mental health problems in young people suggest that there is still work to be done to clarify which problems are responsive to digital interventions and what factors influence the uptake and persistent use of mHealth technologies (Hollis et al., 2017). But, some promising trial data have been published. For example, Fitzpatrick et al.

(2017) evaluated the effectiveness of an app featuring a conversational agent programmed to deliver cognitive behavioral therapy informed messages to young adults. Following a two-week trial, treatment-group participants reported significantly reduced depressive symptoms (Fitzpatrick et al., 2017).

Developing digital mental health resources for Jamaican youth could facilitate help-seeking by reducing privacy and confidentiality concerns, decreasing stigmatization around treatment seeking, and improving service accessibility. This fits with global trends where young people regularly engage with technology in everyday life and express receptiveness to the integration of mental health services into this medium (Montague et al., 2015; Proudfoot et al., 2010; Torous et al., 2014).

However, despite the potential of mHealth and the studies that suggest their usefulness in service user support, various challenges hinder mHealth development. For example, it can be challenging to incorporate specific user-needs and cultural considerations into the design process in order to ensure a user-friendly and clinically effective experience (Marzano et al., 2015; Coyle et al., 2007; Schnall et al., 2016). Additionally, once the apps are successfully co-designed, there can be significant start-up cost barriers related to implementation and testing for usability and clinical efficacy (Aranda-jan et al., 2014; Brian and Ben-Zeev, 2014; Marzano et al., 2015). Data from service users highlight other barriers such as privacy concerns (i.e. if text messages are read by others; or security of the data collected), lack of infrastructure (i.e. phone ownership, electricity, Wi-Fi access), and low literacy levels (Aggarwal, 2012; Dowling and Rickwood, 2014b; Marzano et al., 2015; Musiat et al., 2014). These barriers, particularly lack of internet infrastructure, may disproportionately impact rural neighborhoods more than urban neighborhoods. In order to better understand user needs and contextual considerations, local infrastructure and mHealth preferences should ideally be evaluated prior to developing digital mental health services.

While many studies endorse the use of mHealth solutions in LMICs, user interest and infrastructure barriers need to be checked in local contexts (Khoja et al., 2015; Rangaswamy et al., 2008). As an example of this approach, Ben-Zeev et al. (2017) developed a brief survey to investigate barriers for Palestinians living in urban, rural, and refugee camp settings across the West Bank. Adults were approached in public settings and asked to answer questions on mobile phone infrastructure and interest in mHealth. Descriptive analyses revealed that participants from all locations indicated high rates of phone ownership, electricity, and Wi-Fi access, which demonstrated widespread mobile phone infrastructure. Additionally, 88% percent of participants believed digital mental health resources would be helpful for individuals experiencing mental distress, and between 64 and 68.8% (*N* = 272) expressed personal interest in using mHealth services (Ben-Zeev et al., 2017). It is important to note Ben-Zeev et al. (2017) mentions low literacy levels as a potential threat to the representativeness of their study sample. Although an estimated 70% of participants took the option of having the survey questions read aloud, illiteracy may have deterred others from participating. However, these results do suggest that mHealth strategies show promise as a way of increasing access to mental health care among Palestinians in the West Bank.

In summary, while results from some studies support the potential implementation of mHealth in a low-resource context, it is unknown how well these results will generalize to other LMIC contexts. The heterogeneity of cultures and resources across LMICs, as well as variations between rural and urban communities, illustrates the need to evaluate infrastructure and mHealth interest in context. Our work will examine how well mHealth solutions may be received as a youth mental health treatment option in the Jamaican context. This will help validate the use-case for applying digital mental health strategies in a Caribbean context as well as exposing some of the similarities and differences in the implementation issues seen across varying LMIC settings.

1.3. Aims

To date, no published studies have examined infrastructure and attitude barriers to using mHealth strategies to deliver mental health services to Jamaican adolescents. We address this gap by conducting a feasibility study to determine the viability of deploying digital mental health resources in Jamaica, with a particular focus on identifying variations in infrastructure and preferences between rural and urban adolescent populations. Additionally, since previous mental health help-seeking attitudes research has under-recruited from rural settings (Jackson Williams, 2012), we will more fully examine differences in treatment preferences between rural and urban adolescents. Finally, we will examine whether young people can be differentiated on the basis of their attitudes towards mHealth. Greater understanding of adolescents' attitudes towards mHealth, and mental health care in general, is an important precursor to the development of digital tools for young Jamaicans.

2. Methods

This descriptive cross-sectional feasibility study recruited adolescents during May – June 2018 from urban locations throughout Kingston and rural communities throughout the parishes of St. Elizabeth, Clarendon, and Manchester. The study received approval from the University of Glasgow's College of Medical, Veterinary, and Life Sciences Ethics Committee (Ref: 200170084) and the University of the West Indies Mona Faculty of Medical Sciences Ethics Committee (Ref: ECP, 103, 17/18).

2.1. Measures

2.1.1. Survey part 1

Adolescent receptiveness to mHealth services was evaluated using a culturally modified version of a survey effectively administered to Palestinians in the West Bank by Ben-Zeev et al. (2017). The survey posed multiple-choice questions regarding mobile phone infrastructure to examine the viability of implementing digital mental health services in the target setting. A 5-point Likert scale, ranging from 1 (not at all interested) to 5 (very interested), assessed receptiveness to utilizing various mHealth resources, including one-direction SMS (receive regular text messages with information about mental health); bi-directional SMS (communicate with therapist/doctor through text messages); web-based on mobile (communicate with therapist/doctor through calling or video); and smartphone application (self-monitor and management of mental health through apps). In addition to indicating personal interest in mHealth, participants estimated the percentage of adolescents in their communities they believed to suffer from mental distress (such as feelings of hopelessness or excessive worry) and whether mHealth resources may be helpful for these individuals. Modifications were made to the original Ben-Zeev et al. (2017) survey to accommodate the target population. For example, a question on treatment barriers was added in an effort to generate further understanding of the role mental health apps might play in help-seeking. Additionally, three questions regarding literacy and language preferences were added, as Ben-Zeev et al. (2017) anecdotally reported up to 70% of participants requested for questions to be read aloud, indicating a need to accommodate variations in population literacy levels.

2.1.2. Survey part 2

Adolescent treatment seeking preferences and treatment optimism were evaluated through a survey previously developed and administered in Jamaica (Jackson Williams, 2012, 2014). Since previous literature suggests mental disorder labels may impose Western concepts on non-Western cultures and subsequently generate stigma, the questionnaire did not explicitly use mental disorder labels (Alarcón, 2009; Ben-Zeev, Young, & Corrigan, 2010; Kirmayer and Pedersen, 2014;

Link, 1987). Instead, seven symptom groupings were presented, listing DSM-IV derived criteria for depression, anxiety, schizophrenia, attention deficit/hyperactivity disorder-combined type (ADHD), conduct disorder, eating disorder not otherwise specified, and substance abuse. Following each symptom grouping, participants: (1) Indicated where they would seek help by ranking eight potential help sources, including *family, friends, medical doctor, clergy/church person, psychologist/psychiatrist, obeah*[1] *man/woman, teacher/guidance counselor,* and *no one (deal with it on your own)*; and (2) Reported the perceived helpfulness of each treatment source on a 4-point Likert Scale, ranging from 1 (not helpful) to 4 (very helpful). The only modification made to the questionnaire, based on the recommendation of the survey developer, was the separation of the help source "*family/friends*" into two distinct categories of "*family*" and "*friends*" (Jackson Williams, 2012).

2.2. Sample

Participants met the following criteria: (1) 10–19 years of age, in accordance with the World Health Organization's classification of *adolescence* (World Health Organization, 2005, 2012); (2) Born and raised in Jamaica; (3) Understood and spoke English, or the local dialect of Patois; (4) Exhibited no condition affecting their capacity to provide informed consent.

2.3. Procedure

Urban adolescents were approached at major transportation hubs, city centers, and parks throughout Kingston. The primary investigator stood in public locations during peak commuting hours and asked adolescents passing by if they were interested in completing a brief survey on mobile phone mental health services. In an effort to also encourage participation in both urban and rural areas, we also coordinated with a volunteer organization and their network of rural communities. Volunteers affiliated with the organization are assigned a rural community to visit 2–3 times per week, assisting with activities such as local youth groups. The investigator accompanied volunteers to their sites and asked adolescents involved in the volunteers' activities if they would be interested in completing the survey.

Those who expressed interest were provided with information sheets and consent forms. The researcher read the documents aloud to ensure comprehension and received written consent from participants and their guardians (if under 18 years of age). In an effort to encourage participation, particularly when time was constrained (e.g. waiting for a bus), adolescents were provided the option to complete a hard copy of survey Part 1 (5 min) or complete both survey Part 1 and Part 2 (15–20 min). If requested, the investigator translated questions from English to Patois. Additionally, adolescents could choose to take home the information sheet, consent form, and survey, and investigators then collected the survey on a subsequent day at a predetermined location. Upon completion, the investigator facilitated a debriefing and provided a card with local mental health resources.

2.4. Analysis

All data were analyzed using the Statistical Package for Social Sciences (SPSS) Version 25 Software with alpha set at 0.01 for all analyses. Accessibility of infrastructure based on location (rural vs. urban) was evaluated using chi-squared tests of association and independent sample *t*-tests. Descriptive analyses were used to explore participant interest in digital mental health services. Variations in mHealth preferences based on demographics and infrastructure were evaluated using Pearson's correlation coefficient, independent sample *t*-

---

[1] "Obeah" refers to a system of sorcery and traditional healing derived from West African voodoo practiced primarily in the Caribbean.

tests, and one-way ANOVA.

Differences in perceived barriers to treatment were explored between rural and urban participants using chi-squared tests of association. Then, descriptive analyses were used to evaluate trends in treatment preferences. Following the methods from Jackson Williams (2012), treatment-source ranks were averaged to create an overall rank score for each treatment across all participants for all symptom groupings. Additionally, all treatment helpfulness scores were averaged across all participants for all symptom groupings, to create an overall helpfulness score for each treatment source. Differences were evaluated between rural and urban participants using independent sample t-tests.

To determine perceived treatability of each disorder, participants' helpfulness scores of *first choice help sources* were averaged according to each symptom grouping. Jackson Williams (2012) calculated treatability by averaging all helpfulness ratings for *all help sources* across each disorder. However, averaging the helpfulness of all help sources (ranked 1 through 8) likely leads to regression towards the mean. This effect is evident in Jackson Williams' (2012) helpfulness scores aligning to the scale midpoint of 2.5. By using the top ranked source of help in our analyses we avoided this loss of precision in describing treatability ratings.

Treatment optimism was determined by averaging the perceived helpfulness of participants' top choice help sources across symptom groupings. The 4-point Likert scale of helpfulness indicated participants who marked "3" or "4" perceived the treatment as *helpful* or *very helpful*, respectively. As an example, someone whose average "helpfulness" rating for 7 problem types (e.g. depression, anxiety, substance abuse, etc.) was above 3 would be classed as a treatment optimist. Respondents who returned a mean helpfulness score below 3 were categorized as treatment fatalists. Variations in mHealth preferences between these two groups were then explored using independent sample t-tests.

3. Results

Of 283 people approached, 107 completed survey Part 1. Sixty-four also completed survey Part 2. After screening for missing or uninterpretable data, the final data set for Part 2 of the survey was 56 respondents (see Table 1 for demographic characteristics). We found that the 56 adolescents who provided usable data for survey Part 2 did not significantly differ in age, gender, location, education, or marital status from those who completed only Part 1. Compared to Jackson Williams' (2012) sample, our sub-sample for survey Part 2 had a larger proportion of rural adolescents (60.7% vs. 15.0% rural; X^2 (1, 52) = 102.28, $p < .001$).

3.1. Aim 1: examination of mHealth infrastructure

Of the 107 respondents, 95 (88.8%) reported having electricity in their household *most* of the time, 55 (51.4%) reported having Wi-Fi in their household *most* of the time, and 106 (99.1%) had access to a mobile phone. A majority of mobile phone owners had smartphones (97; 91.5%) and engaged regularly with calling (93; 87.7%), SMS messaging (79; 74.5%), video chatting (65; 61.3%), and app functions (94; 88.7%). Additionally, 81 (76.4%) mobile phone owners did not share their phone with others, while 94 (88.7%) used their phone 6+ days/week. Most used a pay-as-you-go service (64; 60.4%).

No differences were found between rural and urban mobile phone owners for the following variables: electricity; number of phones owned; smartphone ownership; phone usage; phone sharing; service; ability to charge phone; or functions used (i.e. calling, video chatting, etc.). But, rural adolescents had less frequent access to Wi-Fi than urban adolescents (X^2 (2, 93) = 16.902, p < .001).

Table 1
Adolescents' receptiveness to mHealth services for personal and community use.

mHealth interest	Urban respondents (N = 46)	Rural respondents (N = 54)	Total respondents (N = 107)
	%	%	%
Indicated interest in the following: [a]			
Smartphone app	63.0	51.9	56.1
Web-based on mobile [b]	60.9	40.7	47.7
Bi-directional SMS	47.8	42.6	44.9
One direction SMS	37.0	38.9	38.3
How many adolescents in your community do you think have experienced mental distress?			
0%	2.2	5.6	3.7
1–25%	32.6	29.6	29.9
26–50%	21.7	14.8	18.7
51–75%	23.9	27.8	26.2
76–100%	19.6	16.7	18.7
No response	0.0	5.6	2.8
Would mHealth be helpful for these people?			
Yes	80.4	74.1	78.5
No	19.6	18.5	17.8
No response	0.0	7.4	3.7

[a] Respondents defined as interested if they rated 4 or 5 on a 5-point scale.
[b] Significant difference was observed between urban and rural respondents ($p < .01$).

3.2. Aim 2: receptiveness to mHealth resources

When asked to estimate rates of mental distress among their peers, 68 respondents (63.6%) estimated more than one in four of adolescents had experienced such symptoms, and 84 respondents (78.5%) thought mHealth resources would be beneficial for these people (see Table 1). When asked about personal interest in digital mental health services, a majority of respondents (60; 56.1%) indicated interest in a smartphone application used to self-monitor mental health. Although fewer than half of respondents indicated interest in the other mHealth resources, only 27 respondents (25.2%) indicated no interest in any of the services.

No differences in preference for one-direction SMS or bi-directional SMS were found based on demographics or mHealth infrastructure variables. A significant difference was found in interest for web-based communication on mobile, defined as *communicating with doctor/ therapist through calling or video*, with urban adolescents (M = 3.65; SD = 1.27) indicating higher interest in the resource compared to rural adolescents (M = 2.38; SD = 1.65) (t (94.25) = 2.728, p = .008). A majority of urban respondents (60.9%) were interested in web-based communication on mobile. Unsurprisingly, smartphone owners (M = 3.77; SD = 1.31) were significantly more interested in the smartphone application compared to non-smartphone owners (M = 150; SD = 1.00) (t (96) = 3.418, p = .001).

3.3. Aim 3: barriers to treatment and treatment preferences

3.3.1. Barriers to treatment
When asked to indicate barriers to seeking mental health care, respondents most frequently reported the problem was *too personal/embarrassing* (47; 43.9%) or *not serious enough* (44; 41.1%). There were no differences in perceived barriers for rural vs. urban respondents.

3.3.2. Treatment preferences
Ranks were combined across all disorders to map overall mental illness treatment preference. Fig. 1 displays the average rank of each help source across all symptom groupings, and indicates *family* was designated as the first choice help source, with an average rank
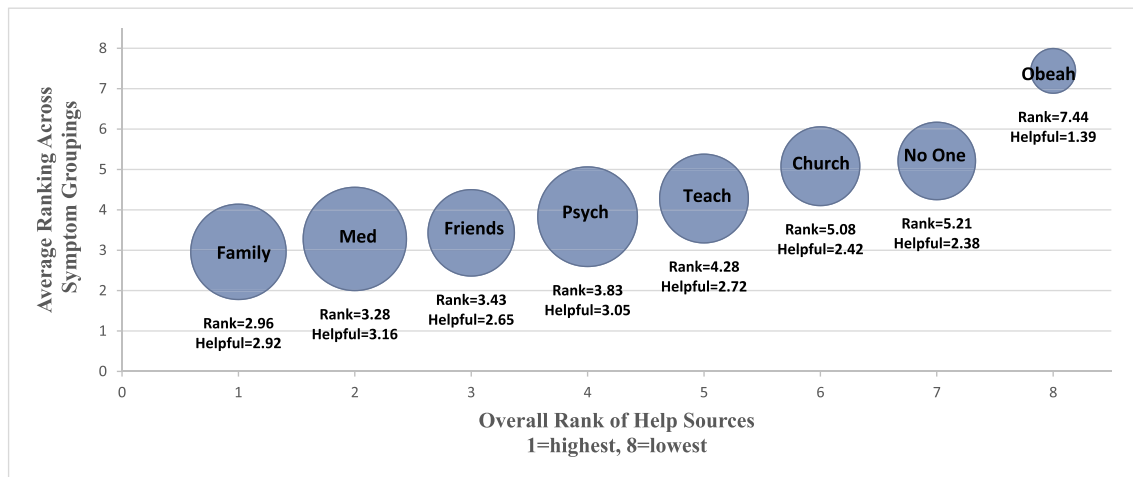
Fig. 1. Survey Part 2 treatment source ranks were averaged across all 7 symptom-groupings to evaluate overall treatment preferences for mental illness.
Note: Rankings are derived from average treatment preference ratings for all sources of support. For example, when the ranking of *family* was averaged across all participant surveys, and across all symptom-groupings within each survey, the rank averaged was 2.96 (on a scale of first choice to eighth choice). This was the highest ranked value among all averaged treatment sources, and placed family as the most preferred help source. Therefore, on the figure, *family* is in the highest-ranking position, with a rank value of 2.96. *Medical doctor* ranked second overall, with an average ranking of 3.28, *friend* ranked third overall, with an average ranking of 3.43, and so on.
The size of the data bubble indicates average perceived helpfulness of each help source on the Likert Scale of 1 (not helpful) to 4 (very helpful), with larger bubbles signifying greater perceived helpfulness. As evident in the figure, the perceived helpfulness of the source did not necessarily correspond to help source rank. For example, *friend* was ranked third overall while *psychiatrist* was ranked fourth overall (although no significant difference was found between rank values, p = .163), but *psychiatrist* was perceived as significantly more helpful than *friend* (p < .001).

consistently in the top 3 places, while *Obeah* was the last choice help source, with an average rank at below 7th place. Additionally, the size of the associated data bubble in Fig. 1 represents the helpfulness score of each treatment preference, with larger data bubbles representing greater helpfulness scores.

We found significant differences between average overall ranks of help sources (F (7, 2355) = 176.641, $p < .001$), as well as significant differences between average overall helpfulness scores of help sources (F (7, 2334) = 95.522, p < .001). One important difference to note is *Obeah* was ranked significantly lower (p < .001) and perceived as significantly less helpful (p < .001), than all other help sources. Additionally, a majority of help sources (*family, medical doctor, friends, psychologist/psychiatrist,* and *teacher*) were ranked significantly higher than *no one* (p < .001) and perceived as significantly more helpful than *no one* ($p \leq .010$), suggesting adolescents would be more likely to seek help from these sources before trying to solve the problem alone. Another important difference indicates that *medical doctor* was ranked significantly higher than *psychologist/psychiatrist* (p = .008), suggesting adolescents would be more likely to seek help from a general practitioner than a mental health specialist; however, *medical doctors* were not perceived to be significantly more helpful than a *psychologist/psychiatrist* (p = .90).

When treatment preference was evaluated according to symptom grouping, trends were found in help source preferences (see Table 2). An important finding to note is that *family*, *friends*, and *medical doctor* were ranked in the top four choices across all disorders, with *family* ranking first in all disorders except for schizophrenia and substance abuse, where *medical doctor* ranked first. It's also important to note that the rank of each individual help source did not differ according to disorder (for example, the rank value of *family* did not significantly differ across *depression, anxiety*, etc.). Therefore, the trends in help source preferences did not significantly differ according to symptom grouping. Additionally, we did not find any differences in help source rank according to disorder based on urban versus rural location.

3.4. Aim 4: treatment optimism & mHealth interest

The rates at which Survey Part 2 respondents (*N* = 56) ranked their first choice help source as *very helpful* were examined. The likelihood that the top ranked treatment option would be very helpful was highest for ADHD (with 44.6% of respondents expecting a "very helpful" treatment effect) and lowest for Eating Disorders (with 32.1% expecting treatment to be "very helpful"). Hence, fewer than half of respondents rating their top help source for any condition as likely to be *very helpful*.

Additionally, mean helpfulness ratings were calculated for *first choice help sources* across all participants for each symptom grouping, and we found perceived treatability of mental illness to be high across all symptom groupings (see Fig. 2). Perceived helpfulness of *first choice help sources* ranged from 3.00 to 3.45 across all disorders, therefore ranging between 3 ("helpful") and 4 ("very helpful") on the Likert Scale.

Mean helpfulness ratings were then calculated according to each participant to evaluate perceived treatment optimism. We chose to categorize participants as either *treatment optimists* (respondents who had an average helpfulness score of 3.00 to 4.00) or *treatment fatalists* (those scoring between 1.00 and 2.99). Using this categorization, the sample consisted of 36 treatment optimists and 11 fatalists. We found no difference in frequency of treatment optimism vs. fatalism based on rural vs. urban location. Interest in mHealth services was evaluated based on treatment optimism, with no differences detected for one-direction SMS, bi-directional SMS, smartphone application, and web-based communication on mobile (see Table 3). However, we found it noteworthy that exploratory analyses detected a difference in ratings of web-based communication on mobile, with treatment fatalists (M = 4.00; SD = 1.27) indicating greater interest in the resource compared to treatment optimists (M = 2.86; SD = 1.64) (t (21.32) = −2.42, p = .024). Since Levene's test indicated unequal variances (F = 5.52, p = .02), results of Welch's *t*-test (equal variances not assumed) are reported. In the interests of identifying patterns worth exploring in future studies we did not adjust alpha for these exploratory

Table 2
Help source rankings according to disorder.

Rank	Depression	Rank	Anxiety	Rank	Eating	Rank	Schizophrenia	Rank	Substance	Rank	ADHD	Rank	Conduct	Rank
1st	Family	2.65	Family	2.54	Family	2.77	Medical Doctor	2.87	Medical Doctor	2.98	Family	3.00	Family	3.24
2nd	Friends	3.33	Friends	3.22	Medical Doctor	2.80	Family	3.12	Friends	3.19	Medical Doctor	3.45	Friends	3.44
3rd	Medical Doctor	3.68	Medical Doctor	3.52	Friends	3.48	Psychologist	3.48	Family	3.43	Psychologist	3.69	Psychologist	3.54
4th	Teacher	3.98	Psychologist	4.21	Psychologist	3.98	Friends	3.69	Psychologist	3.70	Friends	3.79	Medical Doctor	3.59
5th	Psychologist	4.17	Teacher	4.3	Teacher	4.75	Teacher	4.35	Teacher	4.30	Teacher	3.86	Teacher	4.49
6th	Church	5.11	Church	5.00	No One	4.82	Church	5.13	Church	5.05	Church	5.12	Church	4.62
7th	No One	5.17	No One	5.36	Church	5.49	No One	5.41	No One	5.52	No One	5.17	No One	5.07
8th	Obeah	7.48	Obeah	7.50	Obeah	7.41	Obeah	7.38	Obeah	7.38	Obeah	7.44	Obeah	7.51

analyses. However, given the low sample numbers and the post hoc nature of these analyses we suggest that further studies are needed to determine whether these patterns are replicable in other samples.

4. Discussion

This is the first study to report infrastructure and attitudinal barriers to mHealth uptake in Jamaican adolescents. An important factor in delivering mHealth resources at scale is the absence of practical barriers that might impede the uptake of digital mental health resources. All but one respondent reported access to a mobile phone, which suggests adolescents generally have access to mobile phones, and aligns with previous reports that for every 100 people in Jamaica's general population (age not specified), there are 101 mobile phone subscriptions (The World Bank, 2018). Additionally, the majority of mobile phone owners used their phone six or more days per week (88.7%) and did not share their phone (76.4%), which alleviates some privacy concerns, such as others accessing their mHealth app. However, as noted by Ben-Zeev et al. (2017), mHealth app security can be password protected and set to automatically log out following a few minutes of inactivity. Ensuring privacy might also address respondents' most highly cited barrier to help-seeking, *"The problem is too personal/embarrassing"*.

The need for treatment access is also supported, with most respondents (63.6%) believing more than one quarter of adolescents in their community experience mental distress, and most respondents (78.5%) agreeing that mHealth resources would be helpful for these individuals. Also, more than half of participants indicated personal interest in using a smartphone application to monitor their own mental health (56.1%). Fewer were interested in communicating with health providers via one-direction SMS, bi-directional SMS, and web-based communication on mobile and one in four were not personally interested in any of the services.

Although urban adolescents were significantly more interested in web-based communication on mobile services than rural adolescents, with 61% indicating interest, we suspect respondents may have interpreted *web-based* as a service operating on a tablet or computer rather than a mobile phone. Therefore, respondents may have assumed Wi-Fi was necessary to access the resource. Since urban adolescents' had more frequent access to Wi-Fi, their receptiveness to this service may have been swayed towards greater interest. Future studies should clarify the function of this proposed resource as calling or video chatting with a health provider on a mobile phone.

Also important to note, respondents may be unwilling to exhaust their mobile phone data plan on mHealth resources. As Ben-Zeev et al. (2017) discussed, participants may only utilize mHealth services requiring Internet when they have access to Wi-Fi. If Wi-Fi access is sporadic or rare, participants may experience difficulty adhering to specific appointment times or connecting to services during typical 9 am – 5 pm work-week hours, when clinicians would likely be available to text or video chat. As suggested by Ben-Zeev et al. (2017), a smartphone application could include features that do not require Internet access, while those features requiring connection could be accessed on a flexible schedule, when Wi-Fi is available. Application development may also need to involve clarification of Jamaican adolescents' language preferences. Although respondents indicated preferring to read and write in English, they preferred to speak in *both* English and Patois. Incorporating English and Jamaican Patois into mHealth resources (e.g. information videos) might encourage participation.

The results from survey Part 2 also support the usage case for developing mHealth resources. Consistent with Jackson Williams' (2012) findings, our sample preferred informal compared to formal help sources for a majority of mental health symptoms. Understanding local adolescents' treatment preferences may inform the development of effective mHealth resources. Smartphone application and web-based resources could incorporate these preferences to create more effective
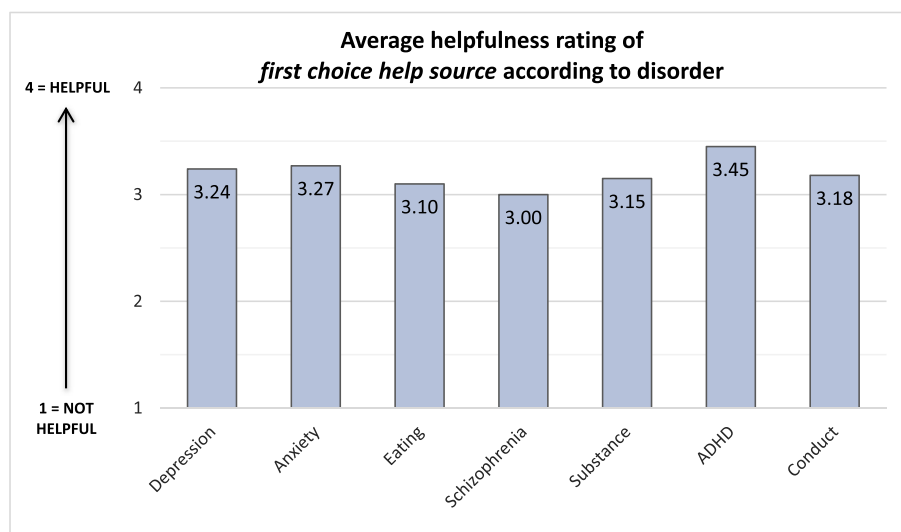
Fig. 2. Perceived treatability of symptom groupings examined by averaging helpfulness ratings of *first choice help sources* across all participants for each symptom grouping.

Table 3
Average interest in mHealth based on treatment effectiveness expectations.

Type of mHealth resources	Treatment optimists (N = 36)		Treatment fatalists (N = 11)	
	M	SD	M	SD
One-direction SMS	3.14	1.26	3.36	1.28
Bi-directional SMS	3.22	1.51	3.82	1.32
Web-based on mobile[a]	2.86	1.64	4.00	1.26
Smartphone application	3.56	1.56	3.91	1.22

[a] Note: Post hoc exploratory analyses found a difference between *treatment optimists* and *treatment fatalists* (t (21.32) = −2.42, p = .024).

treatment plans. For example, the services could encourage adolescents to seek social support from their preferred help sources, such as family and friends.

In contrast with Jackson Williams (2012), our data suggests most Jamaican adolescents perceive mental illness to be largely amenable to treatment. Although fewer than 50% of respondents marked their top choice help source as *4* or *very helpful* across each disorder, average helpfulness scores for first place help sources ranged from 3.00 to 3.45, with the Likert scale rating of *3* indicating *helpful*. Additionally, the survey part 2 sample had a skewed distribution towards treatment optimism, with 35 participants classified as *treatment optimists* and only 11 classified as *treatment fatalists*, which further suggests most Jamaican adolescents believe mental illness is treatable. Since this population likely perceives mental illness as amenable to treatment, they may be more likely to seek out effective help sources, such as mHealth services.

In 2008, the Lancet launched the Movement for Global Mental Health that has advocated for reducing the mental health *treatment gap* - the difference between the number of people affected by mental illness and the number receiving treatment. This disproportionately impacts people in Low and Middle Income Countries (LMICs) compared to those in High Income Countries (Patel et al., 2011; Saxena et al., 2007). In an effort to address this disparity, the Movement supports the implementation of services, such as mHealth, that overcome barriers to care and improve access to treatment for vulnerable populations, particularly within under-represented LMIC. In order to promote acceptance of services among local communities, the Movement for Global Mental Health works to culturally adapt and refine treatment strategies. Therefore, understanding the intricacies of mHealth receptiveness within a particular nation is essential in progressing the global mental

health field (Kieling et al., 2011; Kirmayer and Pedersen, 2014). With < 6% of all mental health research emerging from LMICs, this study contributes to the growing body of literature evaluating the practicalities of mHealth implementation in a global context (Patel et al., 2008). Overall, this feasibility study supports the proof of concept for collecting data to inform mHealth development throughout urban and rural Jamaican communities. Adolescent receptiveness to these resources supports the need for further user-focused investigation in Jamaica. The study addresses some key practical issues that are relevant to other low- and middle-income contexts, while acknowledging cultural and social elements specific to Jamaica. A particular strength of this study is that it is one of the few to recruit a large proportion of rural adolescents. Understanding receptiveness to mHealth in rural populations is particularly critical, because many in these communities face additional barriers to mental health care partly because the majority of mental health professionals live in urban areas (Kakuma et al., 2011; Saxena et al., 2007).

4.1. Study limitations

The small sample size reflects the early stage of this work and we had more female youth (57%) than the population rate of 49% for 10–19 year old Jamaican females. Additionally, interest in mHealth services may not always reflect actual usage patterns when implemented, and would require further evaluation. But, we argue that the lack of LMIC-based mental health research, especially in the Caribbean, needs to be redressed if we are to determine which principles and procedures can be generalized across cultural and linguistic contexts (Misra et al., 2019; Patel et al., 2008), Also, despite the small sample, this is the most comprehensive study of this type conducted in the Caribbean region. This is important as the growth of global mental health research has gone some way to reducing the over-reliance on research data collected in high income countries but the work done in LMICs over the past decade has been unevenly distributed with the majority of data coming from sub-Saharan Africa and South East Asia (Misra et al., 2019). Given the importance of taking account of culture and linguistic diversity in reducing mental health treatment inequalities (Muñoz, 2019), we hope that our work will help to advance research work in settings that have been under-examined previously.

Following our decision to adopt methods previously used in Jamaica by Jackson Williams (2012) for Part 2 of the survey we found that the method was complex for many respondents, and it is possible that they did not fully comprehend the meaning of the different symptom groups

(e.g. due to limited health literacy). These factors may have contributed to the lower number of participants choosing to complete the second half of the survey. Future studies could develop and trial more accessible and age-appropriate methods for examining mental health help-seeking preferences and expectations. Similarly, the wording and response scales of the Part 1 survey derived from Ben-Zeev et al.'s (2017) study in Palestine could also be refined in future investigations, for instance using the adaptation guidelines used in other cross-cultural measure development studies (Van Ommeren et al., 1999).

A final limitation to note is that our conceptualization of treatment *optimists* vs. *fatalists* is a new observation that we offer to make sense of the patterns seen in our preliminary data. This distinction has not been posed before and so it will be important for future studies to develop and test methods for validating this distinction. If these different attitudes prove to be replicable, then they will provide a helpful guide for targeted interventions to promote engagement with mental health treatments.

4.2. Future directions

Future studies should gather more data on the perceived *accessibility* of mental health help sources, in addition to getting ratings of treatment *preference* and perceived *helpfulness*. Further exploration of *accessibility* may provide context to adolescents' preference for *family* and *friends* as help sources, rather than formal treatment services, particularly among a population where stigma and privacy are expressed concerns. Understanding help source accessibility may also help explain variations in treatment preferences between rural and urban adolescents (e.g. low accessibility may reduce preference for some resources). Given that there seem to be few infrastructure barriers to accessing mHealth resources, it is possible that internet delivered interventions could be highly acceptable to Jamaican adolescents. It is also possible that the higher interest in internet interventions in the treatment fatalists group (Table 4) could be a function of their experience that conventional sources of mental health help are hard to access (and are therefore less likely to be helpful).

Future studies should also evaluate mHealth receptiveness among adolescents experiencing mental health difficulties, to further understand how the views of this subpopulation compare to the general population of Jamaican adolescents. We suggest distributing a culturally adapted survey evaluating mental health status in conjunction with the mHealth receptiveness survey, to further explore potential associations.

Future research should also evaluate Jamaica-based healthcare professionals' receptiveness to using mHealth resources in treating adolescent patients. Not only would healthcare professionals need to be consulted in the development of an mHealth application, but also services such as web-based communication on mobile would require their active participation. Therefore, if Jamaica-based healthcare professionals were not receptive to mHealth technology, the resources would prove ineffective. Previous research has evaluated healthcare providers' opinions on digital mental health services, but to our knowledge no such studies have been conducted in Jamaica (Bradford and Rickwood, 2014; Dowling and Rickwood, 2014a).

4.3. Conclusion

The current feasibility study supports the development of smartphone based mental health resources for Jamaican adolescents. Few practical barriers are likely to impede the development of mHealth services among rural and urban populations throughout Jamaica. Barriers such as embarrassment and stigma are more likely to disrupt help seeking. However, by incorporating culturally relevant language and preferences into mHealth resources, these services could increase privacy and confidentiality, and therefore encourage help seeking. Additionally, the appropriateness of mHealth is supported by participants' perception of mental illness as amenable to treatment. Few age-

appropriate mental health resources currently exist in Jamaica, so the development and implementation of such resources have the potential to fill this gap and increase access to mental health care among a vulnerable population.

Declaration of competing interest

None.

References

Abel, W.D., Kestel, D., Eldemire-Shearer, D., Sewell, C., Whitehorne-Smith, P., 2012. Mental health policy and service system development in the English-speaking Caribbean. West Indian Med. J. 61 (5), 475–482. https://doi.org/10.7727/wimj.2012.308.

Aggarwal, N.K., 2012. Applying mobile technologies to mental health service delivery in South Asia. Asian J. Psychiatr. 5 (3), 225–230. https://doi.org/10.1016/j.ajp.2011.12.009.

Alarcón, R.D., 2009. Culture, cultural factors and psychiatric diagnosis: review and projections. World Psychiatry 8, 131–139.

Anderson, J.K., Howarth, E., Vainre, M., Jones, P.B., Humphrey, A., 2017. A scoping literature review of service-level barriers for access and engagement with mental health services for children and young people. Child Youth Serv. Rev. 77, 164–176. https://doi.org/10.1016/j.childyouth.2017.04.017.

Aranda-jan, c., Mohutsiwa-dibe, N.M., Loukanova, S., 2014. Systemic review on implementation of mobile health projects in Africa: what works? What doesn't work and why? BMC Public Health 14 Retrieved from. http://www.who.int/medical_devices/global_forum/B12.pdf.

Arthur, C.M., Hickling, F.W., Robertson-Hickling, H., Haynes-Robinson, T., Abel, W., Whitley, R., 2010. "Mad, Sick, Head Nuh Good": mental illness stigma in Jamaican communities. Transcultural Psychiatry 47 (2), 252–275. https://doi.org/10.1177/1363461510368912.

Bennett, J., Stennett, R., 2015. Attitudes towards mental illness of nursing students in a baccalaureate programme in Jamaica: a questionnaire survey. J. Psychiatr. Ment. Health Nurs. 22 (8), 599–605. https://doi.org/10.1111/jpm.12234.

Ben-Zeev, D., Young, M.A., Corrigan, P.W., 2010. DSM-V and the stigma of mental illness. Journal of Mental Health 19 (4), 318–327. https://doi.org/10.3109/09638237.2010.492484.

Ben-Zeev, D., Fathy, C., Jonathan, G., Abuharb, B., Brian, R.M., Kesbeh, L., Abdelkader, S., 2017. mHealth for mental health in the Middle East: need, technology use, and readiness among Palestinians in the West Bank. Asian J. Psychiatr. 27, 1–4. https://doi.org/10.1016/j.ajp.2017.02.010.

Bradford, S., Rickwood, D., 2014. Electronic psychosocial assessment tool: concept development and identification of barriers to successful implementation. J. Technol. Hum. Serv. 32 (4), 275–296. https://doi.org/10.1080/15228835.2014.967906.

Brian, R.M., Ben-Zeev, D., 2014. Mobile health (mHealth) for mental health in Asia: objectives, strategies, and limitations. Asian J. Psychiatr. 10, 96–100. https://doi.org/10.1016/j.ajp.2014.04.006.

Brown, A., Rice, S.M., Rickwood, D.J., Parker, A.G., 2016. Systematic review of barriers and facilitators to accessing and engaging with mental health care among at-risk young people. Asia Pac. Psychiatry 8 (1), 3–22. https://doi.org/10.1111/appy.12199.

Coyle, D., Doherty, G., Matthews, M., Sharry, J., 2007. Computers in talk-based mental health interventions. Interact. Comput. 19, 545–562. https://doi.org/10.1016/j.intcom.2007.02.001.

Dalton, H., Read, D., Handley, T., Perkins, D., 2017. Low Intensity Mental Health Services: A Rapid Review - January 2017. (Newcastle, Australia).

Dowling, M.J., Rickwood, D.J., 2014a. Experiences of counsellors providing online chat counselling to young people. Aust. J. Guid. Couns. 24 (2), 183–196. https://doi.org/10.1017/jgc.2013.28.

Dowling, M., Rickwood, D., 2014b. Investigating individual online synchronous chat counselling processes and treatment outcomes for young people. Adv. Ment. Health 12 (3), 216–224. https://doi.org/10.1080/18374905.2014.11081899.

Fitzpatrick, K.K., Darcy, A., Vierhile, M., 2017. Delivering cognitive behavior therapy to young adults with symptoms of depression and anxiety using a fully automated conversational agent (Woebot): a randomized controlled trial. Journal of Medical Internet Research Mental Health 4 (2). https://doi.org/10.2196/mental.7785.

Gulliver, A., Griffiths, K.M., Christensen, H., 2010. Perceived barriers and facilitators to mental health help-seeking in young people: a systematic review. BMC Psychiatry 10 (1), 113. https://doi.org/10.1186/1471-244X-10-113.

Hollis, C., Falconer, C.J., Martin, J.L., Whittington, C., Stockton, S., Glazebrook, C., Davies, E.B., 2017. Annual research review: digital health interventions for children and young people with mental health problems - a systematic and meta-review. J. Child Psychol. Psychiatry 58 (4), 474–503. https://doi.org/10.1111/jcpp.12663.

Institute for Health Metrics and Evaluation, 2018. Global Burden of Disease Results Tool. Global Health Data Exchange, Seattle, Washington Retrieved from. http://ghdx.healthdata.org/gbd-results-tool.

Jackson Williams, D., 2012. Where do Jamaican adolescents turn for psychological help? Child and Youth Care Forum 41 (5), 461–477. https://doi.org/10.1007/s10566-012-9177-7.

Jackson Williams, D., 2014. Help-seeking among Jamaican adolescents: an examination of individual determinants of psychological help-seeking attitudes. J. Black Psychol.

40 (4), 359–383. https://doi.org/10.1177/0095798413488940.

Jackson Williams, D., Heatherington, L., 2006. Young Jamaicans' attitudes toward mental illness: experimental and demographic factors associated with social distance and stigmatizing opinions. Journal of Community Psychology 34 (5), 563–576. https://doi.org/10.1002/jcop.20115.

Kakuma, R., Minas, H., Van Ginneken, N., Dal Poz, M.R., Desiraju, K., Morris, J.E., Scheffler, R.M., 2011. Human resources for mental health care: current situation and strategies for action. Lancet 378 (9803), 1654–1663. https://doi.org/10.1016/S0140-6736(11)61093-3.

Kessler, R.C., Berglund, P., Demler, O., Jin, R., Merikangas, K.R., Walters, E.E., 2005. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey replication. Arch. Gen. Psychiatry 62, 593–602. https://doi.org/10.1001/archpsyc.62.6.593.

Khoja, S., Khan, M.A., Husyin, N., Scott, R., Yousafzai, A.W., Durrani, H., ... Khan, D., 2015. Improving mental health care for young adults in Badakshan province of Afghanistan using eHealth. Studies in Health Technology and Informatics 209, 46–50. https://doi.org/10.3233/978-1-61499-505-0-46.

Kieling, C., Baker-Henningham, H., Belfer, M., Conti, G., Ertem, I., Omigbodun, O., Rahman, A., 2011. Child and adolescent mental health worldwide: evidence for action. Lancet 378 (9801), 1515–1525. https://doi.org/10.1016/S0140-6736(11)60827-1.

Kirmayer, L.J., Pedersen, D., 2014. Toward a new architecture for global mental health. Transcultural Psychiatry 51 (6), 759–776. https://doi.org/10.1177/1363461514557202.

Link, B.G., Cullen, F.T., Frank, J., 1987. The social rejection of former mental patients: Understanding why labels matter. American Journal of Sociology 92 (6), 1461–1500.

Lipps, G.E., Lowe, G.A., Halliday, S., Morris-Patterson, A., Clarke, N., Wilson, R.N., 2010. The association of academic tracking to depressive symptoms among adolescents in three Caribbean countries. Child Adolesc. Psychiatry Ment. Health 4, 16. https://doi.org/10.1186/1753-2000-4-16.

Marzano, L., Bardill, A., Fields, B., Herd, K., Veale, D., Grey, N., Moran, P., 2015. The application of mHealth to mental health: opportunities and challenges. Lancet Psychiatry 2, 942–948. https://doi.org/10.1016/S2215-0366(15)00268-0.

McCann, T.V., Mugavin, J., Renzaho, A., Lubman, D.I., 2016. Sub-Saharan African migrant youths' help-seeking barriers and facilitators for mental health and substance use problems: a qualitative study. BMC Psychiatry 16 (1), 1–10. https://doi.org/10.1186/s12888-016-0984-5.

McFarlane, S., Younger, N., Francis, D., Gordon-Strachan, G., Wilks, R., 2014. Risk behaviours and adolescent depression in Jamaica. Int. J. Adolesc. Youth 19 (4), 458–467. https://doi.org/10.1080/02673843.2012.751041.

Ministry of Health Jamaica, 2016. Islandwide Mental Health Clinic Schedules. Retrieved from. http://www.moh.gov.jm/wp-content/uploads/2016/06/Mental-booklet-Clinic-Schedule-2.pdf.

Misra, S., Stevenson, A., Haroz, E.E., de Menil, V., Koenen, K.C., 2019. "Global mental health": systematic review of the term and its implicit priorities. BJPsych Open 5 (3), e47–e48. https://doi.org/10.1192/bjo.2019.39.

Montague, A.E., Varcin, K.J., Simmons, M.B., Parker, A.G., 2015. Putting technology into youth mental health practice: young people's perspectives. SAGE Open 5 (2). https://doi.org/10.1177/2158244015581019.

Morgan, A.J., Jorm, A.F., Mackinnon, A.J., 2012. Email-based promotion of self-help for subthreshold depression: mood memos randomised controlled trial. Br. J. Psychiatry 200 (5), 412–418. https://doi.org/10.1192/bjp.bp.111.101394.

Morgan, A.J., Jorm, A.F., Mackinnon, A.J., 2013. Self-help for depression via e-mail: a randomised controlled trial of effects on depression and self-help behaviour. PLoS One 8 (6), e66537. https://doi.org/10.1371/journal.pone.0066537.

Muñoz, R.F., 2010. Using evidence-based internet interventions to reduce health disparities worldwide. J. Med. Internet Res. 12 (5), e60–10. https://doi.org/10.2196/jmir.1463.

Muñoz, R.F., 2019. Harnessing psychology and technology to contribute to making health care a universal human right. Cogn. Behav. Pract. 1–11. https://doi.org/10.1016/j.cbpra.2019.07.003.

Murry, V.M., Heflinger, C.A., Suiter, S.V., Brody, G.H., 2011. Examining perceptions about mental health care and help-seeking among rural African American families of adolescents. Journal of Youth and Adolescence 40 (9), 1118–1131. https://doi.org/10.1007/s10964-010-9627-1.

Musiat, P., Goldstone, P., Tarrier, N., 2014. Understanding the acceptability of e-mental health - attitudes and expectations towards computerized self-help treatments for mental health problems. BMC Psychiatry 14 (1), 109–116. https://doi.org/10.1186/1471-244X-14-109.

National Collaborating Centre for Mental Health, 2011. Generalised Anxiety Disorder in Adults: Management on Primary, Secondary and Community Care. The British Psychological Society & The Royal College of Psychiatrists, London, UK Retrieved

from. http://www.nhs.uk/Conditions/Anxiety/Pages/Introduction.aspx.

Our World in Data, 2018. Prevalence of depression by age, world, 2017. *OurWorldInData.org.* Retrieved from. https://ourworldindata.org/grapher/prevalence-of-depression-by-age.

Palmer, G.J., Palmer, R.W., Payne-Borden, J., 2012. Evolution of counseling in Jamaica: past, present, and future trends. Journal of Counseling & Development 90 (1), 97–101. https://doi.org/10.1111/j.1556-6676.2012.00013.x.

Patel, V., Flisher, A.J., Hetrick, S., McGorry, P., 2007. Mental health of young people: a global public-health challenge. Lancet 369 (9569), 1302–1313. https://doi.org/10.1016/S0140-6736(07)60368-7.

Patel, V., Flisher, A.J., Nikapota, A., Malhotra, S., 2008. Promoting child and adolescent mental health in low and middle income countries. J. Child Psychol. Psychiatry 49 (3), 313–334. https://doi.org/10.1111/j.1469-7610.2007.01824.x.

Patel, V., Collins, P.Y., Copeland, J., Kakuma, R., Katontoka, S., Lamichhane, J., Naik, S., Skeen, S., 2011. The movement for global mental health. Br. J. Psychiatry 198, 88–90. https://doi.org/10.1192/bjp.bp.109.074518.

Proudfoot, J., Parker, G., Pavlovic, D.H., Manicavasagar, V., Adler, E., Whitton, A., 2010. Community attitudes to the appropriation of mobile phones for monitoring and managing depression, anxiety, and stress. J. Med. Internet Res. 12 (5), e64. https://doi.org/10.2196/jmir.1475.

Rangaswamy, T., Sujit, J., Kotteswara, R., 2008. Telepsychiatry in Chennai, India: the SCARF experience. Behavioral Sciences and the Law 26, 315–322. https://doi.org/10.1002/bsl.816.

Rickwood, D.J., Deane, F.P., Wilson, C.J., 2007. When and how do young people seek professional help for mental health problems? Med. J. Aust. 187 (7), S35–S39. Retrieved from. https://www.mja.com.au/journal/2007/187/7/when-and-how-do-young-people-seek-professional-help-mental-health-problems.

Saxena, S., Thornicroft, G., Knapp, M., Whiteford, H., 2007. Resources for mental health: scarcity, inequity, and inefficiency. Lancet. https://doi.org/10.1016/S0140-6736(07)61239-2.

Schlosser, D.A., Campellone, T.R., Truong, B., Anguera, J.A., Vergani, S., Vinogradov, S., Arean, P., 2017. The feasibility, acceptability, and outcomes of PRIME-D: a novel mobile intervention treatment for depression. Depression and Anxiety 34, 546–554. https://doi.org/10.1002/da.22624.

Schnall, R., Rojas, M., Bakken, S., Brown, W., Carballo-Dieguez, A., Carry, M., Travers, J., 2016. A user-centered model for designing consumer mobile health (mHealth) applications (apps). J. Biomed. Inform. 60, 243–251. https://doi.org/10.1016/j.jbi.2016.02.002.

Sylwestrzak, A., Overholt, C.E., Ristau, K.I., Coker, K.L., 2015. Self-reported barriers to treatment engagement: adolescent perspectives from the National Comorbidity Survey-Adolescent Supplement (NCS-A). Community Ment. Health J. 51 (7), 775–781. https://doi.org/10.1007/s10597-014-9776-x.

Tharaldsen, K.B., Stallard, P., Cuijpers, P., Bru, E., Bjaastad, J.F., 2017. "It"s a bit taboo': a qualitative study of Norwegian adolescents' perceptions of mental healthcare services. Emot. Behav. Diffic. 22 (2), 111–126. https://doi.org/10.1080/13632752.2016.1248692.

The World Bank, 2018. Mobile cellular subscriptions (per 100 people) - Jamaica. World Bank Group Retrieved from. https://data.worldbank.org/indicator/IT.CEL.SETS.P2?locations=JM.

Torous, J., Chan, S.R., Yee, S., Tan, M., Behrens, J., Mathew, I., Keshavan, M., 2014. Patient smartphone ownership and interest in mobile apps to monitor symptoms of mental health conditions: a survey in four geographically distinct psychiatric clinics. Journal of Medical Internet Research Mental Health (1), 1. https://doi.org/10.2196/mental.4004.

Van Ommeren, M., Sharma, B., Thapa, S., Makaju, R., Prasain, D., Bhattarai, R., de Jong, J., 1999. Preparing instruments for transcultural research: use of the translation monitoring form with Nepali-speaking Bhutanese refugees. Transcultural Psychiatry 36 (3), 285–301.

Virtue, E., 2013, June 30. Long wait for help - child guidance clinics under stress as thousands of children seek help to address mental problems. In: The Sunday Gleaner, Retrieved from. http://jamaica-gleaner.com/gleaner/20130630/lead/lead3.html.

Whiteford, H.A., Degenhardt, L., Rehm, J., Baxter, A.J., Ferrari, A.J., Erskine, H.E., Vos, T., 2013. Global burden of disease attributable to mental and substance use disorders: findings from the Global Burden of Disease Study 2010. Lancet 382 (9904), 1575–1586. https://doi.org/10.1016/S0140-6736(13)61611-6.

World Health Organization, 2005. Atlas: Child and Adolescent Mental Health Resources. https://doi.org/10.3109/08039487509097356.

World Health Organization, 2012. Adolescent mental health: mapping actions of non-governmental organizations and other international development organizations. Retrieved from WHO Press http://www.who.int/about/licensing/copyright_form/en/index.html.