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Digital Mental Health Interventions: Bridging the Gap in Adolescent Mental Health Services in Nigeria

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Abstract: Adolescence (10–19 years) represents a critical developmental period marked by significant physical, emotional, and social transitions, during which mental health challenges such as anxiety, depression, and behavioural disorders frequently emerge. In Nigeria, these challenges are compounded by socioeconomic stressors, limited mental health infrastructure, and pervasive stigma, resulting in a substantial treatment gap. Despite the growing burden, access to adolescent mental health services remains critically inadequate due to shortages of trained professionals, poor service integration, and weak policy implementation. This study explores the potential of digital mental health interventions (DMHIs) in bridging the gap in adolescent mental health service delivery in Nigeria. DMHIs including mobile health applications, internet-based cognitive behavioural therapy, telepsychiatry, and short message services offer scalable, accessible, and cost-effective approaches to care. Evidence suggests that these interventions are effective in reducing symptoms of common mental disorders and improving treatment adherence, while also enhancing privacy and reducing stigma associated with help-seeking. The increasing penetration of mobile technology among Nigerian adolescents provides a unique opportunity to expand mental health access, particularly in underserved and rural communities. However, several barriers persist, including digital literacy gaps, infrastructural limitations, cultural beliefs, and concerns regarding data privacy and regulatory oversight. Findings indicate that while DMHIs hold significant promise, they are most effective when integrated with existing healthcare systems rather than used as standalone solutions. Addressing systemic challenges and strengthening policy frameworks will be essential for sustainable implementation.

Keyword: Adolescent mental health, Digital mental health interventions, Access to healthcare, Mental health service gap, Nigeria

INTRODUCTION

Adolescence (11- to 19-year-olds) is a pivotal stage of growth, filled with rapid physical, emotional, and social changes. During this period, many young individuals experience mental health challenges, such as anxiety, depression, and behavioral disorders. Despite the increasing prevalence of these issues, access to timely and effective mental health services remains a significant barrier [1]. Faruqui [2] stated Nigeria is currently facing its worst economic crisis in about 30 years which has significantly worsened in the last 2 years. The concomitant stressors and traumas being experienced by Nigerians could contribute to a mental health crisis in the country.

BACKGROUND

Mental Health is a state of wellbeing of an individual in all aspects including cognitive, behavioral, emotional, social and psychological well-being. It is all about how we think, feel, and behave. It also affects how we handle stress, anxiety, depression, overcome life's challenges, relate to others, and make choices [3].The World Health Organization defines mental health as a state of well-being where individuals realize their potential [4].

Mental health issues among Nigerian adolescents represent a significant public health concern with serious consequences when left untreated. Research indicates that up to 65% of Nigerian households live on less than US$1.25 per day, with high rates of child malnutrition and low school enrollment, creating substantial mental health risks for children and adolescents [5]. According to WHO in 2025, Globally, one in seven 10-19-year-olds experiences a mental disorder, accounting for 15% of the global burden of disease in this age group. Depression, anxiety and behavioural disorders are among the leading causes of illness and disability among adolescents. Suicide is the third leading cause of death among those aged 15–29 years old. Similarly, clinical data from Federal Neuropsychiatric Hospital, Enugu revealed a 9.9% prevalence of mental illness among adolescents aged 15-18 years, with schizophrenia spectrum disorders being most common (69.2%) and males more affected than females [6]. Critically, mental health literacy remains extremely low, with only 4.8% of adolescents' correctly identifying depression and merely 1.5% recommending professional psychiatric help [7]. Studies in Lagos State confirm high prevalence of mental health problems among adolescents, particularly those aged 12-15 years, often accompanied by out-of-school issues [8].The consequences of failing to address adolescent mental health conditions extend to adulthood, impairing both physical and mental health and limiting opportunities to lead fulfilling lives as adults.

Chijioke et al [9] stated Nigeria mental health infrastructure consists mainly of eight neuropsychiatric hospitals and teaching hospital psychiatric departments for 200 million people, with only one private community residential facility [9]. Key barriers include inadequate mental health specialists, poor integration of services into existing healthcare structures, and weak policy frameworks [10]. Additional obstacles encompass lack of incentives for healthcare workers, inadequate workforce, poor education, ignorance, stigmatization, absence of rural services, high costs, and travel distances [11]. The disparity between available services and need is substantial, with challenges in policy development, financing, research, training, and primary healthcare integration [12].

Digital mental health encompasses information and communication technologies used in mental health services, including internet-based platforms, smartphone applications, wearable devices, and immersive solutions like virtual reality [13]. These technologies serve various functions from self-help services to professional-assisted interventions for mental health promotion, prevention, and treatment [14].

Digital mental health interventions represent a promising solution to address Nigeria's significant mental health treatment gap, where access to care remains critically limited due to stigma, inadequate infrastructure, and economic constraints [14]. These interventions, including mobile applications, teletherapy, and AI-driven chatbots, leverage Nigeria's growing digital ecosystem and mobile phone penetration to provide scalable, cost-effective solutions [14]. Current digital mental health initiatives in Nigeria primarily consist of private platforms connecting users directly to mental health professionals [15]. Key

advantages include increased efficiency, accessibility, reduced stigmatization, and enhanced adherence to treatment [15, 16]. However, significant challenges persist, including digital literacy gaps, socio-cultural resistance, data privacy concerns, infrastructural limitations, lack of policy frameworks, and limited funding [15, 16].

RATIONALE

Nigeria faces severe challenges in mental health service provision, with significant gaps between service availability and population needs. The country has only eight neuropsychiatric hospitals and a similar number of teaching hospital psychiatric departments serving over 200 million people, alongside a single private residential facility [9]. This limited infrastructure contributes to a substantial treatment gap, particularly for adolescents who already face barriers to accessing care. Digital mental health services offer significant potential to address barriers in traditional mental healthcare delivery. Research shows that digital interventions can reduce stigma, improve confidentiality, and lower cost barriers, which are major deterrents to help-seeking behavior [17, 18]. These interventions are especially beneficial in low-resource settings, where access to trained professionals is limited and geographic distance restricts service utilization [18]. Furthermore, digital platforms leverage increasing mobile phone penetration and internet access in Nigeria, providing scalable and cost-effective solutions for mental health promotion, prevention, and treatment [19]. They also enhance accessibility and efficiency in service delivery while potentially improving adherence to treatment [15, 16].

However, despite these advantages, several challenges hinder the effective implementation of digital mental health interventions. These include digital literacy gaps, infrastructural limitations, socio-cultural resistance, concerns about data privacy, and the absence of strong policy frameworks and funding support [15, 16].Therefore, this study aims to explore how digital mental health interventions can be bridge the gap in adolescent mental health services in Nigeria.

OVERVIEW OF ADOLESCENT MENTAL HEALTH IN NIGERIA

Adolescent mental health is now widely recognised as a major public health priority due to its far-reaching effects on educational attainment, social functioning, and long-term economic productivity [20].

Globally, an estimated 13% of individuals aged 10-19 years live with a diagnosable mental disorder, highlighting the scale of the problem during this critical developmental period [21]. Emotional disorders, particularly anxiety and depression, constitute the largest proportion of this burden and are strongly associated with impaired daily functioning and reduced quality of life [22]. Suicide remains a leading cause of mortality in this age group, ranking fourth among adolescents aged 15-19 years worldwide [21]. Early onset of mental health conditions is linked to persistence into adulthood, contributing to chronic illness, substance misuse, and diminished life opportunities [23].

In sub-Saharan Africa, the burden of adolescent mental health disorders is substantial and remains inadequately addressed [24]. A systematic review reported that 40.8% of adolescents experience emotional or behavioural problems [24]. Anxiety and

depressive disorders affect 29.8% and 26.9% of adolescents respectively in the region [24]. Post-traumatic stress disorder and suicidal ideation have been documented in 21.5% and 20.8% of adolescents respectively [24]. Mental disorders rank among the leading causes of disability in children and adolescents globally [22]

Nigeria, with a population exceeding 220 million and a median age of approximately 18 years, faces a considerable adolescent mental health burden [25]. One in six young Nigerians aged 15-24 is estimated to experience poor mental health [25]. Prevalence estimates among adolescents range from 10% to 37%, depending on methodology and setting [20]. Despite this variation, adolescent psychiatric morbidity remains a significant and under-recognised public health issue in Nigeria [26]. Depression is one of the most commonly reported mental health conditions among Nigerian adolescents [23]. A study conducted in Ibadan found that 23.8% of adolescents had mild to moderate depressive symptoms [23]. Severe depression was reported in 5.7% of participants in the same study [23]. Research from South-East Nigeria has similarly demonstrated a high prevalence of depressive disorders in school settings [27]. Untreated depression in adolescence is associated with poor academic outcomes and increased risk of substance misuse [23]. Other conditions such as anxiety disorders, ADHD, substance use disorders, and conduct disorders are also prevalent [26].

Among adolescent girls, mental health outcomes are influenced by gender-specific social and economic factors [28]. A cross-sectional study reported that 35% experienced anxiety [28]. The same study found that 30% experienced depression [28]. Trauma-related symptoms were reported in 24% of participants [28].

Cultural beliefs significantly shape perceptions of mental illness in Nigeria [29]. Supernatural explanations remain common, particularly in rural and religious communities [29]. These beliefs often direct help-seeking toward traditional or faith-based healers [30]. In some settings, more than 60% of patients access psychiatric care only after alternative pathways have failed [30]. Stigma further limits access by discouraging disclosure and delaying treatment [31].

Structural constraints significantly restrict mental health service delivery [31]. Nigeria allocates less than 1% of its national health budget to mental health [31]. The country has fewer than 300 psychiatrists for a population exceeding 220 million [32]. This corresponds to approximately 0.1 psychiatrists per 100,000 population [33]. The treatment gap exceeds 75%, leaving most individuals without access to care [31].

Mental health services are unevenly distributed, with most specialists located in urban centres [34]. Adolescents in rural areas face barriers including cost, distance, and limited referral systems [20]. The emigration of trained professionals continues to exacerbate workforce shortages [31].

Nigeria's mental health system has historically focused on adult inpatient care [26]. The Lunacy Act of 1958 governed mental health services for decades [35]. The Mental Health Act of 2021 represents a policy shift but remains inconsistently implemented [35]. Specialised child and adolescent services remain limited [26]. Primary care integration using WHO mhGAP has shown promise but has not been widely scaled [34].

DIGITAL MENTAL HEALTH INTERVENTIONS

Digital mental health interventions involve the use of information and communication technologies to support the prevention, assessment, and treatment of mental health conditions [36]. These interventions include mobile applications, internet-based therapy platforms, telepsychiatry, short message services, and interactive voice response systems [36]. The World Health Organization defines digital health as the use of digital technologies to improve health outcomes, within which digital mental health is situated [21]. Digital interventions may be delivered synchronously through real-time interaction or asynchronously through self-guided or delayed communication systems [37].

The evidence base for digital mental health interventions has expanded considerably in recent years [36]. A meta-review of 304 studies found that digital interventions are effective across a wide range of psychiatric conditions including depression and anxiety [36]. Internet-based cognitive behavioural therapy has demonstrated outcomes comparable to face-to-face therapy when guided by clinicians [37]. Tele-mental health interventions have also been shown to be non-inferior to in-person care for common mental disorders [38]. User acceptability remains high, with pooled satisfaction rates exceeding 70% [38].

Mobile health applications represent the fastest growing segment of digital mental health care [36]. More than 50,000 mental health-related applications were available globally by 2022 [36]. However, only a small proportion of these applications have demonstrated evidence of effectiveness [39].

Short message services and interactive voice response systems are particularly relevant in low-resource settings [39]. These technologies allow delivery of mental health content without requiring smartphones or high literacy levels [40]. Interactive voice response systems are especially useful in rural areas with limited internet access [40].

Evidence specific to sub-Saharan Africa remains limited [41]. A systematic review identified only one rigorously evaluated school-based digital intervention in the region [41]. Adolescent-focused digital interventions are increasingly being developed using participatory design approaches [42]. User involvement in design has been associated with improved engagement and acceptability [39].

Nigeria's digital infrastructure provides both opportunities and challenges for implementation [43]. Internet penetration has increased significantly, with millions accessing services through mobile devices [43]. Smartphone usage continues to rise, particularly among young people [44]. Despite this growth, disparities in access remain [32]. Rural populations experience lower connectivity and limited digital infrastructure [32]. A gender digital divide also affects access to digital mental health services [44]. Additional barriers include unreliable power supply, cost constraints, and limited digital literacy [32]. Regulatory frameworks for digital mental health remain underdeveloped in Nigeria [32].

Cultural adaptation is essential for the effectiveness of digital interventions in Nigeria [29]. Interventions must incorporate local languages, beliefs, and culturally relevant narratives [42]. Improving mental health literacy should also be a core component of digital interventions [23].

Atilola et al. [45] implemented the Break Free from Depression programme, a four-module depression-literacy curriculum, across 21 secondary schools in three states in South-West Nigeria, reaching 3,098 students and 294 teachers [45]. The intervention was adapted

for a Nigerian school context and assessed knowledge, attitude, and confidence domains at baseline and immediately after training [45]. Statistically significant improvements were recorded across all three domains following programme completion, suggesting that structured psychoeducational content can produce measurable gains in mental health literacy within school settings [45]. A notable strength of this study was its scale: the reach of over 3,000 adolescents across multiple states demonstrates the operational feasibility of school-based delivery and reduces dependence on the formal mental health workforce at a time when Nigeria has fewer than 300 psychiatrists nationally [32]. The simultaneous training of teachers also created a multiplier effect, building institutional capacity within schools for ongoing mental health support [45]. However, the study measured only immediate post-training outcomes, and no follow-up data were collected to determine whether the gains in knowledge and attitude were sustained over time [45]. The sample was drawn entirely from South-West Nigeria, limiting the generalisability of findings to other geopolitical zones where cultural attitudes toward mental illness and educational infrastructure may differ considerably [29]. The study also measured literacy rather than clinical outcomes, meaning its impact on actual help-seeking behaviour or symptom reduction among students with depression remained unaddressed [45].

Ofoegbu et al. [46] conducted a 10-week group randomised trial evaluating the efficacy of a guided internet-assisted intervention grounded in cognitive behavioural therapy principles among 192 educational technology students identified as depressed across Nigerian universities [46]. The intervention produced significant reductions in depression scores at post-test, which were maintained at a four-week follow-up assessment [46]. This represents one of the few studies in Nigeria to use a randomised controlled design with a structured follow-up period, giving it comparative strength over many feasibility-only studies in the region [32]. The internet-based delivery format also demonstrated that CBT-oriented digital content could be adapted for and accepted by a Nigerian university population [46]. The study's limitations are nonetheless significant: the sample was restricted to educational technology students, a group likely to have above-average digital literacy and reliable internet access, which may not reflect the experiences of the broader adolescent population in Nigeria, particularly those in rural or less digitally connected settings [32]. The follow-up period of only four weeks was insufficient to establish long-term durability of treatment effects [39]. Additionally, only mild to moderate depression was evaluated, excluding students with severe symptoms and thereby limiting the intervention's relevance to more clinically complex presentations [46].

Thomas, Lawani, and James [47] conducted the first randomised controlled trial in Nigeria evaluating the effect of short message service reminders on clinic attendance among 200 patients with first-episode psychosis at the Federal Neuro-Psychiatric Hospital in Benin City [47]. Both the intervention and control groups received appointment cards, but those in the intervention arm also received SMS text reminders prior to their scheduled visits [47]. Patients who received SMS reminders were found to be almost twice as likely to attend their next scheduled outpatient appointment, and the intervention independently reduced the risk of missed appointments by 50% after adjusting for relevant confounders [47]. A primary strength of this study was its use of a simple, low-cost, and widely accessible technology that functions without smartphones or internet connectivity, making it particularly appropriate for a resource-limited Nigerian psychiatric setting [39]. The intervention addressed a documented and clinically consequential problem, given that early

disengagement from care among patients with first-episode psychosis is associated with poorer prognosis and reduced medication adherence [47]. The main limitation of the study was that it was conducted in a single tertiary facility, restricting the generalisability of results to other psychiatric centres or primary care settings in Nigeria [32]. The study also did not assess longer-term attendance patterns beyond the immediate outcome, making it difficult to determine whether the effect was sustained over multiple appointment cycles [47]. Furthermore, while the intervention was conducted among adults, the broader applicability of SMS-based appointment reminders to adolescent psychiatric populations in Nigeria remains untested [39].

Kola et al. [48] surveyed 260 perinatal adolescents aged 16 to 19 years attending 33 primary health care clinics across the 11 local government areas of Ibadan, Oyo State, to assess mobile phone use patterns and openness to mHealth-supported mental health interventions [48]. The study found that the large majority of respondents owned and used mobile phones, and that 96.2% expressed interest in using mobile phones for preventive mental health information, while 93.5% indicated openness to treatment-related information delivered via mobile platforms [48]. Half of respondents preferred text messages as their delivery mode, a finding with direct implications for intervention design in this population [48]. A key strength of the study was its community-based recruitment across 33 clinics in multiple local government areas, giving the sample meaningful geographic breadth within Oyo State and increasing its representativeness of low-income perinatal adolescents in primary care [48]. The findings also provided empirical grounding for the development of a theory-informed mHealth intervention for adolescent perinatal depression in primary care Nigeria, subsequently described by Kola et al. [49]. However, the study did not evaluate any intervention outcomes, as it was a needs assessment and acceptability survey rather than a trial [48]. Only 23% of phone-owning respondents had smartphones, which meant that app-based interventions would effectively exclude a substantial proportion of the target population at the time of data collection [48]. The sample was limited to Oyo State and did not include adolescents from northern Nigeria, where mobile phone access and gender-based disparities in technology use are more pronounced [44].

BENEFITS OF DIGITAL MENTAL HEALTH INTERVENTIONS

Digital mental health interventions (DMHIs) like online CBT programs, apps, or tele-counseling have proved to benefit adolescents facing common mental health issues. Systematic reviews and meta-analyses show that computerized cognitive behavioural therapy (cCBT) significantly reduces anxiety and depression in young people compared to control groups [50], with these findings corroborated by reviews and meta-analyses that concentrate on adolescents [51, 52, 53].

Notably, guided digital CBT is beneficial in reducing anxiety and depressive symptoms compared to passive controls in adolescents and young adults. It also yields outcomes comparable to face-to-face therapy for mild to moderate anxiety and depression [50]. The positive effects of cCBT on depressive symptoms persist beyond the short term. DMHIs are also beneficial in reducing symptoms of stress with similar efficacy to conventional treatment. However, DMHIs with an in-person element deliver the best outcomes [54]. Evidence backing gamified cCBT is also progressing: the SPARX randomized

trial demonstrated equivalence to conventional treatment for teenage depression [55]. Overall well-implemented DMHIs produce clinically significant improvements similar to traditional therapy.

Asides their effectiveness, DMHIs offer concrete advantages in settings where almost 90% of young people with mental health issues in sub-Saharan Africa remain untreated [56], with Nigeria particularly having just 250 psychiatrists for its 200 million population [57]. DMHIs fill this gap by connecting patients with mental health professionals and enhancing mental health delivery by providing diagnostic tools and information to community health workers under the supervision of specialists. It also has the advantage of potentially reaching patients in conflict zones where mental health services are likely non-existent [58]. Thus, DMHIs improve access to care by leveraging nearly universal mobile phone usage among young people [59].

DMHIs importantly help to mitigate stigma associated with seeking mental health care. Stigma is a major barrier to seeking care especially in low- and middle-income countries leading to poor quality of life and social isolation in individuals battling mental health disorders [58]. Digital technologies show promise in reducing stigma concerns. Studies have reported stigma concerns as a primary reason for accessing digital mental health services [60]. Particularly, young people value anonymity: around 80% of youths surveyed view confidentiality as a crucial element in seeking help online, diminishing stigma [61].

Beyond improving access and reducing stigma, DMHIs can help extend support at scale in resource-limited settings, especially when delivered as self-guided or professionally supported tools for adolescents in LMICs [62]. Their interactive features can also strengthen engagement and adherence, which is often a major challenge in adolescent mental health care [63]. In addition, digital and interactive approaches may improve health literacy by making mental health information easier to understand and use [64].

CHALLENGES OF MENTAL HEALTH SERVICES IN NIGERIA

The demand for mental health services in Nigeria is significant and increasing annually but the availability of these services is limited and unevenly spread. Approximately 20–30% of Nigerians, around 40–50 million individuals, will encounter a mental health issue during their lifetimes, with adolescents being particularly impacted since nearly half of the nation's population is below 15 years old [65]. Despite this challenge, it is estimated that up to 80% of Nigerians experiencing serious mental illnesses do not receive treatment, leading to poor educational outcomes for young people and considerable strain on families and communities [66, 67].

The primary reason for this gap is the significant lack and unequal distribution of mental health professionals. Nigeria has under 300 active psychiatrists for a population over 200 million, resulting in an approximate ratio of 0.15 per 100,000, compared to the WHO guideline of 1 per 10,000 [65, 68]. Other personnel are likewise insufficient, with only around 1,000 psychiatric nurses and about 300 certified clinical psychologists across the country [65]. The situation is expected to worsen; a nationwide survey revealed that 52.7% of early-career psychiatrists in Nigeria anticipate practicing overseas within five years [69].

The majority of remaining specialists are concentrated in southern cities like Lagos, Ibadan, and Abeokuta, resulting in rural and northern populations being largely underserved [70].

Funding and infrastructure are severely inadequate. Mental health accounts for around 3.3% of Nigeria's federal health budget, which forces services to depend on ad hoc funding and out-of-pocket expenses [68]. Care continues to be concentrated in eight federal neuropsychiatric hospitals and some state facilities [66, 70]. Despite the National Mental Health Act of 2021 being enacted in January 2023 replacing the colonial Lunacy Act, its execution has been hampered by inadequate coordination among federal, state, and local levels and the lack of a functioning operational plan [67, 71, 72].

Stigma and cultural beliefs additionally limit the behavior of seeking care. Mental illness is often linked to witchcraft or spiritual attacks, leading families to seek traditional and faith-based healers as their primary form of treatment, often resulting in human rights violations [73]. Mental health literacy among adolescents is quite poor, with just 4.8% of Nigerian secondary school students accurately recognizing depression [74].

EMPIRICAL REVIEW

Ogundipe et al. [75] in "Perception, Attitude and Use of Digital Health Platforms for Mental Health Promotion among Students in South-Western Nigeria" conducted a cross-sectional survey of 400 students at the University of Ibadan to assess the acceptability and use of digital mental health platforms. The study reported a high level ownership of digital devices and internet access among study population, however awareness and utilization of digital mental health platforms was low. Factors influencing usage included perceived usefulness, ease of access, and concerns about privacy. The study also highlights that while digital interventions are acceptable, barriers such as stigma and trust issues still limit their adoption [75]. A key strength of this study is that it that simultaneously measures awareness, attitudes, utilization of digital mental health tools and user perception. Its limitation is its single-institution design, affecting generalizability.

Kola et al. [59] in "Mobile Phone Use and Acceptability for the Delivery of Mental Health Information Among Perinatal Adolescents in Nigeria" examined mobile phone use patterns and readiness for mental health interventions among adolescent mothers in Oyo State, Nigeria. The study surveyed 260 adolescent mothers aged 16–19 years in their perinatal or postnatal periods across primary health care clinics in Ibadan, Oyo State, Nigeria. The study found high prevalence mobile phone ownership and willingness to receive mental health information through digital platforms. Identified factors influencing acceptability included ease of use, privacy, and perceived usefulness [59]. A major strength of this study is its focus on a vulnerable adolescent sub-population often excluded from digital mental health research. However, its limitation is its cross-sectional design and restricted geographic scope to a single state, limiting generalizability.

A study by Ofoegbu et al. [46] titled "Efficacy of Guided Internet-Assisted Intervention on Depression Reduction Among Educational Technology Students of Nigerian Universities" aimed to determine the efficacy of a guided internet-assisted intervention (GIAI) on depression reduction among educational technology students of Nigerian universities. A group randomized trial (GRT) was employed, involving pre-test, post-test, and follow-up assessments of 192 educational technology students identified as having

depression. Findings showed that after 10 weeks of participation in GIAI, there was a significant reduction in depression among students in the treatment group compared to those in the usual-care control group. The follow-up assessment indicated a further significant reduction in depression among participants in the treatment group, highlighting that GIAI was significantly effective in reducing depression among university students in the treatment group. A major strength of the study is that it is one of the few Nigerian studies employing a randomised trial design to test a web-based mental health intervention. However, the sample is restricted to university students in specific faculties, limiting generalizability to other population subgroups [46].

Buhari et al. [76] in "Internet-Based Psychological Interventions to Improve Mental Health: Preference for and Willingness to Use among Students in a Nigerian University" assessed the preference for and willingness to use internet-based psychological interventions for mental health improvement among students in a Nigerian university. A cross-sectional multistaged randomized design was used, covering a study population of 3,300 students at the University of Ilorin, Kwara state, Nigeria. The study found that 48.6 percent of respondents were open to using internet-based psychological interventions for mental health support, though awareness of available platforms remained limited. A key strength of this study is that it highlights baseline data on receptivity to digital mental health tools within a Nigerian university setting, which can directly inform the design and marketing of such interventions. However, the sample population from a single university poses a generalizability constraint [76].

CONCEPTUAL FRAMEWORK

The conceptual framework of this study integrates two complementary models: WHO Mental Health Action Plan (2013–2030) which identifies the determinants of the treatment gap in low- and middle-income countries, and the Digital Health Adoption Model (DHAM), which explains the individual, contextual, and systemic factors influencing engagement with technology-driven health interventions. Together, the models provide the framework for the following concepts: the adolescent mental health service gap and digital mental interventions and mental health outcomes [77].

The adolescent mental health service gap refers to the measurable distance between the prevalence of mental health disorders among Nigerian adolescents and actual utilization of these services where available. This gap serves as the foundation of the framework and is shaped by factors across multiple levels [78]. At the individual level, an adolescent's psychological status, mental health literacy, internalized stigma, digital literacy, and access to smartphones directly determine whether they recognize a mental health need and seek help or not. These individual factors are in turn shaped by household conditions including family socioeconomic status, caregiver awareness and attitudes toward mental illness, and access to digital devices and internet services. At the community level, social stigma, peer influence, and the absence of school-based mental health services further constrain help-seeking behaviour. At the structural level, the severe shortage of mental health professionals, chronic underfunding of psychiatric services, geographic concentration of specialist care in urban centres, and weak digital health infrastructure represent the most systemic determinants of the treatment gap [77].

Digital mental health interventions encompassing mHealth applications, SMS-based tools, internet-based cognitive behavioural therapy and telepsychiatry serve to bridge the gap of adolescent mental health service across all levels. They improve mental health literacy and enable anonymous help-seeking at the individual level, deliver psychoeducation to caregivers and provide confidential adolescent support at the household level, extend mental health awareness into schools and communities at the institutional level, and scale services at low cost while reducing dependence on scarce specialists at the structural level. However, the effectiveness of these interventions as a bridging mechanism is largely influenced by acceptability (the degree to which they are regarded as appropriate and credible by adolescents, caregivers, and healthcare providers) and feasibility (practical implementation within Nigeria's resource-constrained context) [79]

DISCUSSION

This study examined and explored the importance of Digital mental health interventions and how it helps in bridging the gap to adolescents mental health services in Nigeria. Our findings show that mental health problems amongst adolescents are high and remains and accessibility to mental health services is very limited. This gap is as a result of multiple factors such as inadequate mental health specialists, stigma, poor integration of services into existing healthcare structure, low awareness of mental health issues and weak policy implementation. Digital mental health interventions which includes mobile health applications, internet based therapy platforms, telepsyschiatry, SMS and interactive voice response systems are effective across a wide range of psychiatric conditions including depression and anxiety and they are effective in reaching a wide range of adolescents.

From our study, a major issue highlighted is the large treatment gap in Nigeria. Most adolescents with mental health conditions do not receive any form of care as we have about 250 psychiatrists serving over 200 million people. For adolescents, this situation is very concerning because untreated early mental health problems often persists into adulthood, affecting education, relationships, and productivity. Digital mental health interventions can address this challenge and has proven to benefit adolescents facing mental health issues by connecting them with mental health professionals and enhancing mental health delivery.

A study done by Ofoegbu et al. [46] demonstrated the efficacy of guided internet-assisted intervention in cognitive behavioural therapy which significantly reduced depression among Nigerian universities. This shows that digital platforms can deliver clinically meaningful outcomes. Similarly, SMS-based interventions, as seen in Thomas et al. [78], improved clinic attendance and reduced the risk of missed appointments by 50%.

In addition to effectiveness, digital mental health interventions improve accessibility. Many adolescents in Nigeria own mobile phones, making digital platforms a convenient way to reach them. Unlike traditional services that require physical visits to hospitals, digital platform tools allow adolescents to access support right from their homes. This is particularly important in rural areas where mental health services are scarce or completely unavailable.

Another key advantage identified is the reduction of stigma because digital platforms provide anonymity and privacy, which makes adolescents more comfortable seeking help. Studies showed that young people value confidentiality, and this increased their willingness

to engage with digital mental health services. Despite these benefits, the study also highlights several important challenges that limit the effectivenes and use of digital mental interventions in Nigeria.

Cultural beliefs and mental health stigma remains another major barrier to help seeking behaviours among adolescents. Many adolescents and families still associate mental illness to spiritual or supernatural causes, which discourages them from seeking professional help. Although digital platforms can offer privacy and reduce stigma, they cannot completely overcome deeply rooted cultural beliefs without proper community engagement and education. Moreover, the study showed that policy and system-level support is weak and remains a serious challenge. Despite the introduction of the Mental Health Act, implementation is still limited. There are no strong regulatory frameworks guiding digital mental health services, especially regarding data privacy, quality control and integration into existing healthcare systems making users lose trust in these platforms and limiting its usage.

Furthermore, this study revealed limitations in existing research. Many studies on digital mental health interventions in Nigeria focused on specific groups such as university students or urban populations making it difficult to generalise the findings to the broader adolescents population, especially those in rural or disadvantaged settings. Also, most studies focused on short-term outcomes, with limited data on long-term effectiveness of digital interventions.

Another important finding from this study is that digital mental health interventions are most effective when used as a complement to traditional mental health services, rather than a complete replacement. While digital tools can improve access and provide early support, severe mental health conditions still require in-person clinical care. Therefore, integrating digital interventions into existing healthcare systems is paramount for achieving the best outcomes.

RECOMMENDATIONS

Based on the findings from our study, the following recommendations include:

- Promoting Mental Health Awareness and Digital Literacy among adolescents via school based mental health education programs, community awareness campaigns, social media platforms where youths are the target audience.
- Secondly, there should be strengthening and regulation of policies framework which addresses data privacy and confidentiality and integration with existing healthcare systems leading to trust and encourage more people to use these services.
- Thirdly, Integrating Digital Mental Health tools into primary healthcare by training healthcare workers to use digital tools like the use of telepsychiatry to connect rural areas with specialists, incorporating mental health apps and SMS systems into routine care.

In addition, Digital mental health programs should be adapted into cultural settings by incorporating their local language, addressing cultural beliefs as well as involving the community and spiritual leaders thereby improving cultural acceptance.

CONCLUSION

Adolescent mental health remains a leading public health issue in Nigeria, with a high prevalence of mental health disorders and a significant gap in access to care. This study shows how digital mental health interventions offer a practical approach to bridging this gap. However, the effectiveness of these interventions is influenced by several challenges and without addressing these challenges, the impact of digital mental health solutions remains limited.

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