

Telehealth And Beyond: Enhancing Accessibility For Mental Health And Learning Disability Care

Olabisi Abayomi

Abstract

Telehealth, wearable devices and mobile health applications have grown to be important tools in managing accessibility for caregivers in mental health and learning disability. The application of such technologies has allowed patients especially in the rural areas to access medical services from a distance, eradicating geographical barriers. Telehealth, especially during the COVID-19 pandemic, proved this method as being useful in reaching patients to receive therapy and psychiatric services at the comfort of their homes. Moreover, using devices like smartwatches and heart rate monitors, individuals detect stress or cognitive overload at some stages, and mobile health application interventions such as the Cognitive Behavioral Therapy (CBT) and knowledge-assistance support people around the clock. Nevertheless, there have been some barriers which include digital literacy, access to technology, privacy and also unpredictable reimbursement policies. To maximize the potential of these tools, policymakers, healthcare providers, and technology developers must prioritize innovation, regulatory reform, and equitable access to telehealth services.

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I. Introduction

The challenges faced by individuals with mental health issues and learning disabilities in the United States are becoming increasingly urgent, with gaps in care provision continuing to grow. Mental health conditions, such as anxiety, depression, and PTSD, alongside developmental and intellectual disabilities, are becoming increasingly prevalent, with significant effects on quality of life. According to recent data, nearly one in five adults in the U.S. experiences a mental illness each year (National Institute of Mental Health, 2022). Among youth, the rates are also concerning, with 16.5% of adolescents aged 12-17 reporting a major depressive episode in 2020 (Substance Abuse and Mental Health Services Administration, 2021). Bitsko et al (2022) highlighted significant public health concern of children's mental health disorders in the United States, with mental health issues becoming more prevalent as children age. About 2% of children aged 3-5 years are diagnosed with conditions like ADHD, anxiety, or ASD, with an increase in disorders like depression and anxiety during adolescence. This according to Bitsko et al (2022) varies by gender with factors such as racial disparity, socio-economic disparity and geographical location having effects on the experience of mental health disorders of children.

Learning disabilities, such as dyslexia, ADHD, and autism spectrum disorders, affect a significant portion of the population in the United States, contributing to the growing need for specialized educational and healthcare interventions. According to the National Center for Learning Disabilities, approximately 1 in 5 children in the U.S. have at least one learning disability that makes it hard for them to understand information, participate with academic material, and be successful in school and social situations (National Center for Learning Disabilities, 2020). In addition, Fletcher and Miciak (2023) reviewed that SLD diagnosis is complicated, and SLD assessment is controversial with no consensus on the best approach. Depending on the test measures, SLD is, to some extent, distinct from Intellectual Disabilities (ID), as the latter is more conditionally attuned to IQ scores, while the former is more related to the achievement of reading and mathematics. Because this lacks standardized assessment and because little research exists that explores the intersection of learning disabilities with anxiety and depression, diagnosis and treatment is complicated. Yet the educational system has changed in its attempt to address these children's needs and yet many of these children's learning deficiencies remain underserved, underfunded and untimely to cause complications in their learning difficulties. Besides this, lack of resources, inadequate preparation of the educators, and the general lack of professionals who are qualified to address the complicated learning disorders as outlined by Fletcher and Miciak (2023) adds to these challenges.

It is relatively difficult to introduce underserved populations, including rural, racial and ethnic minorities, and low-income individuals to mental health care. From the Kaiser Family Foundation (2020), there is a location disparity in mental health because only 22% of the rural population has this access as compared to the urban area that only has 38%. However, there is a lack of personnel in terms of mental health workers, other related challenges such as financial constraints, and logistical factors (Maddox et al., 2021). Internet connection

also remains a challenge in rural areas, which hampers telehealth services from reaching out to other people especially in rural areas (Maddox et al., 2021). Additionally, Black and Indigenous peoples, Persons of Color (BIPOC) also have unique barriers including cultural prejudice, distrust from health organizations and providers, and cultural competence. Moreno and Chhatwal (2020) found in studies that BIPOC populations have hesitations to seek mental health support because of fear of discrimination and cultural insensitivity.

Besides geographic and cultural barriers, underserved populations also face a huge divide in the quality of care received. It has been shown that low income populations, irrespective of racial and ethnic background, are more likely to present poorer mental health outcomes and greater barriers to accessing care (Garcini et al, 2022). In this regard, the COVID 19 pandemic worsened the issues by exposing deep inequities in the healthcare system. During the pandemic, many people from underserved backgrounds faced disruptions of care and telehealth services exposed the digital divide (Warde, 2021). For instance, mental health providers implemented more of their telehealth usage during the COVID-19 crisis, but there were still many who needed more education and training in order to adopt telehealth modalities and support patient needs (Perle, 2022).

Telehealth, means the use of digital communication technologies for the purpose of the provision of healthcare at a distance, has been identified as a vital solution to the issue of accessibility and provider shortage in mental health and learning disability care (Ezeamii et al, 2015). Certainly, during the COVID 19 pandemic telehealth services for mental health care exploded and they provide a great indication for its future use. A report from the U.S. Department of Health and Human Services, shows that mental health telehealth visits increased more than four times from 2019 to 2020 as patients and providers looked for safer alternatives to in person visits (HHS, 2021). Moreover, there are new possibilities in mobile applications and digital tools that supplement traditional care offering novel interventions in mental healthcare and learning disabilities. But there are also equity concerns, as some vulnerable populations lack access to the requisite technology or digital literacy skills. Imagine, someone with learning disabilities may have a more difficult time when using telehealth platforms (Torous & Wykes, 2020).

Telehealth may be particularly appropriate to address the issue of access to mental health and learning disability care, but the successful implementation of these interventions poses many challenges. This includes providing equal access to technology, closing digital literacy gaps, as well as overcoming privacy concerns. While telehealth has helped many, including as part of the COVID19 pandemic and in rural communities, those with learning disabilities may find platform navigation and communication via digital means wasteful and hugely stressful. Therefore, the impact of telehealth on population groups and iteration of these platforms to improve accessibility and effectiveness needs to be assessed further.

II. Literature Review

State of Mental Health and Learning Disability Care in the U.S.

Mental health care in the US faces an extensive challenge due to mounting service demands and noticeable differences between groups alongside an insufficient number of specialized practitioners who serve marginalized and disadvantaged communities (Reinert and Nguyen, 2024). Multiple factors sustain these mental health problems across the United States population because of geographic barriers and socioeconomic differences as well as cultural stigmas and insufficient mental health workers in the workforce (Mongelli et al, 2020). Patients from rural and minority groups experience worsened treatment outcomes because provider barriers create both care accessibility problems and delay delivery of effective treatment (Rodgers et al, 2022). Proposed solutions including telehealth service expansion and integrated care delivery have yet to establish a complete and fair mental health care system (Rodgers et al, 2022).

Geographic access emerges as the most significant barrier that hinders Americans from getting appropriate mental health services. Mongelli et al (2020) notes that rural districts pose additional challenges to the residents who require health care especially in facilities of mental health. Terlizzi and Zablotsky in their 2020 study for the Centers for Disease Control Prevention (CDC) revealed that 20.3% of the U.S. adults had sought mental health treatment at some point in the previous year, although there were variations depending on the demography and geographical location of the patients. In the United States, the study shows that non-Hispanic white people (24.4%) are more likely to seek a mental health professional than Black (15.3%), Hispanic (12.6%), and non-Hispanic Asian (7.7%) individuals. The current data indicate that people who live in urban areas seek mental health treatment more than the adult's living in rural areas (Terlizzi and Zablotsky 2020). The treatment rate was significantly lower in the adults than in children in shaanxi province because the rural areas of China still have scarce mental health resources, long distances of access, and poor health services. These two factors worsen care access because of poor availability of public means of transport as well as poor family income making patients reach their clinical appointments.

The shortage of mental health professionals in rural areas is a significant concern. There are limited mental health services available in the United States, and 66 percent of rural U.S. counties do not have a practicing psychiatrist, reports the National Rural Health Association. On top of long wait times for

appointments, a long distance may have to be travelled by anyone looking for care (Orlando et al, 2019). For those living with severe mental health crises like psychosis or who are suicidal the delays in care can be man deadly. Tadmon and Bearman (2023) examine the correlation between people's ease of access to mental health care and U.S. suicide rates, and they concluded that longer travel distances to mental health providers are one of the major causes of the rise in U.S. suicide rates, most significantly in rural areas. Using data from 711,000 licensed mental health providers across the country, their study found that if a patient needs urgent care, longer distances to care delay the treatment of the need, which worsens the outcomes of the patient. Though telehealth has the capability to help in this instance, not sufficient data infrastructure in rural countries presents a considerable difficulty for the provision of telehealth services for those in the most remote places (Tadman and Bearman, 2023).

In addition to factual limitations, geographic, socioeconomic disparities also restrict the access to mental health care services. Mongelli et al. (2020) asserted that black, Latino, and Native American communities are some of the most jeopardized minority populations and burdened with compounded barriers to mental health care. The reasons why these people are not seeking mental health care to be treated are lack of insurance, or being under insured, or the very high out of pocket cost of mental health services, etc. However, for those not insured or underinsured, the high cost of therapy, medications, and psychiatric care can present a barrier (Mongelli et al, 2020). The Affordable Care Act (ACA) did expand insurance coverage for many Americans, but it failed to eradicate the practice of insurance discrimination and the financial burden placed on those who still have no adequate mental health coverage. In addition to that, Mongelli et al (2020) stated that mental health stigma is a serious issue in minority communities, and cultural beliefs about mental illness can keep people from getting help. In immigrant communities this stigma is especially common (Mongelli et al, 2020), as language barriers and culturally incompetent care have prevented access to treatment.

Another issue of critical importance is that of shortage in the workforce for mental health services. The demand for mental health services remains high, but there are not enough mental health professionals to meet it, especially in under-resourced or rural areas. The use of Coordinated Specialty Care (CSC) programs for early intervention to people suffering from first episode psychosis is stressed by George et al. (2020). These programs, consisting of psychotherapy, medications and case management, have been effective in enhancing outcomes for those suffering from psychosis. However, such programs are available in limited quantities and there is also a shortage of trained professionals such that a good number of people cannot access such services. In rural areas, where the population density is low, the funding is limited and there is a high turnover among mental health experts, the lack of mental health programs is even more severe.

Various approaches aim to solve the problems which prevent people from accessing mental health services. The successful implementation of telehealth services represents a powerful solution especially in difficult times (Butzner and Cuffee, 2021). Telehealth usage soared rapidly during COVID-19 which showed its capability to improve mental healthcare availability particularly for rural communities and underserved population areas. Telehealth enables patients to find therapy and psychiatric support directly at home which reduces travel requirements and makes service access more convenient. Among telehealth benefits there are several known restrictions (Lee et al, 2023). Yom-Tov et al. (2023) discovered that rural residents used digital mental health screening tools frequently yet they did not follow up with their care properly. The lack of digital literacy along with poor technology access creates major obstacles for low-income and older adult populations because these groups typically do not have reliable internet or smartphones. The lack of proper telehealth platform training among mental health professionals results in inadequate care delivery leading to unsatisfactory treatment results (Yom-tov et al, 2023). The cultural response of telehealth platforms remains limited so minority communities face barriers when trying to use mental health services. The benefits of telehealth services for severe mental health patients including those with bipolar disorder or schizophrenia remain unclear because healthcare often requires in-person sessions to care for complicated cases (Yom-Tov et al, 2023).

In addition to delivery models, there is a need for policy to also be adopted for consideration in fighting disparities in mental health care. HHS MHBG funding is also important to fund programs or services that provide treatment of people with beginning psychosis and those who have serious mental health disorders. Mongelli et al. (2020) has suggested several approaches and among them it is pointed that the funding resources ought to be steady in order to ensure the mental health services availability in any region with a unique focus on the underserved zones. Funding for mental health sector expansion is crucial to rural facilities to take advantage of the particularly few available funds.

More recently, Shifrer (2023) utilized data obtained from the High School Longitudinal Study of 2009, to research the class learning disability status as well as race and socioeconomic status all directed towards students' academic outcomes regarding math course placement. The study found out that learning disabled students dreaded significant educational barriers that affected the enrollment to mathematics courses especially by students from racially and socio-economically privileged backgrounds. Thus, learning disability status moderates the relationship between the four variables in such a manner that it widens the academic disparity

when it combines with race and socioeconomic status facts. A systematic review done by Ee et al. (2021) analyzed how healthcare professionals perceive and understand learning disabled individuals who also have mental health issues. Ee et al (2021) indicated healthcare professionals typically have deficient education in LD-specific patient requirements including people who also have mental health disorders. Insufficient understanding between medical professionals and their patients generates incorrect diagnoses and treatment delays and results in inadequate healthcare.

The study by Iezzoni et al. (2020) studied American physician understanding about the Americans with Disabilities Act (ADA) alongside disability accommodation practices for their patients. Many physicians demonstrate insufficient understanding of both ADA legal mandates and proper methods to support patients who have disabilities such as learning disabilities. The absence of medical professional education about learning disabilities leads to worsened barriers that block patients from getting customized adjustment services which make their treatment effective. The report highlights the need for greater medical training and policy reforms that teach disability rights knowledge because these improvements would lead to better care access and interactions between healthcare providers and disabled patients including those with learning disabilities.

According to Shiffer (2023) the education-related inequalities faced by students with LDs become worse because of unpredictable availability of support services. Students attending wealthier areas obtain timely correct interventions as well as adequate specialized tutoring and therapy although underfunded school districts experience longer delays in receiving appropriate services. Students with learning disabilities face large academic differences between low-income school districts and districts with higher income levels. Knowledge and methods of learning disabilities management continue to improve despite difficulties in their assessment and support.

Historical Development and Current Use of Telehealth

Initially, telehealth was used in the 1950s for two-way live consultations of neurological exams (Frehse, 2021), and has grown to offer critical healthcare services today. Telehealth programs grew during the 1960s as Massachusetts General Hospital offered emergency care at Logan Airport and Nebraska Psychiatric Institute connected rural doctors. By the 1970s, remote communities including Native Americans were connected to health care by programs such as NASA's STARPAHC. The rapid developments that occurred, especially because of COVID-19, have turned telehealth into a common practice around the world, with various technological improvements in the technologies, including video conferencing, remote patient monitoring, and mobile health apps (Frehse, 2021). This growth was further facilitated by changes in regulations, including relaxation of HIPAA regulations, expansion of Medicare coverage, and expanded access, especially to rural and underserved populations. Telehealth is an essential part of healthcare today and is used to provide remote consultations, mental health services, chronic disease management, and primary care (Frehse, 2021).

In recent years, the uptake of telehealth in the care of individuals with mental health issues and learning disabilities has been deemed to increase at an unprecedented rate somewhat due to technology advancements and a need for alternative healthcare options. In this context specifically, there have been related studies in telemedicine tools for treating intellectual disabilities. For instance, Salgado et al. (2018) created an application that is aimed at managing drugs administered to young adults with intellectual disabilities. The study, which used a Delphi technique to determine the consensus among clinical experts regarding the features to be included in such applications to increase independence in managing medication, generates four extensive and insightful suggestions for this kind of application. Among the 42 features evaluated, 64% are considered important for inclusion, for instance, automatic drug expiration messages, sharing information with caregivers and pharmacies. Finally, it showcases the expanding significance of digital instruments in enhancing management of healthcare and self reliance of individuals afflicted with intellectual disabilities.

Ptomey et al. (2017) conducted another study that examined the feasibility of using telemedicine to increase physical activity in adolescents with intellectual disabilities. The physical activity sessions were performed through teleconferences three times a week for 12 weeks. On that note, the study found that during the majority (77%) of sessions, participants showed up, which suggests that telehealth interventions can work for engaging people with intellectual disabilities in physical activity and affecting their health positively. However, this is further exacerbated by further barriers when it comes to in person care that are highlighted by the COVID pandemic for someone with intellectual disabilities. For instance, a study by Jeste et al. (2020) found that 74% of parents of children with intellectual disabilities lost access to at least one therapy or educational service during the pandemic. However, 56 percent of children remained receiving some services via telehealth demonstrating the resilience of telehealth systems to offer care under difficult circumstances.

Although it has its advantages, there is a risk involved with the utilization of telemedicine (i.e exposure to misinformation, cyberbullying, difficulties with privacy policies, etc.) especially for someone with intellectual disabilities who may not be able to comprehend the consequences of using digital tools (Jeste et al, 2020). Cummings et al (2024) emphasized important barriers for telehealth's effectiveness of people with SMI,

including technological illiteracy, limited broadband access and the stigmatizing nature of the illness (paranoia/delusions) precluding the willing use of technology mediated communication. Difficulties with accessibility are multiplied by socioeconomic disparities given that persons with SMI are more likely to be unemployed and homeless. According to Cummings et al (2024), there are potential inequities in health given that depending only on telehealth could potentially widen the gap in terms of disparities.

Additionally, Harris et al. (2023) found that technological barriers to telehealth disproportionately affect underserved populations, particularly older adults, Black individuals, people with disabilities, and those with lower income or education levels. Their study highlighted that widowed individuals, those over 65, and racial minorities were significantly less likely to access telehealth services, with 78% of counties with high Black populations falling into the lowest tier of telemedicine access. This is concerning given the existing healthcare access disparities. A major obstacle is digital literacy, as older adults, unemployed individuals, and those with lower education levels often struggle with telehealth platforms, making them less likely to use these services. Although initiatives like the National Broadband Plan aim to improve internet access, Harris et al. (2023) stressed that simply having the internet and a smartphone does not guarantee increased engagement with telehealth.

Regulatory Landscape and Policy Barriers to Telehealth

Farringer (2021) accentuated significant regulatory barriers to telehealth adoption in the United States with emphasis on the complexity of navigating federal and state regulations, licensure laws, and reimbursement policies. During the COVID-19 public health emergency, federal waivers expanded telehealth access, but state-specific licensure laws still limited the ability to provide services across state lines. The article stresses the need for better coordination between federal and state regulators, a comprehensive approach to telehealth regulation, and reduced geographic and locality barriers to reach underserved populations (Farringer, 2021). It also calls for expanded reimbursement, payment parity, and incentives for states to coordinate licensure laws. Federal initiatives like the CARES Act have helped fund infrastructure, particularly in rural areas, but state licensure laws and fragmented Medicaid reimbursement policies remain significant obstacles. Despite temporary policy shifts during the pandemic, challenges in reimbursement, licensure, and prescribing regulations still impede widespread telehealth adoption (Farringer, 2021).

Although policy reforms that seek to expand coverage of mental health care, like those embodied in the Affordable Care Act have had some effects, more remain. According to Rodgers et al. (2021), despite greater insurance coverage for mental health services, Medicaid expansion has not been equitably provided to all communities. A few of these policy changes have had limited benefits for rural areas where the lack of healthcare providers willing to accept Medicaid reimbursement is still a major barrier. Finally, urban areas have financial issues as well high co-pays, limited insurance coverage for types of care (i.e. psychotherapy) and inconsistent insurance coverage with regard to learning disabilities. The disparities in availability of mental health professionals such as psychologists, psychiatrists and social workers also contribute to the problem. While some solutions to this problem exist for bridging the gap (e.g. through telehealth), Rodgers et al. (2021) find that telehealth alone does not solve the provider shortages in underserved areas.

Rangachari et al (2021) in their narrative review revealed key regulatory and policy barriers influencing the use and sustainability of telehealth in the U.S. across different medical specialties. It identifies macro-level challenges such as reimbursement policies, which remain inconsistent and can hinder telehealth adoption. At the meso level, hospitals and specialty societies play critical roles in facilitating telehealth use by advocating for better payment policies and providing support for providers in terms of training and guidelines (Rangachari et al, 2021). Specialties with higher telehealth use, like cardiology, have historically leveraged telehealth to improve patient experience, reduce costs, and promote population health, aligning with the Triple Aim framework for healthcare delivery. In contrast, specialties with lower telehealth adoption, like allergy-immunology, have faced challenges such as limited support from hospital systems and a more conservative, reimbursement-driven provider culture. Rangachari et al (2021) suggests that a proactive approach from hospital organizations and specialty societies, alongside consistent reimbursement policies, is crucial for overcoming these barriers and ensuring the sustainability of telehealth services across specialties.

III. The Role Of Telehealth In Reaching Underserved Populations

Cummings et al. (2024) studied the effects of expanded telehealth on mental health care accessibility of those with serious mental illness (SMI), using data from the Department of Veterans Affairs (VA). They found both the advantages and disadvantages of using telehealth for their population. Telehealth initially made it possible for such types of services as intensive outpatient programs (IOP) to be accessed, but the continuity of care wasn't always better via telehealth. Although SMI patients, especially those with schizophrenia, use in person MH services at a high rate, they use telehealth to a lesser extent. Cummings et al (2021) also found that increased telehealth adoption at VA facilities was associated with reduced engagement in primary care, lower

access to psychotherapy and psychosocial rehabilitation, and decreased continuity in intensive case management (ICM) programs. Although telehealth helped maintain care during the pandemic, these findings suggest potential tradeoffs, particularly for populations requiring consistent, high-touch care. Over time, as telehealth became routine, its effectiveness in maintaining mental health service continuity diminished, with most measures returning to baseline or declining. The only metric that showed sustained improvement was continuity within SMI-specific ICM programs, suggesting that hybrid approaches incorporating in-person support may be necessary for optimal care.

Hernandez (2022) found that telehealth significantly improved access to mental health care by overcoming barriers related to distance, hospital capacity, and costs. Before the COVID-19 pandemic, telemental health services were underused, but the pandemic accelerated its adoption. Telehealth helped alleviate psychiatric hospital overcrowding by enabling at-home care, particularly for immunocompromised or quarantined patients. It also facilitated early diagnosis, reducing suicide rates and chronic conditions, and led to better long-term outcomes and lower costs (Hernandez, 2022). Telehealth reduced hospital readmissions by over 40% and saved an estimated \$1 billion annually. It also enhanced family involvement in recovery by enabling remote communication with hospitalized patients. Additionally, telehealth addressed rural disparities, reducing travel burdens by an average of 145 miles, 143 minutes, and \$70 per visit. It is safe to admit that telehealth proved to be a cost-effective, scalable solution that revolutionized mental health care accessibility (Hernandez, 2022).

Sultana and Pagan (2023) found that telehealth has significantly improved mental health care accessibility for low-income populations, especially for anxiety and depression. Their review highlighted three key areas of impact: therapy access, care coordination, and medication adherence. Virtual therapy, particularly cognitive behavioral therapy (CBT) and computer-assisted CBT (CCBT), was commonly used, offering affordable and accessible support. Through telehealth technology patients received monitoring and scheduling support as well as reminders in a controlled system which promoted increased participation. Digital scheduling and check-in methods generated better medication adherence but non-acceptance of treatment and financial challenges continued to impede patient outcomes. Bilingual therapists together with cultural intervention approaches helped non-English-speaking communities overcome language communication challenges. Low-income individuals still face challenges to equitable telehealth access because they encounter issues with technology access and digital literacy and privacy concerns as well as financial hurdles (Sultana & Pagan, 2023).

According to Azar et al (2024), telehealth increased care availability to medically inaccessible populations who experienced homelessness and disabilities and were non-English speakers. Azar et al (2024) reported that six strategic elements emerged which included incorporating telehealth into shelters and outreach vans in addition to lowering transportation obstacles faced by disabled patients while providing upgraded language interpretation capabilities. Health centers established telehealth rooms within shelters and vans to deliver virtual healthcare through smartphone and tablet devices while facing ongoing problems with phone connection and patient technical abilities (Azar et al, 2024). Telehealth enabled people with disabilities to receive remote care within their homes and this practice eased the caregiving responsibilities. Some medical facilities experienced operational flow problems because of difficulties related to delivering interpreter services to their non-English speaking patients. Telehealth systems created improved access to mental care while simultaneously lowering patient absenteeism and decreasing their feelings of anxiety. The future progress of health services must overcome problems with digital literacy and internet access and provider education to achieve equal telehealth use across all communities (Azar et al, 2024).

Le Pichon (2022) established telehealth as a vital system which optimizes epilepsy care delivery especially for patients in high-income regions and low to middle-income countries (LMICs). The Extension for Community Healthcare Outcomes (ECHO) model operates across 38 nations to connect healthcare services through its capabilities to cross geographic challenges and limited resources and staff shortages. Telehealth in Iraq enabled medical experts from both U.S. and Iraq to work together and helped a patient with restricted care options reach better symptoms control. The REACT project achieved successful engagement of Spanish-speaking audiences through its bilingual video series on YouTube and Zoom virtual platforms designed for educating families of children with epilepsy. Though based in Egypt telehealth systems linked remote practical courses to hands-on training for medical team members especially in surgical epilepsy interventions. Telerehabilitation emerges as a crucial disruptor which optimizes epilepsy treatment delivery particularly in those areas with minimal healthcare resources according to Le Pichon (2022).

Telehealth encounters limited success among underserved populations because of the technological barriers discussed by Bagchi et al. (2022). The study measured telehealth access differences before and after COVID-19 by showing four primary factors that affected success: skills for using digital platforms, available internet connections, patients' privacy issues and their untrusting nature of medical technology. The study demonstrated significant digital inequality as 80.6% of participants had smartphones but a lower number

possessed home internet access (66%) and the rate of broadband users was even less. People with limited resources experienced difficulties conducting telehealth sessions in private locations because they had insufficient available space. The use of videoconferencing for healthcare created increased discomfort among Spanish-speaking patients and those with limited education levels and health literacy skills which worsened the inequalities between different population segments. Telephone communication and video quality problems frequently occurred during telehealth sessions causing both disabled communication and diminished telehealth service reliability. People felt reluctant to participate because they worried about their privacy as well as the reliability of remote diagnostic assessments (Bagchi et al., 2022).

IV. Integration Of Wearable Devices And Mobile Health Apps

Wearable devices are increasingly being used in real time monitoring of mental health indicators such as stress and depression and supporting the management of learning disabilities. Research also reveals that other wearables include smartwatch, heart rate monitor, EEG headband, have the potential of measuring the physiological behavioral indices which include the HRV, EDA, and brain wave activity in order to identify the levels of stress as well as mental health symptoms (Zanella-Calzada et al., 2019; Balconi et al., 2019; Zhu et al., 2020; Hickey et al., 2021). For instance, Hickey et al (2020) stated that various indices of HRV either through the apple watch, Hernando et al, 2018 or Polar V800, Huang et al., 2021 are sufficiently valid for measuring the levels of stress since they exhibit similar levels of ANS dysregulation. This is manifested in terms of a decrease in certain cognitive capacities during stress; the increase in the LF/HF ratio or a decline in average R–R intervals as an expression of HRV are also signs of stress. Also, EEG based devices can track the brain activity cone related to depression and provide non-invasive long term observation of the changes in the symptoms of mental disorders (Hickey et al, 2021).

Hickey et al (2021) claimed that in the case of learning disabilities, such devices could assist in identifying stress or cognitive overload associated with tasks so that timely intervention could occur. For instance, wearables can have breaks or adjustments made into the learning environment for students with learning disabilities, if wearables detect a drop in HRV or increases in stress markers. It can enable personalized support strategies and enhance the overall learning outcomes for those experiencing mental health or cognitive issues (Hickey et al, 2021).

According to Robinson et al. (2023), wearable must play an increased role in self managing mental health conditions, especially in detecting stress and anxiety. TThe most common devices include smartwatches, wristbands and headbands that capture key biometrics such as Electrodermal Activity (EDA), heart rate (HR) and physical activity to infer mental states (Hickey et al., 2021; Kang and Chai, 2022). Moreover, real time mental health assessments are made using EDA that indicates emotional arousal such as stress (Robinson et al., 2023). Machine learning algorithms such as SVM RBF can be used to help integrate machine learning in wearables and these wearables can improve the accuracy of mental state classification for stress tracking and use of intervention (Sano et al., 2018, Zanella-Calzada et al., 2019). These devices update continuously and give the user a complete view of their well being to intervene timely and data driven. Mental health management is also managed through the use of wearables by reducing times of waiting, facilitating remote monitoring, and providing broader access to interventions for the underserved populations (Robinson et al., 2023).

Kang and Chai (2022) also reviewed the current progress in wearable systems in monitoring mental health status. They reported that Wearable devices have emerged as a promising tool for real-time mental health monitoring by capturing physiological and biochemical indicators of stress. These wearable devices play a crucial role in real-time mental health monitoring by tracking heart rate variability (HRV), respiratory patterns, electrodermal activity (EDA), and cortisol levels. HRV sensors assess autonomic nervous system activity, linking reduced HRV to anxiety and depression. Respiratory and EDA sensors detect stress responses through breathing patterns and sweat gland activity. Wearable biosensors monitor cortisol in sweat, offering a non-invasive method for stress assessment. Despite challenges like sensor stability, advancements in wireless ECG, e-tattoos, and microfluidic systems enhance feasibility. Integrating these technologies enables personalized stress management and cognitive performance monitoring, benefiting conditions like ADHD and PTSD (Kang and Chai, 2022).

Mobile Health Apps

Denecke (2022) discussed how mobile health apps integrating Cognitive Behavioral Therapy (CBT), meditation tools, and educational resources engage both patients and caregivers by offering accessible, personalized support for mental health. These apps employ various CBT techniques like cognitive restructuring, behavioral activation, and problem-solving through interactive features such as diaries, exercises, and scheduling tools. By incorporating gamification and social elements, the apps enhance user engagement and improve adherence. They also give information that is useful regarding mental health conditions and coping strategies, enabling the patients to manage independently their own well being. Apps that are targeting

conditions such as depression, anxiety or addiction use CBT techniques to enhance them in real life. Nevertheless, issues persist, such as the requirement for investigations about efficacy with stronger methods and also potential dependency on them. Although these apps support patient autonomy, more research about long term consequences of such apps in mental health management is necessary (Denecke, 2022).

Additionally, mobile health apps that include Cognitive Behavioral Therapy, meditation tools, and educational resources are attracting patients and caregivers with accessible, personalized mental health interventions (Marciniak et al., 2020). MoodKit, MoodMission and Headspace are the examples of these apps that feature interactive media and offer CBT techniques like self monitoring, cognitive restructuring and relaxation, that aid in reducing the symptoms of depression and anxiety. These apps provide a scalable support especially particularly during crises such as COVID 19 pandemic offering early intervention and hence reducing the need for emergency face to face therapy. They also help people with their mental health in solitude and delete the stigma of having therapy. This brings a huge increase of personalization, early intervention and continuity of care by offering continuous, self guided support, and help maintain progress between professional visits. Nevertheless, these tools still require further refinement and long term efficacy is still to be determined (Marciniak et al., 2020).

According to Aguerrebere et al. (2022), most hospitals in the United States employ mobile apps, although they tend to not to make their own, but use external or third party applications. Hospitals are attempting to link apps to websites, patient portals, and social media, but they are still not reaching the mark in dealing with patients' emotional and social needs. For instance, Aguerrebere et al. (2022) mention that the majority of these apps offer limited personal video consultation functionality or make it difficult to reach out to the doctor themselves. The study also showed that more than 50% of the hospitals have no specialized apps for patients with chronic conditions like Heart disease, Cancer and Diabetes although such apps could bring great benefits to health education solutions. It is common to see mobile health apps, but hospitals can do better in the inclusion of personalized care, especially in the emotional support area, to make the mobile digital tools more effective (Aguerebereg et al., 2022).

V. Discussion

Telehealth, wearable devices, and mobile health apps have collectively revolutionized the delivery of care for individuals with mental health issues and learning disabilities. By leveraging technology to bridge gaps in access to care, these tools enhance accessibility, offer real-time monitoring, and support personalized interventions, particularly for underserved populations.

Telehealth remains an essential tool for delivering mental health care because it enables better access to remote medical services particularly in rural regions combined with urban areas that lack proper attention. Telehealth brought unprecedented popularity during COVID times because it enabled patients to receive therapy from their homes without requiring travel to distant locations. Telehealth treatments for serious mental illness SMI demonstrate their ability to cut back hospital admissions together with improving care continuity through regular psychiatric intervention access (Hernandez, 2022; Molfenter et al., 2020). Although telehealth expanded swiftly it shows certain drawbacks when treating severe mental health patients because they often require face-to-face care to reach their best treatment outcomes (Yom-Tov et al., 2023).

Smartwatches along with heart rate monitors stand out as wearable devices that help handle mental health by tracking essential physical indicators such as heart rate variability (HRV) electrodermal activity (EDA) and brainwave activity (Robinson et al., 2023; Kang & Chai, 2022). The detected metrics reveal potential stress early warning signals and depressive and anxious symptoms which aid professionals to take preventive actions that stop conditions from worsening. Learning disabled individuals can benefit from wearables which monitor their stress levels and cognitive overload to make improvements in their learning spaces according to Hickey et al. (2021). Through their ongoing noninvasive tracking wearables enable people to gain essential information regarding their mental state while enabling them to act effectively toward managing their mental health problems (Robinson et al., 2023).

Another integral part of this ecosystem are mobile health apps which provide a range of interventions from Cognitive Behavioral Therapy (CBT) techniques to meditation tools to educational materials. These apps enable increased engagement due to delivering personalized, convenient, accessible mental health support that can be accessed anytime and anywhere (Marciniak et al., 2020). Mobile apps have made mental health management more accessible and flexible for patients by integrating interactive features like daily mood tracking, cognitive restructuring exercise, and gamification element (Denecke, 2022). Moreover, these tools allow the continuity of care by offering constant support between in person appointments so that patients do not lose their mental health progress (Marciniak et al., 2020).

They also provide the opportunity of early intervention. Real time data collected by mobile apps and wearables makes use of the opportunity to identify symptoms before they reach an acute form and creates opportunities for therapy to intervene in time (Hernando et al., 2018). It is important to make this early

intervention even more effective for individuals with SMI or LDs as early management of their symptoms can allow to achieve much better long term outcomes (Sultana & Pagan, 2023). In addition, wearables and mobile health apps have a lot of benefits in the area of personalization. These technologies can monitor individual biomarkers and preferences and deliver tailored interventions, like custom CBT exercises or stress management techniques, which together increase treatment efficacy (Marciniak et al., 2020; Robinson et al., 2023).

Challenges and Gaps: Areas Requiring Further Research

Although telehealth, wearable devices, and mobile health apps can be effective in guiding patients through various types of treatment, there are still significant barriers that affect the utilization of these technologies and their sustainability in communities of lower socio-economic status. They include issues related to technology implementation on one hand, insufficient and inadequate digital literacy on the other hand, issues to do with reimbursement and finally, the issues that touch on the regulatory aspect.

The first threat is the digital divide, which affects the underserved and marginalized society. Although mobile tablets such as smartphones and other gadgets are available and within the reach of many people, applying these technologies poses a problem to some people, especially the older persons, low income earners and the black minorities. As discussed by Bagchi et al. (2022) and Harris et al. (2023), there have been challenges in the exploitation of telehealth and mobile health apps, mentioning the reasons such as unreliable internet connection, low levels of digital competence, and poor access to private spaces. The following are quite alarming, most profound in rural areas, and for those who cannot afford broadband connections or cannot use modern technology applications for telehealth (Rodgers et al., 2021).

The scalability of telehealth, particularly in mental health care, also faces obstacles such as reimbursement and regulatory policies. Although the pandemic brought temporary policy changes like eased licensure requirements and increased reimbursement for telehealth, these policies are inconsistent and differ greatly by the state (Farringer, 2021). Thus, telehealth adoption is still in its infancy and many health care providers struggle to deliver services across state lines. While some elements of telehealth coverage have been extended on a temporary basis, insurance coverage for telehealth is uneven, especially for learning disabilities and mental health services (Rodgers et al., 2021). For telehealth services to be ultimately sustainable in the long run, such policies and insurance reimbursements will have to be comprehensive and uniform across service lines such as therapy and learning disability interventions.

Another significant gap is the long-term effectiveness of telehealth, wearable devices, and mobile health apps. Short-term research shows these technologies work but more trials must measure their effectiveness in treating long-term mental health problems and learning disabilities. Few studies exist to show if mobile health apps and wearables continue working well to control severe mental illnesses including schizophrenia and bipolar disorder (Yom-Tov et al., 2023). Wearable devices track body functions yet they cannot determine important social and mental factors needed to handle complex psychological health problems. Research teams need to examine how wearable technology combines with standard medical services to support patients using both telephone and physical treatment systems (Cummings et al. 2024).

In addition, cultural competence is still an important issue in telehealth as well as mobile health app development and implementation. There are many existing technologies that do not meet the needs of diverse populations such as racial minorities, low English proficiency individuals, and individuals with intellectual disabilities (Mongelli et al., 2020, Ee et al., 2021). The lack of culturally sensitive content and language barriers on the part of telehealth platforms can cause a patient to become disinterested or even adversely affect the treatment efficacy. Given that, future studies should investigate what designs of a culturally competent telehealth platform could increase the engagement of minority populations and improve the outcomes of mental health or learning disabilities interventions.

Finally, there are ongoing concerns regarding the privacy and security of such health data, which are greater for those with mental health disorder or learning disability, since their data is potentially more vulnerable to breaches. While wearables and mobile health apps can track relevant health data, wearables and mobile health apps have become increasingly popular, and as these collect sensitive health data, robust data protection processes are needed to instill patient trust and promote the widespread adoption of these kinds of mobile apps (Robinson et al., 2023). The development of privacy standards and technologies that can preserve personal health data is important for future research as the data should be accessible to patients and providers as much as it should be protected.

VI. Conclusion

Telehealth along with wearable devices and mobile health apps have revolutionized the accessibility to some forms of mental health and learning disability care. Especially for underserved populations, telehealth has helped to fill the gap where in person visits to receive care were either impossible or difficult with the very real

barriers of geography, social and economic barriers. When it comes to the shift during the pandemic of COVID-19, a remarkable increase in the use of telehealth occurred and telehealth became a feasible option for residents of rural places as also for those who do not have easy access to healthcare facilities. Likewise, wearables and mobile health apps have helped in real time monitoring of mental health indicators such as stress and anxiety which has been indispensable in both learning disabilities and mental health management. Using data, data-driven insights are given to users as a continuous support to provide them personalized care. However, barriers such as digital literacy, technological access, and inadequate reimbursement policies still pose challenges. Long term studies are needed to evaluate long term effects of these technologies, and their required regulatory landscape should be elevated to ensure equitable access.

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