Empowering Caregivers Through Technology: Tools For Managing Learning Disabilities And Mental Health Challenges

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Abstract
This paper explores the role of technology in empowering caregivers of individuals with learning disabilities and mental health challenges, particularly in the United States. As these conditions' prevalence rises, caregivers who comprise the immediate family more often, face increasing emotional, social, and financial burdens. Digital tools and assistive technologies, including telehealth platforms, mobile applications, and assistive communication devices, have shown potential to alleviate these pressures by improving communication, supporting behavioral management, and providing access to mental health resources. Despite these growing benefits, barriers such as accessibility, affordability, and digital literacy remain significant challenges. The findings of this study emphasize the growing need for inclusive and user-friendly technological solutions designed with caregivers' needs in mind which will serve to fulfill not only their physical needs but also emotional and psychological needs. Additionally, the study highlights the importance of caregiver involvement in the co-creation process to ensure that these technologies effectively meet their real-world demands. Recommendations for future research include a shift in focus from pandemic-era experiences and solutions to current caregiving challenges, with particular attention to caregivers of individuals with learning disabilities and mental health conditions, who remain underrepresented in the literature. It is also crucial to enhance training programs, reduce technological barriers, and create tools that address both the practical and emotional needs of caregivers.
Keywords: *Caregiving Technology, Learning Disabilities, Mental Health Challenges, Digital Tools, Assistive Technologies, Caregiver Burden, Digital Literacy, U.S. Caregivers, Technology Adoption*

I.   Introduction

Caring for individuals with learning disabilities (LD) and mental health issues is a tough and emotionally draining job. As these conditions increase, especially in the U.S., caregivers are being asked to manage not only the health needs of those they care for but also their well-being (Zablotsky et al, 2023; Srinivasan et al, 2021). Learning disabilities such as Autism Spectrum Disorder (ASD), Attention-Deficit/Hyperactivity Disorder (ADHD), intellectual disabilities, and other developmental delays are affecting a large portion of the population. According to the CDC 1 in 36 children are diagnosed with ASD, 9.5% of children are affected by ADHD, and 7.5% of children are diagnosed with learning disabilities (Ge et al., 2023). Mental health disorders among U.S. adults are also high with over 52.9 million (21%) adults experiencing some form of mental health disorder in 2020, with depression being one of the most common (Olusanya et al., 2023). These conditions affect not only the person diagnosed but also the caregiver who often faces emotional, logistical, and financial challenges as they care for the needs of their loved ones.

As earlier mentioned, mental health disorders like depression, anxiety, and schizophrenia are among the top causes of disability worldwide. According to Olusanya et al. (2023), mental health disorders contribute to 20% of the total years lived with a disability worldwide. In the US, the National Hospital Ambulatory Medical Care Survey (NHAMCS) reports that the emergency department (ED) visit rate for adults with mental health disorders from 2017 to 2019 was 52.9 per 1,000 adults (Santo et al, 2021). Furthermore, racial and ethnic disparities persist with Medicaid being the primary expected payment source for 41.9% of ED visits by adults with mental health disorders compared to 29.5% for those without mental health conditions (Santo et al., 2021). This shows the economic burden that many individuals with mental health disorders and their caregivers face when seeking care. Caregivers of individuals with learning disabilities and mental health disorders are under a lot of pressure and the emotional burden of caregiving is well documented. Literature reveals that managing both developmental and mental health challenges can lead to high levels of caregiver stress, anxiety, and depression. According to Lovino et al. (2021) caregivers of children with ASD and ADHD experience higher levels of psychological distress than caregivers of children without developmental disabilities. The COVID-19 pandemic

has made things worse with many caregivers reporting increased stress due to disruption of care routines and increased isolation (Gwain et al., 2022).
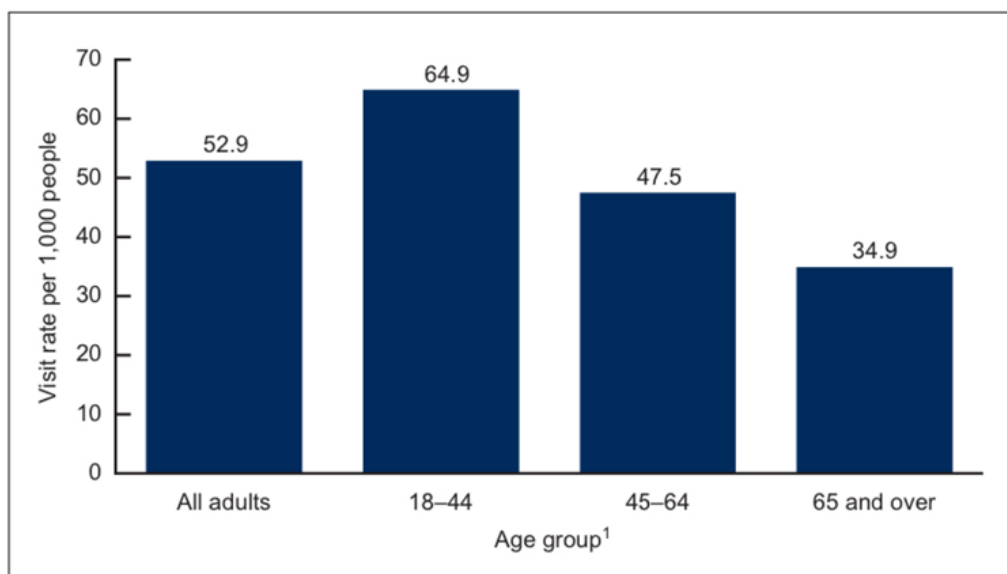
Figure 1. Emergency department visit rates for adults with mental health disorders, by age group: United States, 2017–2019. Source: Santo et al, 2021

Technology, however, has proved to play a game-changing role in supporting caregivers. Digital tools and assistive technologies offer solutions to manage caregiving tasks, monitor health, access therapy and support, and connect caregivers to resources (Lindeman et al, 2020). Using mobile applications, telehealth services, and virtual support groups has shown promise in alleviating caregiving burdens (Haleem et al, 2021). Nonetheless, there are obstacles when it comes to the use of technology such as accessibility of the technology, cost of the technology, and the literacy level of caregivers. Zablotsky et al (2023) has estimated that the incidence of developmental disorders is increasing. They reported that between 2019 and 2021, the prevalence of children aged 3-17 years diagnosed with any developmental disability in the United States increased from 7.4% in 2019 to 8.56% in 2021. Additionally, among specific conditions, intellectual disability prevalence rose from 1.7% in 2019 to 1.65% in 2021, autism spectrum disorder increased from 2.79% in 2019 to 3.05% in 2021, and other developmental delays grew from 5.08% in 2019 to 6.06% in 2021. The implication of these statistics is that the responsibility of the caregivers of these individuals will simultaneously increase, but the use of technological solutions can assist them in discharging their duties.
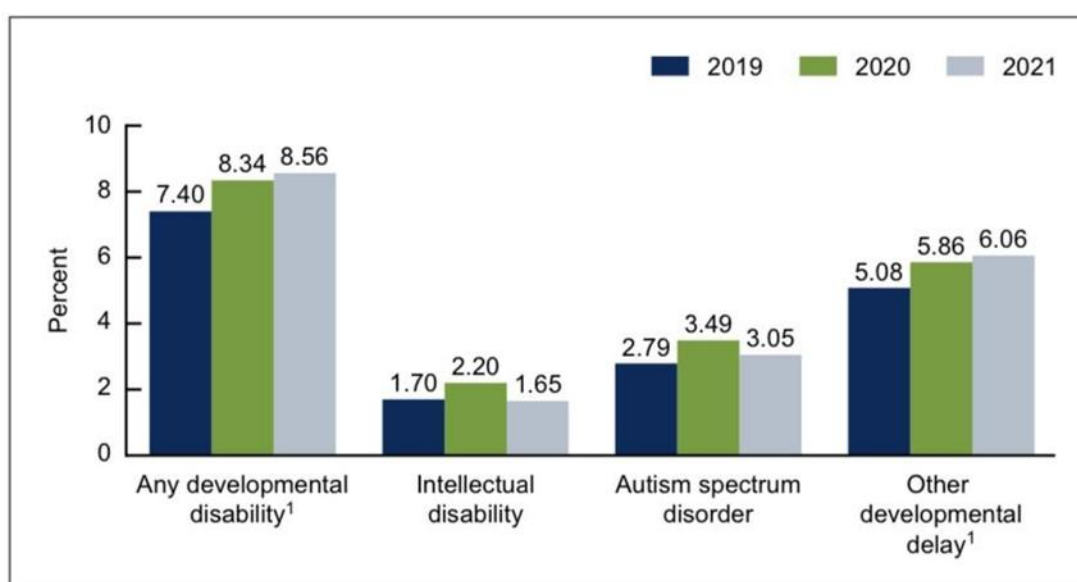
Figure 2. Prevalence of children aged 3–17 years ever diagnosed with selected developmental disabilities, by year: United States, 2019–2021. Source: Zablotsky et al (2023)

The purpose of this paper is to examine the extent to which technology supports caregivers in assisting individuals with learning disabilities and mental health needs, with a specific focus on the United States. It will assess the use of digital tools and assistive technologies in caregiving, and analyze the difficulties that caregivers undergo while implementing and applying the technological intervention. Through these issues, this study will be beneficial to the progress of research on how technology can aid in improving the quality of caregiving and assist families with the caregivers of those with learning disability and mental health conditions.

II.   Literature Review
Understanding Learning Disabilities And Mental Health Challenges

A comprehensive study was conducted by Muktamath et al (2022) to examine learning disabilities which can be traced back to Alfred Strauss and Laura Lehtinen who coined the term "brain-injured child" and, in 1877, the term "word blindness" was developed by Adolf Kussmaul. Muktamath et al (2022) noted that Berlin (1887) first utilized the term 'dyslexia' while Samuel A. Kirk established 'learning disabilities' in 1963 and these two terms combined form the 'specific learning disabilities' umbrella term. In simple terms, Learning disabilities (LD) are neurodevelopmental disorders that impact academic learning of reading, writing, and math skills in people who possess average or above-average intelligence (Muktamath et al, 2022).

Tannock (2013) as cited in Muktamath et al (2022) defined specific learning disability (SLD) as a neurodevelopmental disorder that starts in school years and carries forward to adulthood by affecting students' ability to develop academic skills for reading, writing, and mathematics. In the article, Muktamath et al (2022) identified seven types of specific learning disabilities: dyslexia (reading difficulties), dysgraphia (writing difficulties), dyscalculia (math difficulties), auditory processing disorder (difficulty processing sounds), language processing disorder (difficulty with language-based tasks), non-verbal learning disabilities (difficulty interpreting social cues and non-verbal information), and visual perceptual or visual motor deficits (challenges with eye-hand coordination and visual processing). Muktamath et al (2022) reveal that the various types of learning disability demonstrate different symptoms which affect specific academic and cognitive functions.

Furthermore, Nehra et al (2024) stated that specific learning disabilities (SLD) represent one of the frequent neurodevelopmental disorders which affect school-aged children at rates ranging between 5–15% throughout various linguistic and cultural backgrounds. Learning disabilities commonly appear alongside ADHD, anxiety, and depression when existing alongside other neurodevelopmental disorders which hinders proper diagnosis and treatment. Maenner et al. (2023) found that Autism Spectrum Disorder (ASD) impacted 27.6 out of 1,000 eight-year-old U.S. children during 2020 which amounted to 1 in 36 children having ASD. The data showed California had the highest prevalence rate at 44.9 per 1,000 children yet Maryland registered the lowest rate at 23.1 per 1,000 children. The analysis demonstrated that Black, Hispanic, and Asian or Pacific Islander (A/PI) children experienced elevated ASD prevalence in comparison to White children.

The World Health Organization reports that more than 450 million people develop mental health disorders yearly across the globe (WHO, 2021). The disorders identified as autism, bipolar disorder, dementia, schizophrenia, and depression together produce mental health conditions marked by unusual thoughts alongside irregular emotions, faulty perceptions, and problematic behaviors. Mental health disorders contribute to 20% of total disability lifestyle years at a global scale (Gwain et al, 2022). The United States had 52.9 million adults (21% population) experiencing mental health conditions in 2020 with depression as the most common disorder according to the National Institute of Mental Health (2022). According to the National Hospital Ambulatory Medical Care Survey (NHAMCS) the emergency department (ED) visit rate for adults with mental health disorders in the U.S. averaged 52.9 visits per 1,000 adults during the period from 2017 to 2019 (Santo et al, 2021). Individuals who suffer from mental health conditions visit emergency departments with great regularity because of their serious mental health conditions and their heavy effects on healthcare resources.

III.   The Role Of Caregivers

Caregivers of individuals with learning disabilities and mental health conditions play a vital, complex, and often difficult role. Across various studies, caregivers are seen as the primary source of care and support person, responsible for a whole range of tasks that go far beyond physical care. In most cases, those delivering care are informal and provide care for their loved one, including maintaining their loved one's medical needs, encouraging treatment adherence, aiding with their loved one's daily living, and offering them support socially and emotionally. Informal caregivers assist their children in dealing with academic and behavioral difficulties associated with learning disabilities. According to Muktamath et al (2022), Caregivers are the first line of defense for Dyslexia, ADHD & autism spectrum disorder (ASD). In that regard, caregivers are also key in ensuring children access essential services such as special education support among other services, and helping children in communication situations that warrant the use of adaptive strategies. Additionally, Muktamath et al (2022) affirmed that caregivers also manage their own emotional impact of these responsibilities including the stigma of having a child with a disability, albeit non-physical. According to Avieli et al (2023), relatively high emotional

involvement is also experienced by caregivers of people with mental health disorders who get stressed about managing unpredictable symptoms and mind-eliminating stigma from society.

Furthermore, caregivers of people with mental health conditions, particularly those with bipolar disorder or schizophrenia face unique challenges. They handle complex medical and behavioral issues, provide constant emotional support, and make sure their loved ones comply with the treatment. According to Kargar et al (2021), the caring of those with bipolar disorder is characterized by the unpredictability of the condition, having to manage manic and depressive episodes, and symptoms such as aggression and financially irresponsible behaviors. Sustrami et al (2023) indicated that caregivers of people with schizophrenia become interveners whenever behaviors are uncontrolled or detrimental. It is important to note that these caregivers, who are mostly not trained, or supported, have to juggle their own life, the impact of the actions of their patients, and navigate other life challenges.

The COVID-19 pandemic also revealed important insights about caregivers during times when formal services are interrupted (Iovino et al. (2021). Caregivers who support individuals with developmental disabilities expanded their caregiving roles since professional health services and support grew inaccessible during the COVID-19 pandemic. The situation led caregivers to fill positions that professionals normally perform which substantially increased their overall care responsibilities while adjusting to the dynamics of living caused by the pandemic (Iovino et al, 2021). Caregivers routinely handled the dual functions of physical care and took on the roles of primary educators and emotional supporters despite their existing overwhelming responsibilities (Iovino et al, 2021). Maenner et al. (2023) in their study also highlighted the demanding task that exists when caregivers support individuals who have learning disabilities. The dual responsibility for caregiving duties and personal life and professional responsibilities leads caregivers to experience strenuous situations. They experience fatigue, and distress alongside feelings of guilt because they try to balance caregiving responsibilities together with self-care practices (Maenner et al, 2023).

Literature has revealed that Caregivers serve as the primary caregivers for people who have learning disabilities combined with mental health conditions. It is important to note that caring goes beyond physical care as caregivers need to address emotional, social, and psychological aspects whilst managing complex medical requirements, social stigma, and daily living needs of people living with ongoing health conditions. The caregiving role in healthcare comes with huge emotional strain which we will discuss in the next section.

IV. Challenges Faced By Caregivers In Managing Learning Disabilities And Mental Health Conditions

People with learning disabilities and mental health conditions often have caregivers to support them and look after their needs. Research has shown that caregivers face unique challenges including emotional and physical exhaustion and financial strain. Avieli et al. (2022) looked at the deep, long-term effects on parents, especially those in their later years, of caring for children with developmental disabilities (DD). They found that many parents have to bear immense emotional and physical strain, even to the point of giving up their careers, personal identity, and social life to look after their disabled children. Avieli et al (2022) also interviewed some parents who were devoted to their children and neglected their own needs or who could not find a balance between caregiving and pursuing their own goals. They reported that these parents often feel physically and mentally exhausted as they try to juggle their caregiving role with their desire for personal fulfillment. In addition to this, the study also alluded to the necessity of better support systems along with technology as a means of lessening the burden of caregiving. To assist caregivers in their responsibilities and care for their well-being and aspirations, Avieli et al. (2022) recommend tailored support systems to be created, including specialist technology and community-based resources.

Similarly, Iovino et al. (2021) demonstrated that family caregivers caring for children with developmental disabilities (DD) including children with autism and ADHD struggled with the COVID-19 pandemic. In comparison to the caregivers of children without DD, caregivers of children with DD had higher levels of anxiety, stress, and depression. Caregivers of children with ASD/ADHD had special challenges in doing so, including behavioral challenges and continuous educational support due to a disruption of school services (Iovino et al, 2021). They also affirmed that before the pandemic, caregivers already had few avenues for taking care of themselves, and these lessened further as the pandemic struck. These results demonstrate the requirement for more powerful support systems, particularly where they offer technological answers (Iovino et al, 2021). For example, caregivers could use technology to access information online on educational resources and connect with support networks to receive mental health support, as this alleviates the burden and allows such caregivers to continue fulfilling their caregiving role (Iovino et al, 2021).

Furthermore, Cham et al. (2022) did a systematic review and meta-analysis to examine the caregiving burden of caregivers of individuals with mental illness. Their study included 39 studies from 23 countries with 5,034 caregivers. They found that almost a third (31.67%) of caregivers felt a significant burden, those caring for hospitalized patients (36.06%) and people with psychosis (35.88%) felt the most burden. Many caregivers felt

overwhelmed, as they dealt with emotional stress, financial strain, and social isolation. The more time they spent caring for their loved ones, especially those with severe symptoms, the heavier the burden felt. Cham et. al (2022) also found that the Zarit Burden Interview, a common tool used to measure caregiver stress, showed even higher levels of strain (38.05%).

Given these challenges, Cham et al. (2022) argued for better support systems for caregivers especially those caring for people with severe psychiatric conditions. They suggested more psychological support, caregiver training programs, and policies to ease the financial and emotional burden. Their study shows the importance of caregivers in mental health care and the need for structured support to support both the caregiver and the cared for. Without support, caregiver stress can impact both the caregiver and the patient so it's essential to include caregiver support in mental health services (Cham et al, 2022).

Other studies on caregiver burden in mental health settings, including those on schizophrenia, bipolar disorder, and autism spectrum disorders (ASD) have highlighted the challenges faced by the caregivers which include emotional, social, financial, and physical well-being challenges. For instance, Sustrami, et al. (2023) in their systematic review of the determinants of caregiver burden highlight that caregivers for people with schizophrenia are indeed faced with heavy emotional and financial burdens. The unpredictable nature of the illness and the stigma surrounding mental illness proved to be distressing to caregivers, who reported high levels of anxiety and depression. Feelings of guilt and fear also contribute to emotional burdens which are associated with both the patient's condition and the caregiver's failure to handle the situation properly (Sustrami et al, 2023) . Additionally, the caregiver's age, sex, education level, and the severity of the illness in the patient influenced the intensity of the burden. Importantly, these burdens are mitigated if they receive professional support such as psychoeducation and counseling.

Similarly, Kargar et al. (2021) focused on bipolar disorder and found that the caregiving burden is substantially affected by the characteristics of the illness such as the frequently occurring manic episode and the requirement of constant supervision. They noted that aggressive behavior by the patient and the caregiver's inability to provide for the patient's needs generated particularly strong social and financial strains, and this caused the caregiver to become depressed and anxious. Another source of burden reported in the review, comes from self-stigma among caregivers, especially in instances when the patient's behavior had some connection to substance abuse or relapse. This finding is consistent with schizophrenia wherein caregiving leads to severe emotional distress and social isolation caused by social stigma (Sustrami et al, 2023).

V.   Technological Interventions For Caregivers

The role of caregivers is integral to the care and support of individuals with learning disabilities and mental health challenges. With these conditions on the rise among older adults, caregiving has become increasingly more important. Typically, caregivers are family members or close friends of individuals with learning disabilities and mental health challenges. They manage numerous challenges in caring for the health, social, and emotional needs of a person in their care as well as dealing with the effects of caring on their own physical and mental health and well-being (Kargar et al, 2021; Sustrami et al, 2023). However, technological interventions have become a viable ongoing solution because they provide caregivers tools to assist with care tasks, decrease stress, and improve the general state of their lives. On the technological interventions targeted for caregivers, there is a growing literature that has highlighted both the potential benefits as well as barriers to having these widely adopted.

Koumpouros and Kafazis (2019) conducted a systematic review that explored how mobile and wearable technologies can assist the caregivers of those with Autism Spectrum Disorder (ASD). These technologies provide real-time support, enabling caregivers to monitor behavior, communicate more effectively with the individual they are caring for, and track important health data. It is also noted by Koumpouros and Kafazis (2019) that these technologies are portable, customizable and they offer caregivers immediate access to important information. However, their study brings to light issues like privacy concerns, technological limitations, and the dearth of studies that determine the long-term effectiveness of these tools. While wearable and mobile technologies are very useful for caregivers, they need to be created with caregiver needs in mind such that they are more than feasible, but also user-friendly (Koumpouros and Kafazis, 2019).

In a more focused examination of informal caregivers, Soares et al. (2024) conducted a scoping review to evaluate how digital technologies can promote health literacy and empower caregivers. They also found that smartphones, apps, and other online platforms are being used to help caregivers gain access to health information, manage tasks, and connect with other caregivers and professionals. In areas that have fewer resources or access to traditional support services, being able to gain support online can diminish the feeling of isolation in caregivers and also give them a sense of empowerment (Soares et al, 2024). However, Soares et al (2024) also found significant barriers to adoption which included low health literacy, privacy concerns, and digital illiteracy.

These studies, like many others, highlighted the importance of technological interventions for caregivers but the process of how these solutions are developed is equally important. Merchán-Baeza et al (2023) examined

the concept of co-creation in developing technological solutions for caregivers. Co-creation is the active involvement of caregivers in the design and development phases of technological solutions so that these tools meet their real-world needs. They found that while co-created solutions like apps and web platforms are increasing, caregivers are often only involved in the design and development phases and not in the earlier requirements gathering and later validation stages (Merchán-Baeza et al, 2023). Merchán-Baeza et al (2023) further reported that most technological solutions are focused on enhancing caregivers' social well-being, health knowledge, and ability to manage tasks. However, few studies addressed the critical need for caregiver health support or stress management. Despite the growing interest in co-creation, Merchán-Baeza et al (2023) also noted that there is no standardized methodology for the co-creation process so it is hard to compare studies or replicate successful interventions.

Garnett et al (2022) did further research into mobile health (mHealth) solutions and found that they can help caregivers of older adults manage their physical health, mental well-being, and caregiving tasks better. Often, these tools have features such as medication reminders, health monitoring, and online support groups (Garnett et al, 2022). However, they discovered that caregivers struggle with the use of these tools when they do not possess digital literacy or when the technology does not consider the different needs of different caregiver populations. Key strategies exist to promote the use of mHealth with caregivers such as designing products that overcome barriers to access and adoption noted in Garnett et al (2022), however, including the caregivers in these efforts is crucial.

In another study, De Witte et al (2021) investigated several digital interventions including mobile apps, telehealth, and wearable devices to assist the carers of people with mental health conditions. This review found that the use of these technologies could help to reduce the caregiver burden by improving caregivers' communication with healthcare professionals, real-time health monitoring, and emotional support employing virtual community (De Witte et al, 2021). However, De Witte et al (2021) also found that caregivers struggle to implement and integrate these technologies into their daily lives. They also argued that for technological solutions to be effective, they must be designed with user needs at the forefront, ensuring they are accessible, intuitive, and capable of integrating seamlessly into caregiving tasks (De Witte et al., 2021).

Despite the promise of digital technology to improve care, there are issues around accessibility, affordability, and usability as per De Witte et al (2021). Soares et al (2024) also mention that barriers like low health literacy, privacy concerns, and digital illiteracy can prevent caregivers from adopting and using digital technology. Another hurdle in the literature is the digital divide where caregivers with lower digital literacy or those from economically disadvantaged backgrounds may not be able to access or use these technologies effectively (Garnett et al, 2022; Merchán-Baeza et al, 2023). Many studies show positive results in the short term but there is little data on how they perform in the long term or how they impact caregivers' health and wellbeing.

VI.   Discussion
Technological Tools For Empowering Caregivers

Several studies have shown various technology tools used for caregivers of people with mental health and learning disabilities. Telemedicine and telehealth platforms were used widely during the COVID-19 pandemic so caregivers can access remote mental health services and consultations (Patel, 2020; Krysta et al., 2021). Remote monitoring tools help caregivers track behaviors and medication adherence so they can intervene in time (DeZelar & Lightfoot, 2020). To support caregivers' mental well-being, digital mental health support apps such as BetterHelp and Talkspace offer therapy and stress management resources (Ault et al., 2021). Behavioral management software has been used to manage ADHD and autism-related behaviors, offering structured goal-setting and progress tracking (Lightfoot et al., 2020). Assistive software for learning disabilities such as Ghotit Real Writer and Kurzweil 3000 has enhanced reading, writing, and math skills for people with dyslexia, dyscalculia, and dysgraphia (Krysta et al., 2021).

Therapeutic modules with tracking features and medication reminders from mHealth tools reduce caregiver workload and strengthen patient care delivery (Dunne, 2024). AI-powered chatbots and NLP tools provide quick mental health assessments together with feedback to caregivers who need these services in areas that have limited access to healthcare (Saxena, 2024). The implementation of virtual support networks paired with online peer groups has been incorporated into caregiving practices to help caregivers develop connections that enable collaboration and expert guidance access (Perez Liz et al., 2024). AI-powered assistive technologies including adaptive communication platforms and learning systems with AI support people with neurodevelopmental disorders to complete structured tasks and regular routines (Andreassen et al., 2024). Collectively, these tools empower caregivers by providing personalized support, real-time monitoring, and professional assistance, ultimately improving caregiving outcomes for individuals with disabilities.

VII. The Role Of Technology In Supporting Learning Disabilities And Mental Health Caregivers

Technology has become an invaluable tool in supporting caregivers of individuals with learning disabilities and mental health conditions, thereby enhancing caregiving efficiency and reducing caregiver burden in the United States. Research revealed that mobile apps, telehealth services, and virtual support networks assist with better care and access to mental health resources. Pham et al (2024) asserted that these technologies simplify tasks such as medication reminders, behavior tracking, and medical appointments, making caregiving daily tasks much easier. Perez Liz et al (2024) also found that virtual support networks powered by AI offer personalized interventions and peer support groups that reduce caregiver stress and isolation. AI and digital platforms also give caregivers education resources and professional counseling to promote mental well-being for both caregivers and care receivers.

Moreover, advancements in natural language processing (NLP) and telemedicine have been a big assistance to caregivers especially in underserved areas in the United States. Saxena (2024) looked into the use of AI-powered chatbots for mental health assessments, giving instant feedback and guidance to caregivers, which is very helpful in rural areas where mental health professionals are scarce. Krysta et al (2021) also emphasized the importance of digital tools like telemedicine and video conferencing that allow caregivers to connect with healthcare providers remotely, so continuity of care without the need to travel. These technologies were especially crucial during the COVID-19 pandemic as noted by Patel (2020) who found that online platforms helped caregivers manage stress and access mental health support for their children with disabilities. By improving communication, access to care, and real-time assistance, technology has changed the way caregiving is done making it more efficient and supportive for both caregivers and care receivers.

VIII. Effectiveness Of Digital Tools And Assistive Technologies In Caregiving

Digital tools and assistive technologies are proving super effective at improving outcomes for caregivers, especially for mental health, communication, and educational progress for children with learning disabilities. Andreassen et al (2024) examined the integration of AI-driven systems in caregiving settings, particularly in the classrooms and home care environments. Their study demonstrated that these technologies improve communication and learning experiences for people with neurodevelopmental disorders, so caregivers can tailor interventions based on real-time data (Andreassen et al, 2024). Similarly, Weissflog and Dunne (2024) explored technology-assisted psychosocial interventions in caregiving. Their study revealed that mHealth apps and VR-based therapies are showing promise in improving behavioral outcomes and emotional regulation for people with autism and ADHD. These tools provide caregivers with structured therapeutic modules they can use at home, thereby reducing the need for in-person therapy sessions (Weissflog & Dunne, 2024).

These technologies also extend to remote monitoring tools which have been shown to reduce caregiver workload while improving care for kids with intellectual disabilities. DeZelar and Lightfoot (2020) found that these tools enabled caregivers to track behavioral patterns and medical needs more effectively, so they could intervene proactively. This reduces the daily strain on caregivers and enables more timely and informed decision-making in the care process (DeZelar and Lightfoot, 2020).

IX. Challenges In Technology Adoption

Caregivers face technical and larger systemic barriers to adopting new technologies which makes adoption difficult. One of the challenges is the digital divide which limits access to and the effective use of digital tools, especially in minority communities and economically disadvantaged communities. Weissflog and Dunne (2024) argued that because of the technical and digital skill barriers, caregivers from low-income families are unable to use digital tools during care. Additionally, caregivers in rural regions also have challenges accessing high-quality internet, which would enable them to engage in telemedicine, remote monitoring, and other digital interventions (Weissflog and Dunne, 2024). Besides accessibility, another major challenge in the adoption of technology in caregiving for people with learning disabilities and those with mental health conditions is cost. Ault et al (2021) reported that there is a cost related to the content, specialized devices, health platform subscriptions, and reliable Internet connections which makes healthcare expensive for families, particularly those in low-income or rural areas, to ensure they are healthy. Dahlke and Ory (2020) also validated that socioeconomic status is related to access to assistive technology, specifically in their study about the emerging assistive technology in the United States. They noted that only a small percentage of low-income older adults are smartphone owners, which is a necessary tool for many technology-based interventions.

Furthermore, data privacy and security are also big concerns that limit acceptance of these digital tools as studies reveal that caregivers are hesitant to share health information through digital platforms. According to Andreassen et al (2024), caregivers avoid technology platforms because they fear that their health records may be exposed or misused. There has been evidence of health breaches throughout the United States as Keshta and Odeh (2021) revealed in their systematic review of the concerns and challenges of the security and privacy of

electronic health records. Caregivers also hesitate to use digital tools because there are no clear rules on how to protect their data and maintain privacy (Andreassen et al, 2024). Gleason et al (2021) also reported in their study that the majority of caregivers, especially older adults, hesitated to use new technology because they lacked technical knowledge of devices. In addition, Saxena (2024) demonstrated that training programs for caregivers should teach basic digital health device usage skills. When caregivers have no access to technical education they cannot use digital devices to their full potential, which is assisting them in their caregiving roles. Lindeman et al. (2020) also affirmed that digital health solutions must use straightforward interfaces that serve the unique requirements of all caregiver populations regardless of their ethnic, racial, and financial backgrounds. As demonstrated in their study, while several technology solutions that handle physical caregiving needs exist, they often ignore the emotional and social requirements of caregivers which leaves them isolated (Lindeman et al, 2020).

X. Conclusion

Technology tools help caregivers in their responsibilities especially if the patients have learning disabilities and mental health problems. Digital health tools help caregivers through better communication methods and help patients with behavior while letting caregivers manage stress more effectively. These technologies help caregivers get fast medical guidance, check if patients take their medicine, and link them to support systems to perform better as caregivers. However, despite these advancements, significant challenges remain in terms of accessibility, affordability, and usability. The digital divide continues to hinder the adoption of these technologies, particularly for caregivers in lower-income or rural areas, where access to reliable internet and affordable devices is limited. Additionally, concerns surrounding data privacy and the lack of digital literacy among many caregivers pose further barriers to widespread adoption.

XI. Recommendations

Several key recommendations would further improve the effectiveness of technological interventions for caregivers. First, inclusive design is required, so that education tools are usable by caregivers with a range of digital literacy, made user-friendly and accessible through the use of tutorials and support. Also, technological solutions should take the emotional and social needs of caregivers into consideration and, for example, include virtual counseling or peer support networks to mitigate isolation and stress. More research is needed to understand the co-creation process so caregivers are engaged in all aspects of technology development to ensure we develop tools that address their needs. It is also necessary to conduct long-term evaluation studies to measure the long-term impact of these technologies on caregiver well-being. By addressing these recommendations, technological solutions will become more effective, accessible, and more aligned with the real-world challenges that caregivers must face.

Additionally, more research is needed to further the technological solution for caregivers and to further refine it to meet the current rather than the past needs and innovations. Most of the existing literature around caregiving technology focuses on what was happening during the time of the COVID-19 pandemic, which happened nearly five years ago. Although the pandemic inspired a greater need for remote caregiving solutions, it is important to now consider how caregivers maneuver in their roles in the post-pandemic era. This is particularly important as the caregiving landscape evolves and new challenges emerge. Additionally, most current research on caregivers involves caregivers of those with chronic illness in cases of dementia and Alzheimer's, overlooking the needs of caregivers who are supporting individuals with neurodevelopmental and mental health challenges. Research in this direction should be expanded so solutions that are more relevant can be created which will in turn improve caregiving outcomes.

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