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PAPER

AI Tools Like ChatGPT for People with Neurodevelopmental Disorders

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ABSTRACT

Artificial intelligence (AI) has become increasingly integrated into various aspects of everyday life, including the emergence of the AI tool ChatGPT. This study aims to explore the potential benefits of AI tools, such as ChatGPT for individuals with neurodevelopmental disorders. Through a comprehensive literature review, this paper examines the impact and efficacy of AI tools in enhancing personalized learning, assessment, and diagnosis. It highlights the potential of machine learning algorithms and AI models, which can gather input from multiple users, to contribute to these areas. However, it is important to note that there is currently no research evidence suggesting that AI tools can replace therapists and healthcare professionals in this context.

KEYWORDS

neurodevelopment disorders (NDD), artificial intelligence (AI), AI tools, ChatGPT, autism, ADHD, special education

1 INTRODUCTION

The purpose of this paper is to investigate the contribution of artificial intelligence tools to people with neurodevelopmental disorders. The research questions asked to be answered are as follows: "Can artificial intelligence provide breakthroughs in prediction risk and prognosis for neurodevelopmental disorders?", "Can different artificial intelligence tools be useful for people with neurodevelopmental disorders such as ADHD and autism?", "In what ways tools can be used by people with disorders?"

2 HOW ARE NEURODEVELOPMENTAL DISORDERS DEFINED?

Neurodevelopmental disorders are a group of disorders that affect the normal development and function of the nervous system. These disorders cause

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problems in processing information and interacting with the environment [1]. Neurodevelopmental disorders usually appear from a very young age and continue to affect a person's development and functioning throughout their life.

Neurodevelopmental disorders are defined based on the clinical characteristics and symptoms that the individual presents. They are diagnosed by specialized health professionals through clinical evaluation. Diagnosis is based on defined criteria and determined by clinical guidelines and classifications such as the International System for Classification of Diseases (ICD) and the Diagnostic Statistical Manual of Mental Disorders (DSM). The main categories of neurodevelopmental disorders concern [3,9]:

1. Autism Spectrum Disorder (ASD)
2. Attention-deficit/hyperactivity disorder
3. Learning disorders such as dyslexia, dyslexia, and dysgraphia.

Autism spectrum disorder is a neurodevelopmental disorder characterized by difficulties in social communication and interaction with restricted or repetitive patterns of behavior, interest, and activities [28,32].

On the other hand, people with ADHD have difficulty maintaining sustained attention and/or are hyperactive. Preliminary research points to differences in brain volume in children with ADHD compared to neurotypicals individuals [7] particularly affecting the frontal and parietal cortex.

Finally, regarding people with dyslexia, it is a common type of learning disability that affects 3–15% of school-age children. Dyslexic individuals have been shown to have differences in functional brain imaging compared to non-dyslexic individuals, for example, reduced neural adaptation to repetitive stimuli [10].

The manuals, which state the diagnostic criteria, are based on behavioral observations administered by health professionals [6]. The reliability and validity of the results is called into question when factors such as subjectivity, lack of resources, cultural adaptability of assessments, etc. are taken into account. The above raises the need to develop a new method that provides fast, safe, valid assessments while providing the individualized needs of each person with a neurodevelopmental disorder.

Artificial intelligence emerged as a promising alternative. Artificial intelligence is built according to the biological networks of the human brain and covers a wide range of technologies that are capable of performing cognitive functions imitating human intelligence. Regarding the use of artificial intelligence to date to find and identify autistic traits, mobile phone applications have been developed. However, without sufficient evidence to support their validity and reliability, it may provide inaccurate information and cause unnecessary delays in providing personalized programs.

3 ARTIFICIAL INTELLIGENCE

AI refers to artificial intelligence and more specifically to computer systems designed to perform tasks that require human intelligence. Artificial intelligence is being developed to resemble human intelligence and perform tasks such as voice recognition, image recognition, autonomous decision-making, and automatic learning. It leverages a range of techniques such as machine learning algorithms, neural networks, and natural language processing to solve problems and simulate human behavior [32]. Over time, artificial intelligence has impacted many fields such as

medicine, automotive, robotics, pattern recognition, decision support, and many others [2,8]. Various health sectors use Machine Learning techniques and Artificial Intelligence for quick and accurate diagnosis [67]. AI-based systems look promising and pose many challenges in the clinical diagnosis of neurodevelopmental disorders [68,38].

The term AI is often used in a wide range of programs and applications. It is usually used to distinguish between ordinary programming and programming that learns as the user interacts.

In international journals, artificial intelligence is defined as "The ability of a system to correctly interpret external data, learn from this data and use this knowledge to achieve specific goals and tasks through flexible adaptation".

In conclusion, artificial intelligence refers to the creation of computational systems that can perceive, understand, learn, empathize, decide, and perform tasks that normally require human intelligence. Machine Learning-based systems learn from patterns and predict situations to assist clinicians in the early and effective detection of Neurodevelopmental Disorders [2,4].

As for whether AI programs can recognize autism [16], there are companies that are pioneering methods to diagnose autistic people using AI and other technologies. In detail, an application allows parents to upload videos of their children for observation. Clinicians watch the videos in order to make remote diagnoses. Recently, the company behind the app began training AI algorithms to observe and categorize behaviors. Algorithms will not make a diagnosis but could be used to direct clinicians to specific behaviors that would otherwise be missed.

Another AI-powered autism screening tool is a mobile app that parents can use without the involvement of a trained assessor. It examines answers to multiple-choice questions as well as videos of the child. While there is interest in the use of AI as a diagnostic support tool, there is little support for the idea that AI alone can provide a reliable diagnosis of autism.

Autistic people are often overwhelmed by the demands of human interaction. Social expectations, sensory challenges, difficulty with expressive and receptive speech, and attention issues can all affect optimal outcomes. To get around this problem, some innovative groups have begun exploring ways to use artificial intelligence to teach and engage people on the autism spectrum. One of the most interesting approaches to using artificial intelligence in therapy involves creating and training robots to interact with autistic children [12, 33–37]. Their goal is to help people with autism learn how to make different facial expressions, interact with others, and understand how to respond in different social situations [13].

Also, humanoid robots are able to express emotions by changing the color of their eyes, moving their hands, and changing the tone of their voice. Children with autism respond more positively to humanoid robots than to a human therapist, according to research. [8,17] Robots have unlimited patience compared to humans and are able to repeat the same cues in the same way over and over without variation. Researchers at MIT programmed a robot to integrate information about individual children using data from video, audio, and measurements of heart rate and skin perspiration [18,19]. Using this information along with information about expected and appropriate behaviors, the robot can understand and respond to the autistic person's behaviors.

A startup company specializing in artificial intelligence applications for autistic people has developed a robot called BiBli that can talk to children following the child's own rhythm. The founder of this particular robot says that artificial intelligence is a scalable way to provide care to children who do not receive the care they

need because many times their environment does not understand their individualized needs [31]. Also, the robot develops emotional intelligence.

In the long term, information collected by a robot or app can be analyzed and shared with a therapist to provide the therapist with insight into issues that are challenging to the person's clinical picture and that would take multiple treatments to realize.

AI-based applications are less expensive and easier to integrate into homes, schools, and therapists' offices than high-tech robots. There are many apps aimed at autistic people that support behavioral therapy and learning. Research suggests that while AI-based robots and apps have the potential to support children as they learn, they have some shortcomings. For example, while robots provide useful functions to humans, they are expensive to build. Autistic children who have the skills to use apps must be able to read and follow directions, skills that a large percentage of people on the autism spectrum struggle to master. Even semi-independent use of any application requires a level of functionality and motivation that is far beyond the mental capacity of many autistic people. The apps are intended to teach specific skills, such as appropriate social communication, facial expression recognition, and eye contact.

Although some children are more willing to interact with a robot than with a human, it does not appear from research that these children will be able to transfer their human interaction skills. Applications are not yet fully integrated into people's daily lives. In addition, some therapists and schools are beginning to use the benefits of technology, but some are reluctant to study it, resulting in a widening gap between technological and educational solutions.

In contrast, according to a survey [68], interacting with robots has been found to induce anxiety disorders among a significant portion of the general population, while so such impact has been observed in individuals with neurodevelopmental disorders. Conversely, numerous research studies have highlighted the beneficial effects of robots on individuals with autism and attention deficit hyperactivity disorder.

4 HOW CAN INDIVIDUALS WITH NEURODEVELOPMENTAL DISORDERS BENEFIT FROM THE UTILIZATION OF AI AND ITS FUNCTIONALITIES?

According to the researchers, studies are being conducted on whether Artificial Intelligence and its functions can contribute to the diagnosis of autism as well as help people with autism improve their social, communication, and emotional skills. More specifically, the diagnosis of autism through the use of artificial intelligence is now a reality and some AI-based apps are now downloadable for any smartphone user.

ChatGPT is an Artificial Intelligence model. As an AI model, it can provide information, advice, and support for people with neurodevelopmental disorders and the people around them. For example, it is capable of providing information about understanding autism, diagnostic procedures, and possible treatment approaches.

It is important to note that as an AI model, it cannot provide individual treatment or personalized support for individuals. However, it can provide information and general advice to parents or therapists as well as the people themselves as they would search a multitude of publications on the World Wide Web, that is, it can be considered a search tool. Machine-learning-based models present a unique challenge to regulatory agencies because the models can evolve rapidly as more data and user feedback are collected [4].

Some ways it can help people with neurodevelopmental disorders such as autistic people and people with ADHD include the following [14]:

1. Training and support: Providing appropriate training and support is important for the development of individuals. This may include specialized training methods and support services.
2. Managing the senses: Some people may be hypersensitive to certain senses such as hearing or sight. With a virtual environment that is tailored to their needs, avoiding excessive sensory stimulation can help individuals reduce anxiety and discomfort.
3. Schedule and structure: Organized schedules, structure, and daily routines can help people feel more comfortable and secure.
4. Social support: Support from family, friends and the community is important for the integration of autistic people into society. There are also support groups and organizations that can provide resources and information.
5. Acceptance and empathy: Beyond what AI tools can provide to autistic people, they can provide insights and experiences in typical people so that they are open and able to accept autistic people. Can any typically developing person use AI tools to understand how people with neurodevelopmental disorders communicate, behave, or perceive the world?
6. Communication: AI tools can adapt the way they communicate based on the needs of individuals. For example, some autistics benefit from simple and concrete language, while others may communicate better through graphic or non-verbal means.
7. Respect for individual needs: It is an opportunity to study AI tools and use them as tools for education. Each autistic person is unique and has their own individual needs. By studying the information provided by the tools, people whose professions are not related to special needs or to the treatments of individuals realize that they respect the diversity, preferences, routines, and individual needs of each person [30].

Accordingly, people with Attention Deficit Hyperactivity Disorder (ADHD) also have unique needs and challenges to deal with. AI tools can provide some general advice and approaches that can help manage ADHD always keeping in mind that each person is unique and may respond differently to different approaches. Here are some ways a tool like ChatGPT can provide support for people with ADHD [14,23].

1. Providing information: ChatGPT may provide information about ADHD, such as the characteristics of the disorder, symptoms, and common management practices.
2. Tips and strategies: Can provide tips and strategies such as organization, approach, and concentration techniques for managing ADHD.
3. Chat and support: ChatGPT can act as a chat tool offering an open listening and support chat to people with ADHD. He can answer questions, offer guidance and provide support.

It is important to note that tools using artificial intelligence do not replace human interaction and professional support. In cases where accompaniment or deeper support is required, it is recommended to seek professional help from specialists such as psychologists, educators or therapists [20–29]. AI tools are not capable of replacing the service delivery of therapists or the personalized approach that individualized

intervention programs are capable of providing. However, they are capable of being used as assistive tools in individuals' daily lives to enhance individual's functional needs.

5 CONCLUSION

As a wealth of research has been studied, we can realize the benefits of AI tools in such a complex field as the diagnosis and treatment of neurodevelopmental disorders. Although for now the apps and tools don't have the data they need to diagnose a neurodevelopmental disorder, researchers are optimistic about what artificial intelligence has to offer through machine learning algorithms. With the passage of years and the "feeding" of tools with a lot of data, artificial intelligence is going to stand as an assistant to therapists and health professionals.

According to research [11], machine learning algorithms applied to brain anatomical scans can help in the automatic detection of ASD. Features extracted from the corpus callosum and intracranial brain regions presents significant discriminative information to classify individual facing ASD from the control sub-group [15].

It is important to note that the goal of artificial intelligence during the significant development of the technology is the fair treatment in society for people with neurodevelopmental disorders by typically developing people without exposing their sensitive personal data [7].

Generally, as many researchers referred, short-term investment in Machine Learning will certainly have long-term gains, both in terms of financial savings resulting from precision medicine, and the ultimate improvement in the health of the population [5].

Finally, artificial intelligence is confirmed by research to be a promising solution for improving social interaction and supportive education in children with neurodevelopmental disorders. It would be of great interest in further research to use deep learning techniques to develop an artificial intelligence model that will be a helpful tool for teachers and therapists. The AI model will include input features such as facial expression images, speech signals, biological signals, and clinical information. It will be able to anticipate the user's learning needs and provide personalized guidance to suit the individual's learning needs [39–66].

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