A Critical Review of Fridhi et al.'s (2018) Application of Virtual Reality and Augmented Reality in Psychiatry and Neuropsychology: Implications for Autism Spectrum Disorder (ASD)

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all of whom are respected figures in the field of psychiatry and neuropsychology (2018)

Abstract- This critical review evaluates Fridhi et al.'s (2018) study on the application of VR and AR in psychiatry and neuropsychology, focusing on Autism Spectrum Disorder (ASD). The paper highlights the potential of virtual environments to enhance cognitive and social skills in individuals with ASD, supported by psychological theories like emotional processing, cognitive restructuring, and self-efficacy. However, limitations include the lack of standardized protocols, challenges in generalising skills to real-world settings, and insufficient discussion of ethical, practical, and financial barriers. While the study offers valuable insights into the therapeutic potential of VR and AR, the review identifies gaps, such as risks of sensory overstimulation and the need for greater consideration of patient and familial perspectives. Further research is essential to address these limitations and optimise the use of VR and AR in ASD therapy.

Index-Terms - Virtual Reality (VR); Augmented Reality (AR); Autism Spectrum Disorder (ASD); Neuropsychology; Therapeutic Interventions; Cognitive and Social Skills

INTRODUCTION

Autism spectrum disorder (ASD) is a neurodivergent and developmental disorder that hampers an individual's ability to learn, communicate, and behave (National Institute of Mental Health, n.d.). Among the many treatments that attempt to improve communication and emotional skills in individuals with ASD, virtual reality (VR) and augmented reality (AR) tools have also been implemented to increase social and cognitive skills. A paper by Fridhi et al. (2018) summarizes existing research on how VR and AR can support children with ASD by promoting activities of daily living (ADL) to improve cognitive and social functioning (Fridhi et al., 2018). This review critically evaluates the strengths and weaknesses of Fridhi et al.'s study, its relevance in today's world, and some missing elements while considering its contributions to neuropsychological therapy.

Strengths of the Study

The paper by Fridhi et al. (2018) comprehensively summarizes the potential advantages of VR and AR in treating symptoms of ASD, enhancing cognition, and learning how to work in new or existing circumstances. The study is based on established psychological theories such as Foa and Kozak's emotional processing theory, Beck's cognitive theory, and Bandura's self-efficacy theory. The discussion gains legitimacy from the backing of these theories as it supports the usefulness of VR and AR for exposure treatment, cognitive restructuring, and boosting self-confidence in people with ASD, respectively.

The authors highlight how virtual environments (VE) offer controlled, secure, and customizable environments where users can practice social interactions, emotional regulation, and ADL at their own pace (Fridhi et al., 2018). For instance, through Simple Virtual Environments (SVE) and Collaborative Virtual Environments (CVE), avatars can imitate real-life situations, such as crossing a street or putting out a fire, without exposing the person with ASD to the dangers of the actual world (Fridhi et al., 2018). This method calls for high safety while allowing repeated exposure, which is essential for habituation and skill training.

Additionally, the study underscores the potential of VR and AR to improve social expression and recognition by enabling slower, less overwhelming interactions compared to face-to-face communication (Fridhi et al., 2018). Nichols further demonstrated that using virtual environments for treatments is more

accessible for children with ASD, also mentioning that new technologies are more effective and comfortable for the treatment population (Nichols, 1999). Its benefits also cover the generalizability of skills and control over emotions and engagements with a customizable VE.

Weaknesses and Limitations

Despite the study's multiple advantages, a few limitations have also been observed. One major disadvantage of VR and AR applications is the absence of standardized protocols and tools, which restricts the comparability of findings between studies and makes generalizability difficult. Fridhi et al. (2018) note a few controlled trials that offer strong clinical evidence, while most of the field's present research comprises preparatory studies.

Another limitation of using AR and VR tools for ASD therapy is the gap in development between real-world settings and imitated virtual environments. While VE can easily mimic everyday scenarios (Fridhi et al., 2018), the essence of complex variables of real-life stimuli is not fully delivered, raising questions about the learning acquired through VE and its potency in transferring into life skills. Moreover, the study did not shed enough light on the hazards of excessive technology, which can obstruct the autonomous development of social skills due to over-dependence.

The paper also overlooks ethical and practical challenges associated with implementing VR and AR technologies in clinical and educational settings. To elaborate, the monetary requirements to create, maintain, and enforce VR systems in therapy are not adequately discussed. Without instructions on special training for therapists and knowledge of relevant equipment, elements of VR and AR cannot be readily available in general therapy for ASD. Limited funds and finite access to information would restrict many in the treatment population from pursuing VE tools in therapy.

Relevance Today

Technological advancements continue to expand the therapeutic applications of VR and AR tools in psychiatry and neuropsychology. In this day and age of increased technological prevalence and demand, virtual tools hold great promise for innovative interventions. This mediation of new rehabilitative technology has the scope of dealing with key challenges of improving attention, decision-making, and social skills.

In the paper, Fridhi et al. (2018) discuss the theoretical frameworks of Foa and Kozak's emotional processing theory, Beck's cognitive theory, and Bandura's self-efficacy theory (Fridhi et al., 2018). This literature, when applied to the current context of ASD therapy, holds to be particularly pertinent. Due to the bridging of traditional psychological work and virtual advancements being in tandem with each other, we, as an audience, are more informed and knowledgeable about new research developments and practices, allowing for more trust when enforcing newer forms of therapy. Foa and Kozak's emphasis on prolonged exposure aligns with modern therapeutic practices using VR to treat phobias, PTSD, and anxiety disorders, which are common among individuals with ASD (Foa & Kozak, 1986). Through Beck's cognitive theory, we understand that cognitive patterns (called schemas) influence information processing (Beck & Emery, 1985). This cognitive care method focuses on slow and conscious thinking to override disturbed automatic thought patterns. The same can be achieved by exposing patients to VEs, as reaction times can be slower and less intimidating in virtual settings (Beck & Emery, 1985). Bandura's self-efficacy theory highlights that people often feel powerless when stressed; gaining confidence is key to managing situations (Bandura, 1977). Individuals can feel and believe they are in control of a problem in VEs as they interact with the environment using an avatar, thus aligning with the said theory.

Moreover, public health efforts to integrate technologies like VR and AR into mental health care are constantly changing. While further research is still required to establish standards for long-term effectiveness, accessibility to VR and AR in ASD therapy will play a critical role in providing support tools and developing diagnostics. This emphasis on the need for further research engages learners, making them interested in improving the treatment of ASD from a public health standpoint.

Missing Elements

In the paper, Fridhi et al. (2018) provide a comprehensive review of the operation and application of VR and AR in psychiatry and neuropsychology. Although it covers important subjects like the advantages, objectives, development, and assessment of virtual tools, it appears to be devoid of a critical examination of the possible hazards connected to the application of VR and AR in treating

ASD and its ethical implications. Screen time and repetitive exposure to virtual stimuli pose likely risks, including sensory overstimulation and overload, which are not adequately discussed in therapy. Moreover, the paper does not sufficiently discuss familial and patient insights after seeking such treatment, which can prove highly valuable in advancing the treatments and their applicability.

New developments are bound to present technical and logistical challenges. A detailed analysis of technological shortcomings for VR/AR implementation should be conducted to ensure proper and consistent therapy application. The study would also benefit from thorough explanations of cost, training requirements, and the infrastructure required for VR and AR interventions. This will provide a balanced arrangement of regulations for new therapies and therapists.

CONCLUSION

To summarize, the paper by Fridhi et al. (2018) reviews the contributions of virtual and augmented reality in neuropsychology, particularly in the case of ASD therapy. The paper highlights the strengths of this technological application and its theoretical foundations by providing a comprehensive review of research available in the field. There was a great emphasis on cognitive and behavioural skill development being targets of interventions and building better social communications, emotional regulation, and safety knowledge among children with ASD (Fridhi et al., 2018). However, notable weaknesses such as limited clinical evidence, lack of standardized protocols, and practical challenges were limited in the discussion in the paper. Despite this, the study remains highly noted and relevant when speaking about the evolution of therapy and the introduction of technologies in psychiatric and neurodivergent care. Further research in the field will help clinicians and researchers harness the full potential of innovative technologies and improve the symptoms of children with ASD.

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