



Use of Virtual Reality with ASD: A Mini Review



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Abstract

Considering the increase diagnosis of ASD, it is useful to investigate and explore a new type of intervention to improve social skills and social cognition. In this direction, the aim of this mini review is to underline the possibility of systematized a new intervention that use the new tools of VR.

Keywords: Virtual reality; Autism; social skills

Introduction

Virtual Reality (VR) is finding wide application in health, wellness and healthcare, especially in psychology, physiotherapy and speech therapy [1]. There are non-immersive systems, which do not place people directly in virtual reality, but with a standard computer interface, including online games or Augmented Reality (AR). Immersive systems, on the other hand, exclude the subject from the visual and auditory inputs of reality, accessible through the use of an automated virtual environment [2,3]. The use of these special tools with Learning Disabilities and the co-using with metacognition is analyzed by Drigas et al. [4]. There are evidence-based studies in the literature demonstrating the effectiveness of different levels of immersiveness of virtual reality on pathologies that share difficulties in communication and lack of social skills, among them we find autism spectrum [5]. Autism spectrum disorder (ASD) is an atypical neurodevelopmental disorder characterized by heterogeneous symptomatology, encompassing behavioral difficulties such as repetitive behavioral patterns, restricted activities and interests, and difficult in communication, language and social interaction skills [6]. In this direction, the use of virtual reality emerges as a medium for increasing the socialization skills of people with ASD. Involvement of people with ASD was assessed by the study of Tarantino et al. [7], with encouraging results regarding the use of this technology.

An interesting study compares immersive VR and non-immersive VR, in a sample of young adults with ASD. The results of this study did not show the prevalence of the effect of one of the two conditions over the other but demonstrated an effectiveness of both conditions to increase learning [8]. The concept of virtual reality and its use, therapeutic and otherwise, has various nuances. In this case, for example, virtual reality applied in cases of autism does not only use video, and thus purely visual stimulation, but also motor stimulation. For example, in the study conducted by George et al. [9], the authors used virtual biking with the aim to reduce repetitive behaviors and cortisol level in adults with ASD. The benefits of using VR tools as a medium for clinical and rehabilitation intervention cover several areas. For example, improvements were found in the development of social communication for children with ASD and in the development of cognitive skills [10].

A positive impact of VR, through the reproduction of real-life situations with a three-dimensional perspective, for the development and maintenance of social skills in children with ASD has emerged. The characteristic of these special tools is the possibility to reproduce a situation that is very similar at a real situation, so the experience that a person can live in a virtual reality setting, can be used in a real situation. So, the behavior

learned with the use of VR, can be generalized in the all-day life [11]. Thus, the effectiveness of VR, by providing a safe and dynamic environment, for the recognition and processing of emotions, primary and secondary, and the faces of others, through tone of voice, has been demonstrated [12]. As knowledge and skills are defined as multi-layered and multilevel, the use of VR, with adequate theoretical support both pedagogically and psychologically, as an educational tool with children with ASD has recently been investigated [13].

The content of VR for educational and interventionist purposes should be both adapted to the immersed environment and combined with specific pedagogical design, in fact there is ample evidence on the benefits of VR on the degree of interpersonal interaction, facilitation of learning and engagement through continuous participation in real but more 'friendly' environment especially for primary school education [14]. VR technology has been widely used in the developmental stage in individuals diagnosed with low and high-functioning autism spectrum, finding numerous benefits in the implementation of social skills, which are particularly lacking in people with this type of disorder. Through the use of virtual reality, it appears to be possible to teach children and adolescents with ASD, emotional recognition, social norms and interpersonal interaction [15,16].

In addition to the development of social skills, immersive VR technology has been used to increase safety skills in people with developmental disabilities. Specifically, an environment as similar as possible to the natural environment was reproduced, but with control of the artificial environment. This made it possible to improve safety skills in everyday actions, such as crossing the street. A street crossing with a stop sign and a moving car was simulated, through which participants were able to perform practical actions: walking and turning their heads. Participants learned new behaviors applicable to reality, but in a safer environment [17-22]. The studies analyzed within this article emphasize the importance of using VR technology for children and adolescents diagnosed with autism spectrum disorder. Indeed, such tools have proven to be a valuable treatment support for increasing communication and socialization skills thanks to the protected and controlled environment created through virtual reality. One of the limitations of the articles taken into consideration turns out to be the use of small-to-medium sized samples and limited information regarding the maintenance of the improvements obtained through VR technology. For this reason, it would be important for future developments to study the long-term effects of the benefits of using VR in children with autism spectrum disorder.

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