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Short Communication

Use of Virtual Reality in Health: A Focus on Physical Recovery

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Virtual Reality (VR) corresponds to a technological tool characterized by interaction or interface between man and computational system [1] with a three-dimensional and multisensory aspect [2], which in turn, can provide extensive sensorimotor feedback [3]. Moyle., *et al*. describe that the essence of VR is immersion, in other words, in the perception to be physically present in a virtual context [4]. The sensory combination involving elements of vision, touch, motor control, and proprioception has been described like key mechanisms for the corporal perception. Therefore, the integrity of such elements is essential for immersion effectiveness in VR [5].

The possibility of simulating and visualizing real conditions without offering a risk to the individual's physical integrity, as well as the reduction of costs due to the non-use of physical objects are one of the reasons for the growing interest in applying VR in the context of health. It's worth pointing out that, such application should be directed according to the desired purpose, for example, health education, rehabilitation, among others [6]. Harrington., *et al*. reiterate that VR has a particular ability to "catch the attention" of people even from the most laymen in technology and in different age groups [7].

In the global context, researchers have developed several studies involving VR technology, for example, in mental disorders [8], in neurological diseases [9], in people with dementia [5], in spinal cord injury [10] in kinesthesia investigations [11], in motor learning [3], as a tool in teaching human anatomy [12], in reducing pain [2], and in post-traumatic stress disorder [13].

Computer-aided technology being increasingly accessible, rehabilitation programs that make use of VR environments have also accompanied this growth [3]. Although the literature over the years documents the functions and purposes of VR in health, authors such as de Rooij., *et al*. emphasize that clinical implementation still represents a challenge, both for the diversity and acquisition costs for products with such technology [14]. Another challenging point is that many therapists, researchers, and even patients often demonstrate distrust and dislike for technological equipment when they are seen as a threat in the actual interaction between therapist-patient [15].

Among the health professionals, the physiotherapist has shown an increasing interest in the use of VR for the rehabilitation of numerous dysfunctions, especially those of neurological, motor and perceptive character. Mello and Ramalho defend that VR emerges as an auxiliary instrument for physiotherapy since it adds a motivational and even playful object to conventional treatment because it facilitates the development of perceptual and motor skills of the patient and, consequently, maximizing the individual's active participation during

physiotherapy [16]. In this perspective, VR allows the adaptation of the treatment to the real condition of the patient's functionality, better data acquisition to measure the results achieved based on the treatment protocol applied, and increase patient motivation through feedback [9].

The use of VR by the patient in process of the rehabilitation can be characterized by the combination of perception and action, and it is through vision and proprioception that sensory feedback is integrated into the patient's mental representation [17]. Cameirão., *et al.* argue that such feedback can help to improve changes in cortical levels, once associated with motor learning, which would facilitate the attainment of new motor skills [18]. Also in this context, the association of VR and physiotherapy, for example in patients with pain, attention, and distraction generated by VR, theoretically activates fewer cognitive resources to process the input of nociceptive stimuli, which may result in attenuation of pain [19].

In neurological disorders such as stroke, VR assumes a relevant role in the recovery of lost functional capacity, since it offers enriched training, mainly, in the motivational aspect with specific tasks, and can facilitate the patients' adherence to the treatment program [20]. Among the several therapeutic resources used in the neurorehabilitation of patients who have suffered from stroke, VR has been gaining prominence because it serves both motor and cognitive rehabilitation, especially in chronic patients.

The literature has presented promising studies regarding the use of VR and, therefore, makes it a useful tool to assist in the treatment of various disorders or diseases. However, it is important to highlight two points: 1) much still needs to be discussed and clarified about clinical applicability as a treatment tool, especially regarding sensory and motor changes generated in the long term in the patient; 2) in this context, is suggested the development of new studies in order to increase the knowledge about immersion in VR systems and to know the real implications on human perceptual systems.

Bibliography

1. Vieira GP., *et al*. "Virtual reality in physical rehabilitation of patients with Parkinson's disease". *Journal of Human Growth and Development* 24.1 (2014): 31-41.

2. Tashjian VC., *et al*. "Virtual reality for management of pain in hospitalized patients: results of a controlled trial". *JMIR Mental Health* 4.1 (2017): e9.

3. Monteiro CBM., *et al*. "Short-term motor learning through non-immersive virtual reality task in individuals with down syndrome". *BMC Neurology* 17.1 (2017): 71.

4. Moyle W., *et al*. "Effectiveness of a virtual reality Forest on people with dementia: A mixed methods pilot study". *The Gerontologist* (2017).

5. Kokkinara E and Slater M. "Measuring the effects through time of the influence of visuomotor and visuotactile synchronous stimulation on a virtual body ownership illusion". *Perception* 43.1 (2014): 43-58.

6. Nunes FLS., *et al*. "Virtual Reality for health care in Brazil: concepts, challenges and opportunities". *Brazilian Journal of Biomedical Engineering* 27.4 (2011): 243-258.

7. Harrington CM., *et al*. "Development and evaluation of a trauma decision-making simulator in oculus virtual reality". *The American Journal of Surgery* (2017).

8. Geraets CNW., *et al*. "Social environments and interpersonal distance regulation in psychosis: A virtual reality study". *Schizophrenia Research* (2017).

9. Pavão SL., *et al*. "Virtual environment as an interface device in post-stroke rehabilitation: case report". *Fisioterapia em Movimento* 26.2 (2013): 455-462.

10. Salisbury DB., *et al*. "Virtual reality and brain computer interface in neurorehabilitation". *Proceedings (Baylor University. Medical Center)* 29.2 (2016): 124-127.

11. Harvie DS., *et al*. "Using visuo-kinetic virtual reality to induce illusory spinal movement: the MoOVi illusion". *PeerJ* 5 (2017): e3023.

12. Izard SG., *et al*. "Virtual reality educational tool for human anatomy". *Journal of Medical Systems* 41.5 (2017): 76.

13. McLay RN., *et al*. "A randomized, head-to-head study of virtual reality exposure therapy for posttraumatic stress disorder". *Cyberpsychology, Behavior, and Social Networking* 20.4 (2017): 218-224.

14. de Rooij IJM., *et al*. "Effect of virtual reality training on balance and gait ability in patients with stroke: systematic review and meta-analysis". *Physical Therapy* 96.12 (2016): 1905-1918.

15. Gega L. "The virtues of virtual reality in exposure therapy". *The British Journal of Psychiatry* 210.4 (2017): 245–246.

16. Mello BCC and Ramalho TF. "Use of virtual reality in the physical therapeutic treatment of individuals with Down Syndrome". *Revista Neurociências* 23.1 (2015): 143-149.

17. Santos LF., *et al*. "Movement visualisation in virtual reality rehabilitation of the lower limb: a systematic review". *BioMedical Engineering OnLine* 15.3 (2016): 144.

18. Cameirão MS., *et al*. "Neurorehabilitation using the virtual reality based rehabilitation gaming system: methodology, design, psychometrics, usability and validation". *Journal of NeuroEngineering and Rehabilitation* 7 (2010): 48.

19. Schmitt YS., *et al*. "A randomized, controlled trial of immersive virtual reality analgesia during physical therapy for pediatric burn injuries". *Burns* 37.1 (2011): 61-68.

20. Chen L., *et al*. "Effect of virtual reality on postural and balance control in patients with stroke: a systematic literature review". *BioMed Research International* (2016).

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