

The Impact of Virtual Reality on Body Sway and Balance

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Introduction

The introduction of consumer-grade virtual reality (VR) headsets has led to new and engaging methods for physical rehabilitation. Not only does VR provide the means to bring everyday situations into the rehabilitation therapy, and thereby help their transition into rehabilitation throughout everyday life after therapy, it also allows patients to practise independent from time and place. An important element in rehabilitation therapy is improving balance and gait hence VR has been studied for balance and gait rehabilitation with children with cerebral palsy [1], people with multiple sclerosis [2], stroke patients [3], and the elderly [4]. According to Desiderio CP et al. VR “has the potential to improve balance and gait” but also “brings additional benefits when combined with conventional rehabilitation” [5]. However, to what extent virtual reality influences balance or gait is hardly ever addressed and the focus of this study.

Methods

We designed a study to determine how VR impacts balance. First, we developed a setup that allowed us to measure body sway to assess balance. For this we used a Wii Balance Board from which we extracted body center of pressure (COP) which is a good indication of body sway [6]. Next, we invited healthy participants to take part in the experiment which consisted of 2 sessions, one with a VR headset (an Oculus Quest 2), and one without. During a session we first asked the participant to step onto the Wii Balance Board and performed a traditional balance test (i.e. Romberg Test) where they had to stand with their feet together and hands by their sides. After 30 seconds the participant was then asked to perform 3 items of the Berg balance scale (i.e. reaching forward, turn to look behind, and retrieving an object from the floor) with 10 seconds in between. After this the participant was asked to step off the Wii Balance Board, complete a small questionnaire on their experience, and start the second session. The sessions were counterbalanced to cancel out order effects. Afterwards we extracted the rest periods from the data, calculated body sway and compared the results of the two different sessions.

Results and discussion

At the time of writing, we are in the middle of our study but will be able to present preliminary findings in the coming months. We expect to find differences between the two sessions in terms of body sway and balance which could help tailor future VR rehabilitation and give indications of the safety of VR rehabilitation at home. Although we invited healthy participant in our study, we expect outcomes to be worse for actual patients which will be a topic in our follow-up studies.

Conclusions

Although VR offers new and engaging methods for physical rehabilitation, it is important to be aware of the impact VR has on balance and gait which should be taking into consideration when using VR for rehabilitation therapy.

References

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