Efficacy of stability-based training with visualisation in people with chronic ankle instability

Lauren Emma Forsyth (1) Craig Childs (1) Jason Bonacci (2)

(1) University of Strathclyde (2) Deakin University

Background

Chronic ankle instability (CAI) is associated with recurrent ankle sprains, mechanical laxity and/or perceived instability. Stability-based rehabilitative training has been found to prevent further injury, however poor programme compliance can hinder the programme's effectiveness. Virtual reality (VR) systems have been shown to provide a stimulating and motivational environment that may be more conducive to rehabilitation adherence. An emerging technique, visualisation, is the connection of biomechanical analysis and VR. Visualisation produces real-time feedback, by accurately monitoring movement and progress, using VR to create a diverse, challenging, and controllable environment, representative of real-world situations.

Objective

The aim of this study was to determine the feasibility of incorporating visualisation into stability training for people with chronic ankle instability. Specifically, the effect of visualisation on performance of the Star Excursion Balance Test (SEBT), as well as participant's enjoyment of the experience.

Design and Methods

Individuals with CAI were randomly allocated to the 4-week stability-based training programme with visualisation (VIS), or without (NO-VIS). Balance exercises were based on standard practice, with adaptations for visualisation. Participants completed the SEBT and Cumberland Ankle Instability Tool (CAIT) prior to, and after training. Participants recorded enjoyment of training using the Physical Activity Enjoyment Scale (PACES-8).

The Strathclyde Cluster Model and pointer calibration were applied to all participants. Movement was tracked using Vicon Tracker (Vicon, Oxford, UK), with testing controlled and recorded using D-Flow (Motek Medical, Amsterdam, The Netherlands). Effect size (d) was calculated and interpreted using Hopkin's recommendations.

Results

Of 17 participants (Vis=10,No-Vis=7), there were 2 drop outs (Vis=1,No-Vis=1). No adverse events were reported and participant drop-out was due to injury unrelated to the study. There were no between-group differences in population demographics and pre-training CAIT scores ($p \geqslant 0.2$). Following training there was a non-significant but small effect ($d=0.6, p=0.3$) favouring the NO-VIS group for an increase in CAIT score.

There was a non-significant but moderate effect (d=1,p=0.20) favouring the VIS group for an increase in average reach distance on the SEBT. There was a non-significant but large effect (d=1.4,p=0.16) for higher enjoyment of training in the VIS group.

Conclusions

Results of this study support the feasibility and safety of stability training with visualisation in those with CAI. Observations of a more enjoyable experience, alongside improved postural control suggest visualisation may enhance stability-based training. Implications of this will be discussed, along with the practicalities and logistics of running such programmes.

Keywords: chronic ankle instability (CAI), rehabilitation, virtual reality

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