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Dynamic Balance Performances: Effect of Visual Biofeedback

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Abstract:

Effective balance requires an integrative use of visual, vestibular, and somatosensory systems, aiming at maintaining the projection of the center of gravity within the base of support. However, scarce information is available about the effects of visual feedback on dynamic balance performance.

PURPOSE: To evaluate the influence of visual biofeedback in dynamic balance performances.

METHODS: 28 (15 female, 13 male) subjects (age: 25.5±3.3 years; weight: 64.0±12.7 kg; height: 167.4±10.3 cm; BMI: 22.6±2.4) volunteered to participate in the study. Dynamic balance performance was assessed on a wobble board (Balance Board WSP, GSJ Service, Rome, Italy; diameter=40cm) as the time spent in the target zone (TZ, diameter=6.3cm) displayed on a screen and the length of center of gravity trajectory (CoG). Participants were asked to stand barefoot on the wobble board with a comfortable double leg stance, keeping their hands on their hip. After a 3-minute familiarization, three 30-second trials were performed with 1-min sitting recovery in between during two randomized conditions (BF, looking at the screen showing real time performance) and without (NBF, looking at a black wall) visual biofeedback. Differences between performances ($p < 0.05$) were assessed by repeated measures ANOVA.

RESULTS: Differences ($p < 0.01$) emerged in TZ and CoG with better performances in the BF condition (TZ: Female=11.4±4.6s; Male=8.5±6.4s; Total=10.1±5.6s; CoG: Female=893.8±182.7cm; Male=977.1±425.3cm; Total=932.5±315.4cm) with respect to the NBF (TZ: Female=6.3±2.8s; Male=3.8±3.2s; Total=5.1±3.2s; CoG: Female=1023.1±262.9cm; Male=1156.2±469.3cm; Total=1084.9±371.9cm) one.

CONCLUSIONS: Results highlight that BF may improve dynamic balance performances assessed on a wobble board with respect to NBF condition, by facilitating accuracy and goal directedness of postural control. This could impact training and evaluations protocols especially when special populations (i.e., athletes, children, elderly and people with balance disorders) are involved.

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