Influence of Real-World and Virtual Reality Slip-Trip Training on Gait and Balance Confidence

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INTRODUCTION

- Perturbation-based balance training (PBBT) have been successful to improve balance, gait and minimize slips, trips, and falls [1,2].
- The purpose of the study was to assess if a novel customized virtual reality (VR) fall prevention training tool, using virtual slip and trip hazards was successful to improve gait and balance confidence, compared to real-world slip and trip hazard training.

METHODS

- A total of 15 healthy young adults (8 females, 7 males, age 23 ± 3.31) completed two training conditions, real gait training (RGT) and virtual environment gait training (VEGT), which included real and virtual slip and trip hazards, in a counter-balanced order with baseline (BL) and post-RGT and post-VEGT.


Figure 1. Experimental procedures od slip and trip gait training in RGT (top) and VEGT (bottom). Timed-up-and-go test (TUG)
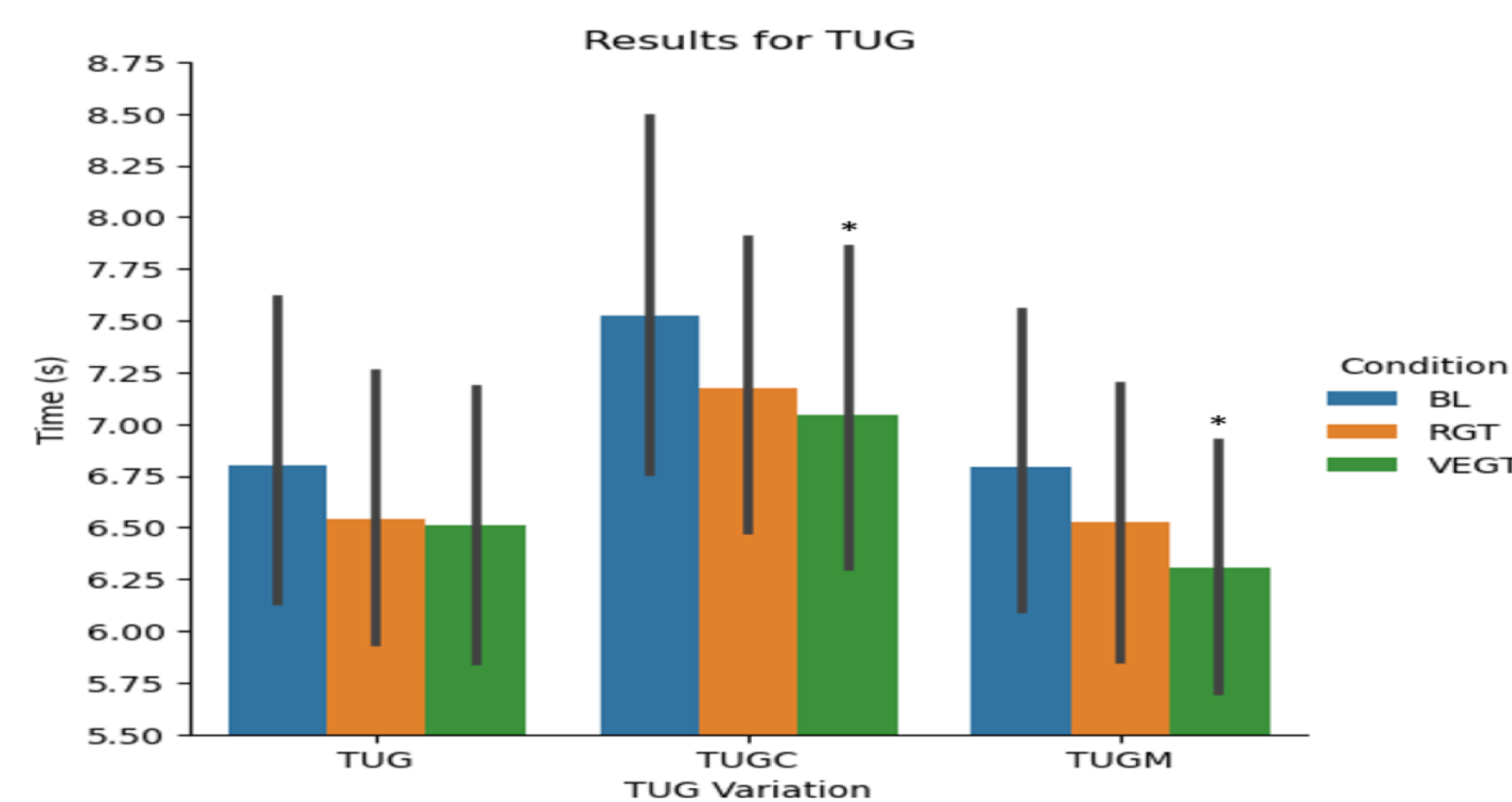
METHODS

- All participants completed pre-training and post-training assessments that included three different timed-up-and-go (TUG) (traditional, cognitive, and manual) as well as a balance confidence survey (BCS).
- TUG times and BCS scores were analyzed using a one-way repeated measures ANOVA.
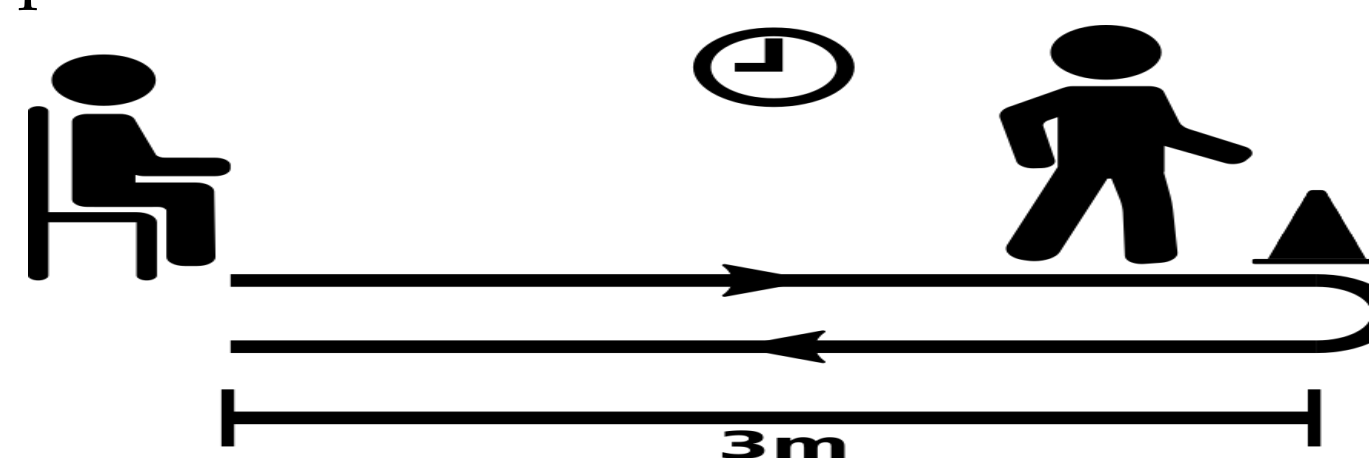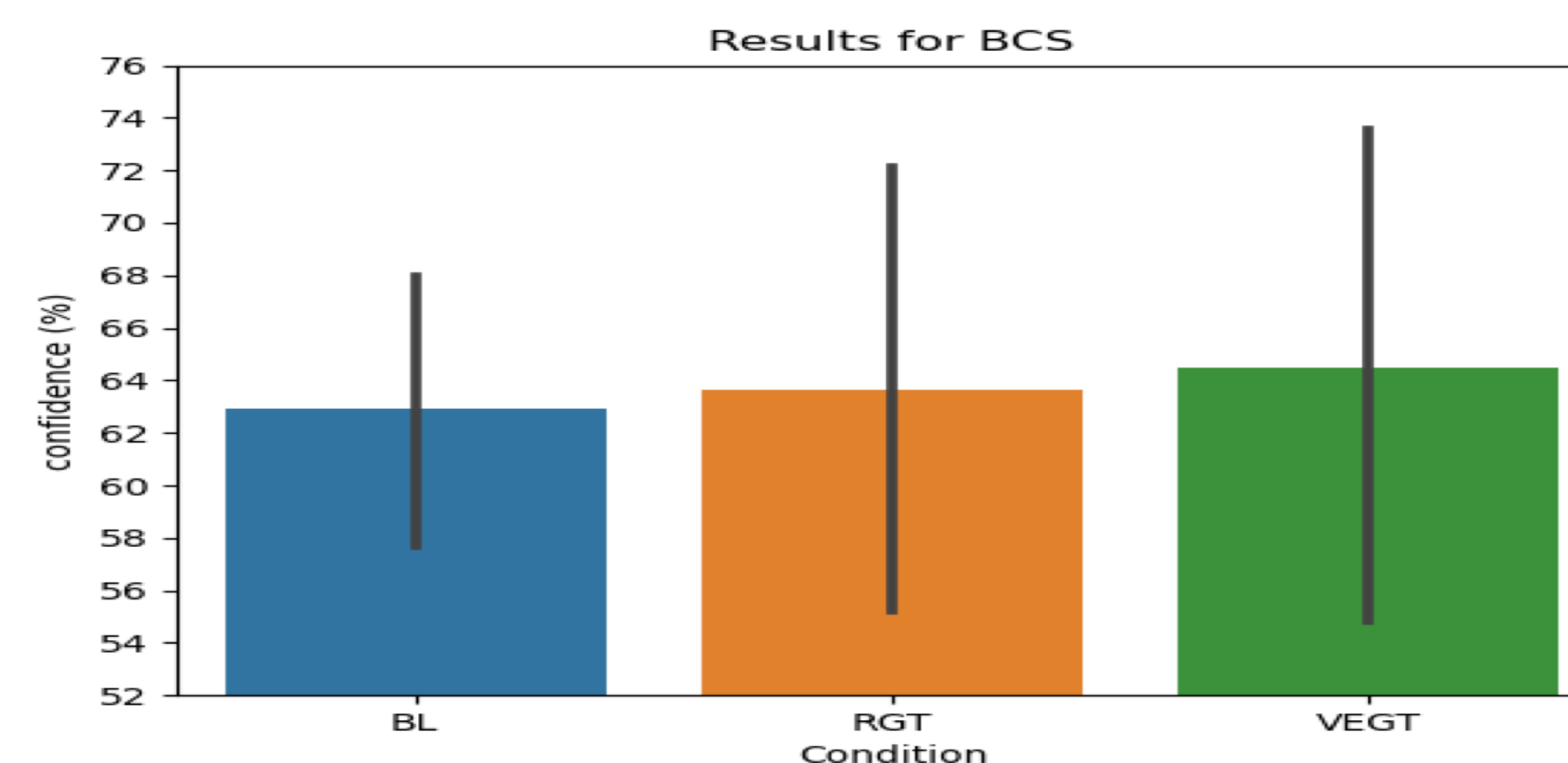

Figure 2. Timed-up-and-go test (TUG)

RESULTS

Figure 3: Time to completion for all three TUG variations in each at baseline and after RGT and VEGT. Significant differences of p < 0.05 from BL is indicated with *. Bars represent standard errors.

Figure 4. Mean confidence ratings as a percentage of total score at BL and immediately post RGT and VEGT. Bars represent standard errors.

RESULTS

- Significant main effects were observed for the TUG cognitive ($p=0.022$) and the TUG manual ($p=0.041$) variations. Follow up comparisons revealed significantly faster times after the VR training compared to pre-training.

DISCUSSION

- Findings suggest that the VR training tool was successful in improving gait significantly and while not statistically significant, balance confidence also improved in the real-world compared to pre-training, as well as in the post-training in VR condition compared to pre-training.

- Findings also demonstrated that using virtual environments with slip and trip hazards in a highly realistic environment elicited significant acute improvements in the postural control and gait systems [3] and offers a promising method for improving gait and postural control.

CONCLUSION

Exposure to slip and trip hazards during gait training in both real and virtual environment improves gait performance and balance confidence and thereby minimizing risk for falls.

The novel VR fall prevention training tool provides an effective, feasible, low-cost, at-home training for fall prevention.

REFERENCES

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