

Impact of Visual Cueing on Functional Mobility for Activities of Daily Living Among Those With Parkinson's Disease With Freezing of Gait

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PURPOSE: Freezing of gait (FOG) is a common characteristic of Parkinson's Disease (PD), where a person has a reduction or absence of effective forward steps. According to Lord et al. (2020), FOG is often most prevalent during more complex motor tasks such as initiating a first step, turning, taking a final step, navigating around obstacles, and managing different surfaces. This can make it difficult for individuals with Parkinson's Disease and freezing of gait (PD-FOG) to adequately and safely navigate their living environment and complete their activities of daily living (ADLs). This symptom is one of the most debilitating motor symptoms and has been associated with higher fall risk, greater fear of falling, and lower quality of life (Lord et al., 2020). External visual cueing has proven to be an effective strategy to improve functional mobility for individuals with PD-FOG, however, the most effective cueing device has yet to be determined (Sweeney et al., 2019). Prior research has studied the effectiveness of visual cueing glasses, and lasers on various walking devices, but few studies have involved lasers mounted on shoes (Sweeney et al., 2019). The purpose of this study is to explore and demonstrate the feasibility of using shoe-mounted laser attachments to improve functional mobility for ADLs for those with PD-FOG. The aim is to assess the impact laser shoe attachments have on functional mobility in "real-world" mobility scenarios for individuals with PD-FOG.

DESIGN/METHOD: This cross-sectional experimental study involved six individuals (H&Y II-III, age 55-79, 4M and 2F) with idiopathic PD and at least one episode of FOG reported in the prior month. They each participated in three real-world mobility scenarios in a staged apartment suite where they were asked to: walk from the bedroom to the kitchen, make tea in the kitchen, and move from the couch to answer the front door. Each task was completed with and without the use of the shoe-mounted laser attachments as a cueing device, in pseudo-random order. Times to complete each ADL task were collected via analysis of video graphed data. Data was analyzed using paired-samples t tests via SPSS to evaluate the difference between task completion time for the lasers-on and lasers-off conditions.

RESULTS/CONCLUSION/IMPACT STATEMENT: Although results were not statistically significant ($p > .05$), the mean time for task completion was shorter for the lasers-on condition for "making tea" (42.26 ± 30.40) and "answering a doorbell" (16.67 ± 8.04) task compared to lasers-off condition (47.52 ± 34.93 and 17.16 ± 6.84 , respectively). Individually, 5/6 participants had shorter times for the "making tea" task, and 3/6 participants had shorter times for "answering a doorbell" task. For the "bathroom" scenario, individually, 4/6 participants had shorter task completion times for this task. Additionally, participants were asked to rate their satisfaction regarding the use of the laser-shoe in their daily life. Specifically, participants rated 6.3/10 (SD = 2.6) for the general ease of use of the device, and 8.0/10 (SD = 1.9) for their overall willingness to use the laser device, indicating that they are likely to use the device in the future. Although this study is ongoing, preliminary findings suggest that laser-shoes may be a feasible option to improve functional mobility for ADLs for individuals with PD-FOG. Current evidence also suggests individuals were favorable in future use of this laser shoe device. This research is important to occupational therapy as it introduces a new way to use lasers to initiate functional gait, which has currently only been used with canes or walkers. Having hands free will have functional and safety implications.

References

- Lord, S. R., Bindels, H., Ketheeswaran, M., Brodie, M. A., Lawrence, A. D., Close, J. C., Whone, A. L., Ben-Shlomo, Y., & Henderson, E. J. (2020). Freezing of gait in people with Parkinson's Disease: Nature, occurrence, and risk factors. *Journal of Parkinson's Disease*, 10, 631-640. <https://doi.org/10.3233/JPD-191813>
- Sweeney, D., Quilan, L. R., Browne, P., Richardson, M., Meskell, P., & O'Laughlin, G. (2019). A technological review of wearable cueing devices addressing freezing of gait in Parkinson's Disease. *Sensors*, 19, 1-35. <https://doi.org/10.3390/s19061277>