Innovative Study Explores Balance and Memory Characteristics in Parkinson's Disease Using Virtual Reality

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Parkinson's disease (PD) is a progressive neurodegenerative disorder characterized by motor symptoms such as bradykinesia, dystonia, tremors, and postural balance disturbances, alongside non-motor deficits like cognitive decline. Despite a well-documented impact of PD on balance and cognition, the precise relationship between these impairments remains largely unexplored. Researchers in the Hearing Tinnitus Balance Research Laboratory in the College of Education's Department of Communication Sciences and Disorders are working to fill this gap. By exploring the intricate relationship between balance and memory impairments in individuals with PD, the team aims to provide new insights into the cognitive and motor challenges this population experiences.

In their innovative study, Ali Danesh, Ph.D., professor in the Communication Sciences and Disorders department, in collaboration with Adar Pelah, Ph.D., a researcher from the University of Cambridge, U.K., and graduate students Claudia Alvarez, Jessica Kaplan, Camila Barvo, and Tanisha Poitevien, are employing advanced virtual reality (VR) technology to assess and potentially improve balance and memory functions. The primary objective is to identify and understand the characteristics of balance and memory, and then to determine whether the balance function is impaired in individuals with cognitive decline due to PD. The team will also explore the role of these impairments in influencing the quality of life of those with PD.

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"Our study aims to bridge the gap between motor and cognitive impairments in PD," Dr. Danesh said. "We hope to uncover new rehabilitation strategies that can significantly improve the quality of life for individuals with PD."

VR technology offers a unique and immersive way to engage participants in therapeutic activities. By employing VR, this study aims to create a lifelike environment that closely mimics real-world objects and events. Previous research has shown that VR-based rehabilitation training can be more effective than traditional methods in improving step and stride length, balance function, and mobility.

Utilizing a VR system known as "Stepsense," the researchers will conduct three distinct tests: the Computerized Gans Sensory Organization Performance (Gans SOP), the Stroop test, and the LAPPS walking assessment.

Additionally, cognitive functions will be assessed using the Cognivue Clarity® automated memory screening device, which evaluates memory, executive function/attention, discrimination, and visuospatial memory. The study hypothesizes that individuals with PD will exhibit declined memory and balance abilities, significantly impacting their quality of life.

Participants formally diagnosed with PD will be recruited from the community, hospitals, and neurology practices. Eligibility will be determined through evaluations using three distinct questionnaires: the Dizziness Handicap Inventory (DHI), the Mini-Mental State Examination (MMSE) Short Memory Test, and the Parkinson's Disease Quality of Life Questionnaire – 39 (PDQL). Additionally, the severity and description of symptom progression will be assessed using the Hoehn and Yahr Scale.

The outcomes of this study will not only benefit researchers and clinicians but also contribute to the broader understanding of PD's impact on cognitive and motor functions. By utilizing cutting-edge VR technology, this research holds the potential to revolutionize rehabilitation approaches for individuals with PD.

For more information, please contact the Hearing Tinnitus Balance Research Laboratory at Florida Atlantic.

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