

# Optimizing dance interventions to improve motor function in people with Parkinson's disease and older adults

**Gates et al.**

Peter Gates<sup>1</sup>; Jin Hyun Kim<sup>2</sup>; Robert Melczak<sup>2</sup>; Fred Discenzo<sup>3</sup>; Joan Meggitt<sup>4</sup>; Angela L. Ridgel<sup>2</sup>

1. Biomedical Sciences, Kent State University, Kent OH
2. Exercise Science/Physiology, Kent State University, Kent OH
3. Rockwell Automation, Cleveland OH (retired)
4. School of Theatre and Dance, Kent State University, Kent OH

Dance comprises a broad range of techniques and styles, which have been utilized in classes specifically designed for individuals with Parkinson's disease (PD) and healthy older adults. Previous studies have shown that a series of dance sessions can improve balance, posture, and mobility for people diagnosed with PD and healthy older adults. However, these studies have not analyzed the linkage between repetitive movement types and persistent changes in motor skills. In order to begin understanding the causative factors of repetitive movement types that result in improved motor skill performance, the functional relationship between movement features and observed performance improvements needs to be examined.

## Purpose

To identify dance movement patterns resulting in the greatest improvement in tests of gait, balance and upper extremity function using partnered and non-partnered dance to music in PD and healthy older adults. We hypothesize that scripted variation in movement will promote improvements in motor performance.

## Methods

Ten participants with and without PD in structured group dance classes were recruited for this study. Performance measures of upper and lower extremity were collected before and after each dance class. Motion capture, video and live observations were used to examine movement patterns.

## Results

Individuals with PD had slower baseline performance in the 9 hole peg test (9HPT) than healthy older adults in both left ( $p=0.026$ , 33.5 s vs 24.9 s) and right hand ( $p=0.008$ , 31.2 s vs 26.5 s). There was also a significant improvement in the 9HPT for the left hand after the dance

classes in the individuals with PD ( $p=0.035$ , 3.44 s). Participants with PD saw no differences in hip range of motion or maximum movement angles between the different dance types, however those without PD did see such differences ( $p < 0.01$  for left and right hip flexion, and left and right hip rotation). Factors that led to observed improvements in mobility and movement execution included: repetition of foundational weight shifts in a separate exercise, engagement of the spine and arms in counterbalancing movement in the legs, incorporating flexion at the knee into the dance stride, and partnering with a moderately-skilled dancer. Increased amplitude and ease of stride and greater lift in the feet in locomotion were also documented.

## **Conclusion**

These preliminary results suggest that repetitive shifts in balance and movement during dance with music can lead to upper extremity motor performance and increased amplitude of movement in the lower extremity in individuals with PD. The differences in ROM and maximum angles of motion suggest possible future directions for dance instruction.