



# AOTA Evidence Briefs

## Parkinson's Disease

*\*A product of the American Occupational Therapy Association's Evidence-Based Literature Review Project*

### P #7

## Clients with Parkinson's disease can improve performance on fine motor tasks

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Soliveri, P., Brown, R. G., Jahanshahi, M., & Marsden, C. D. (1992). Effect of practice on performance of a skilled motor task in patients with Parkinson's disease. *Journal of Neurology, Neurosurgery, and Psychiatry*, *55*, 454–460.

### Level IIA2b

Nonrandomized controlled trial, 2 groups, 20 or more participants per condition, moderate internal validity, moderate external validity

### Why research this topic?

**Akinesia** (*see Glossary*) is one of the motor symptoms associated with Parkinson's disease. Researchers have used a variety of behavioral tasks to study this phenomenon—for example, reaction time and simple repetitive movements like finger tapping. However, the tasks bear little relationship to the complex, highly skilled tasks that persons with Parkinson's disease must perform in real life, such as walking and writing. "It has been observed clinically that patients can often perform such actions only with conscious effort." This observation led one researcher to conclude that persons with Parkinson's disease "have difficulty in 'the automatic execution of learned motor plans'." However, Soliveri and colleagues (1992), from the Neurological Institute (Milan, Italy) and the National Hospital for Neurology and Neurosurgery (London), hypothesized that persons with Parkinson's disease "have problems not with the automatic execution of [a] learned motor plan per se but with the process of schema learning," which results in the ability to adapt the learned motor plan to the specific conditions of a situation or a task.

### What did the researchers do?

The researchers tested 21 participants with Parkinson's disease (14 men and 7 women) and 23 control participants (9 men and 14 women) matched with the participants with Parkinson's for age. The average ages of the two groups were 60.9 and 62.6 years, respectively. Most participants in both groups were right-handed. Three participants with Parkinson's were in **stage 1** of the disease, 3 were in **stage 2**, and 15 were in **stage 3** (*see Glossary*). The average duration of disease was 9 years. Twenty were taking L-dopa (levodopa).

The study required the participants to perform 10 trials of a fine motor task: buttoning a cardigan. A person generally can perform this task relatively automatically, doing it as he or she does other tasks. When a person encounters a new garment, he or she uses schema learning to determine the specific characteristics of the task: the size of the button, the size of the button hole, and so forth. The participants were asked to perform the buttoning task under eight conditions, ranging in complexity from buttoning only to buttoning with self-paced foot tapping at various rates, to buttoning with foot tapping paced by a metronome.

After a 5-minute break, the participants performed eight more trials, starting with buttoning only and then performing under the seven other conditions in reverse order.

The researchers' reason for introducing the foot tapping was to test how automatic the buttoning had become. The more automatic it was, the less the foot tapping should interfere.

The researchers were interested in *performance time in buttoning* and *rate of foot tapping* (as measured by a computer-activated foot switch).

### **What did the researchers find?**

The participants with Parkinson's disease were significantly slower than the control group participants over all six trials of buttoning only. Across the first four trials, the groups showed a similar decrease in buttoning time. Across the last two trials, however, the participants with Parkinson's disease showed **significant** (*see Glossary*) improvement, whereas the control group participants did not.

Looking at buttoning along with foot tapping, the researchers found the participants with Parkinson's disease to be slower than the control group participants under all four conditions. Examining whether the foot tapping interfered with the buttoning, the researchers found that buttoning time was significantly higher for the participants with Parkinson's disease under all four foot-tapping conditions than under buttoning only, but significantly higher for the control group participants on only three of the four conditions (the second 4-taps-per-second condition being the exception). Compared with the control group participants, the participants with Parkinson's showed a significantly greater slowing on the first two trials but a significantly greater slowing on only the 4-taps-per-second condition on the second two trials. At the rate of 2 taps per second, the increase in buttoning time was the same for both groups.

On the foot-tapping measure overall, the participants with Parkinson's disease tapped significantly more slowly than the control group participants. Also, all participants tapped significantly faster on the second block of trials than on the first. There was no significant difference between the two groups, when the target rate was 2 taps per second, but at 4 taps per second the participants with Parkinson's tapped significantly more slowly than the control group participants.

### **What do the findings mean?**

- For therapists and other providers, the study supports the notion that clients with Parkinson's disease can increase their performance time on a fine motor task, buttoning, thus improving performance for the schema of buttoning. Their improvement occurs more slowly, however, than among persons without Parkinson's disease. The slowness may reflect limits imposed by their abnormal motor system rather than a problem with learning.

### **What are the study's limitations?**

The results of this study may have limited generalizability because participants were not randomly selected. This design flaw threatens internal validity of the study because the findings may not be applicable to the population of persons with Parkinson's disease.

## **Glossary**

**akinesia**—"loss or impairment of voluntary activity (as of a muscle)" (*Webster's Medical Desk Dictionary*)

**Hoehn & Yahr**—system of classifying symptoms

**Stage 1:** unilateral involvement only, usually with minimal or no functional impairment.

**Stage 2:** bilateral or midline involvement, without impairment of balance.

**Stage 3:** first sign of impaired righting reflexes. This is evident by unsteadiness as the patient turns or is demonstrated when he is pushed from standing equilibrium with the feet together and eyes closed. Functionally, the patient is somewhat restricted in his activities but may have some work potential depending upon the type of employment. Patients are physically capable of leading independent lives, and their disability is mild to moderate.

**Stage 4:** fully developed, severely disabling disease; the patient is still able to walk and stand unassisted but is markedly incapacitated.

**Stage 5:** confinement to bed or wheelchair unless aided.

Hoehn, M. M. & Yahr, M. D. (1967). Parkinsonism: Onset, progression, and mortality. *Neurology*, 17(5), S11–S26.

**significance (or significant)**—A statistical term, this refers to the probability that the results obtained in the study are not due to chance, but to some other factor (such as the treatment of interest). A significant result is likely to be generalizable to populations outside the study.

Significance should not be confused with clinical effect. A study can be statistically significant without having a very large clinical effect on the sample. For example, a study that examines the effect of a treatment on a client's ability to walk may report that the participants in the treatment group were able to walk significantly longer distances than the control group. However, if you read the study you may find that the treatment group was able to walk, on average, 6 feet, whereas the control group was able to walk, on average, 5 feet. Although the outcome may be statistically significant, a clinician may not believe that a 1-foot increase will improve his or her client's function.

■ Terminology used in this document is based on two systems of classification current at the time the evidence-based literature reviews were completed: *Uniform Terminology for Occupational Therapy Practice—Third Edition* (AOTA, 1994) and *International Classification of Functioning, Disability and Health (ICIDH-2)* (World Health Organization [WHO], 1999). More recently, the *Uniform Terminology* document was replaced by *Occupational Therapy Practice Framework: Domain and Process* (AOTA, 2002), and modifications to *ICIDH-2* were finalized in the *International Classification of Functioning, Disability and Health* (WHO, 2001).

This work is based on the evidence-based literature review completed by Susan Murphy, ScD, OTR/L, and Linda Tickle-Degnen, PhD, OTR/L, FAOTA.

For more information about the Evidence-Based Literature Review Project, contact the Practice Department at the American Occupational Therapy Association, 301-652-6611, x 2040.



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