AOTA Evidence Briefs

Cerebral Palsy

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

CP #11

A combination of neurodevelopmental treatment and practice may be effective in improving reaching movement in children with spastic cerebral palsy

Fetters, L., & Kluzik, J. (1996). The effects of neurodevelopmental treatment versus practice on the reaching of children with spastic cerebral palsy. *Physical Therapy, 76,* 346–358.

Level: IIB1a

Nonrandomized controlled trial, two groups, less than 20 participants per condition, high internal validity, high external validity

Why research this topic?

Research on the effectiveness of neurodevelopmental treatment (NDT) with children with cerebral palsy has been minimal, and the results have been inconsistent. Neurodevelopmental treatment "focuses on encouraging and building upon normal movement patterns and normal postural reactions, while trying to reduce abnormal movements." A therapist pursues these outcomes "through physical handling of the child during movement, giving the child more normal **sensorimotor** (see *Glossary*) experiences" (p. 347).

What did the researchers do?

Fetters and Kluzik (1996), of Boston University and the Cotting School (Lexington, Massachusetts), respectively, designed a study to compare the effects of neurodevelopmental treatment with those of movement practice on the reaching of children with spastic cerebral palsy. Eight children participated in the study, 6 boys and 2 girls. Their average age was 12.4 years. They were recruited from the Cotting School, a private school for children with disabilities. They all received each type of treatment for 5 days, either neurodevelopmental treatment first and movement practice second (3 children), or vice versa (5 children). The sessions lasted 35 minutes. For the week before the first treatment and for the week between the first and second treatments, they received no treatment. The neurodevelopmental treatment varied for each participant, but the overall goals were the same: "improved trunk and shoulder-girdle control during reaching, improved smoothness and efficiency of movement, and improved ability to initiate movement" (p. 352). In the practice sessions, the children played computer games that required them to reach in the manner to be measured.

The outcome areas of interest to the researchers were *movement units; movement time; path* (straightness of reach); and *reaction time*. These variables were measured by a special system for analyzing motion, as the children played an interactive video game before and after each treatment session.

What did the researchers find?

On all four measures, from day to day, there was **no significant** (see *Glossary*) difference for either treatment group.

Further, between the first-day scores before treatment and the last-day scores after treatment (over the course of one week), there were no significant differences for the neurodevelopmental treatment group, and none for the practice group except in movement time.

After a week of no treatment, neither group's scores were significantly different from its scores at the end of 1 week of treatment.

Looking at the data in terms of overall amount of treatment time, regardless of the type of treatment, the researchers found **significant** (see *Glossary*) differences in movement units and movement time between scores before any treatment and scores after 2 weeks (including 1 week of treatment). They also found significant differences in movement units, movement time, and path between scores before any treatment and scores after 4 weeks (including 2 weeks of treatment).

What do the findings mean?

- The findings suggest that a combination of the two treatments may be necessary to achieve improvement in movement variables.
- The findings should boost confidence in funding programs that combine the two treatments to improve movement variables in children with spastic cerebral palsy. The findings also suggest some directions for research: replication of the study with a larger sample, a longer period of treatment, and weekly measures over many weeks; grouping of children for intervention according to the kind of movement problem they exhibit (initiation, speed, smoothness, etc.); and testing of additional variables following treatment (e.g., tightness or soreness of muscles and cardiorespiratory requirements).

What are the study's limitations?

- Sampling limited to one metropolitan area.
- The sample size may have been too small to show a significant difference between groups for the two treatments. Also, the duration (1 week) of each treatment might not have been adequate to demonstrate differences if they existed.
- The same person provided both the NDT and "practice" sessions, which may have blurred the distinction between the two. No monitoring of treatment fidelity was reported.
- None of the subjects completed the 5 days of treatment (as proposed in the study protocol) during either of the treatment weeks.
- This study offered a comparison group, but no "true" **control group** (see *Glossary*). Therefore, other factors than the treatment itself may have accounted for any differences on the outcome measures for either group.
- Members of both groups improved in speed and smoothness of movement, but no functional outcomes were assessed. "Kinematic" analysis may not be clinically meaningful for the occupational therapy practitioner.

GLOSSARY

control group—A group that received special attention similar to that which the treatment group received , but did not receive the treatment.

nonsignificant (or no significance)—A statistical term that refers to study findings that are likely to be due to chance differences between the groups rather than to other factors (like the treatment of interest). A nonsignificant result is not generalizable outside the study. Like significance, a nonsignificant result does not indicate the clinical effect. Often studies will show nonsignificant results, yet the treatment group's mean will be better than the control group's. This is usually referred to as a trend in the right direction. Because significance is closely determined by sample size, nonsignificant results would often become significant if the sample size was increased.

sensorimotor—Of, relating to, or functioning in both sensory and motor aspects of bodily activity.

significance (or significant)—A statistical term that 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 one that 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. However, if you read the study you may find that the treatment group was able to walk, on average, 6 feet, while the control group was able to walk, on average, 5 feet. While the outcome may be statistically significant, a clinician may not feel that a 1-foot increase will make his or her client functional.

■ 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).

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