AOTA Evidence Briefs

Cerebral Palsy

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

CP #4

Infant stimulation may be more effective than neurodevelopmental therapy in improving motor skills of infants with spastic diplegia

Palmer, F. B., Shapiro, B. K., Wachtel, R. C., Allen, M. C., Hiller, J. E., Harryman, S. E., Mosher, B. S., Meinert, C. L., & Capute, A. J. (1988). The effects of physical therapy on cerebral palsy: A controlled trial in infants with spastic diplegia. *New England Journal of Medicine*, *318*, 803–808.

Level: IA1a

Randomized controlled trial, 20 or more participants per condition, high internal validity, high external validity

Why research this topic?

There have been few clinical trials of the effects of physical therapy on children with cerebral palsy. Furthermore, interpretation of the results of the trials that have been conducted has been difficult because of small samples, attrition among participants, and failure to assign participants randomly to treatment and **control groups** (see *Glossary*).

What did the researchers do?

Palmer and his colleagues (1988), of Johns Hopkins University (Baltimore, Maryland), designed a study to assess the relative effectiveness of neurodevelopmental therapy and a program of stimulation, combined with neurodevelopmental therapy for infants with spastic diplegia. It typically involves handling a child as he or she moves. "Spastic diplegia" is "a form of cerebral palsy with prominent lower extremity impairment but only mild upper extremity involvement" (p. 804).

The participants were children between 12 and 19 months old with spastic diplegia who had been referred to the Kennedy Institute for Handicapped Children (at Johns Hopkins). Ninety of them were evaluated for participation; 52 met the criteria. The researchers obtained consent to participate for only 48. One child later withdrew.

The participants were randomly assigned to receive 12 months of neurodevelopmental therapy (therapy group) or 6 months of stimulation followed by 6 months of neurodevelopmental therapy (stimulation group). Neurodevelopmental therapy focused on improving the infants' righting responses and equilibrium. Stimulation involved a program called *Learningames*, consisting of "cognitive, sensory, language, and motor activities of increasing developmental complexity appropriate for children from birth to 3 years of age" (p. 804). Both treatments involved daily administration of a program at home by parents and individual sessions with a therapist at the Kennedy Institute for 1 hour every 2 weeks.

The outcome areas of interest were *motor skills* (as measured by the Bayley Scales of Infant Development and by observation to determine whether the infants had achieved certain milestones in motor development, such as walking independently); *cognitive skills* (as measured by the Bayley Scales of Infant Development); and *social development* (as measured by the Vineland Social Maturity Scale). The groups were assessed after 6 months of treatment to identify differences due to the effects of their respective treatments. They were assessed after 12 months of treatment to identify differences due to therapy begun earlier in an infant's life and lasting for a year, versus therapy begun 6 months later and lasting only 6 months.

What did the researchers find?

At the 6-month assessment, the stimulation group showed **significantly** (see *Glossary*) more improvement in motor skills than the therapy group, on both the Bayley Scales and the observations. The stimulation group also showed significantly more improvement in cognitive skills. No differences were apparent in social development.

At the 12-month assessment, the stimulation group still showed significantly more improvement than the therapy group in motor skills on both measures. No differences were apparent in cognitive skills or social development.

What do the findings mean?

- The findings suggest that a program of infant stimulation is more effective than neurodevelopmental therapy in promoting motor skills in infants with spastic diplegia. Further, they suggest that neurodevelopmental therapy introduced earlier in an infant's life and lasting longer is no more effective than neurodevelopmental therapy introduced 6 months later and conducted for a shorter period.
- The findings should boost confidence in funding the use of stimulation with infants who have spastic diplegia. They also suggest some directions for research: replication of the study with a control group.

What are the study's limitations?

- Sample drawn from one facility in large metropolitan area.
- Power to detect a difference between treatments across a broad range of motor outcomes was limited by sample size.
- No power calculations done.
- Person completing assessments aware of group assignment, which might introduce **bias** (see *Glossary*).
- No "true" control group that did not receive intervention. The one group difference at post-test might not have been due to the intervention but to some other factor.
- Improvement in cognitive scores for infant stimulation group is a possible practice effect because of similarities between the Bayley cognitive items and the infant stimulation program.

GLOSSARY

biased/biases—Biases are systematic errors within a study. When a study is biased, the means of treatment and/or control groups are artificially inflated or reduced. This artificial inflation or reduction can cause the study's results to be incorrect; the treatment will appear to have an effect, when in reality it does not, or vice versa. Many of the limitations reported in these evidence briefs are related to biases.

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

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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