



AOTA Evidence Briefs

Developmental Delay in Young Children

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

DD #10

Sensorimotor training may improve motor performance in infants with Down syndrome

Lydic, J. S., Windsor, M. M., Short, M. A., & Ellis, T. A. (1985). Effects of controlled rotary vestibular stimulation on the motor performance of infants with Down syndrome. In K. J. Ottenbacher & M. A. Short (Eds.), *Vestibular processing dysfunction in children* (pp. 93–118). New York: Haworth.

Level: IB2c

Randomized controlled trial, fewer than 20 participants per condition, moderate internal validity, low external validity

Why research this topic?

A majority of the studies using **vestibular stimulation** (see *Glossary*) to remediate developmental delays in the motor skills of children, including children with Down syndrome, indicate that it is effective. Some studies, however, do not support this conclusion.

What did the researchers do?

Lydic and her colleagues (1985), variously of Boston University and in private practice, sought to clarify some of the conflicting findings regarding use of vestibular stimulation with infants with Down syndrome. They designed a study to examine systematically the effects of vestibular stimulation on motor skills.

The researchers recruited children for the study by contacting all early intervention programs in Massachusetts, other state agencies in Massachusetts, and regional and national organizations serving people with Down syndrome. Only children with Trisomy 21 (a type of Down syndrome) were included. Children with major medical problems were excluded. The resulting sample consisted of 20 children (10 boys and 10 girls) from Massachusetts, New Hampshire, Ohio, and West Virginia. The researchers randomly assigned them to a treatment or a **control group** (see *Glossary*) following a special procedure to match the groups in age. Before the final evaluation, 2 boys dropped out of the study because of family problems (the article does not indicate what their group memberships were). The 18 children remaining averaged 6.8 months in age. All were simultaneously participating in an intervention program that included **sensorimotor** (see *Glossary*) training.

The members of the treatment group received rotary vestibular stimulation in two positions, sitting and lying on their backs. The procedure involved an occupational therapist placing each child, in turn, in a suspended wooden seat, slowly spinning him or her clockwise for 17 revolutions, waiting 1 minute, then slowly spinning the child counter-clockwise; then placing the child on his or her back in a suspended net hammock and repeating the spinning-rest-spinning sequence. The treatment took place three times a week, 20 minutes at a time, for 12 weeks.

The members of the control group received only their regular therapy, without vestibular stimulation.

The outcome area of interest was *motor development* (as measured by the Movement Assessment of Infants and the Gross Motor section of the Peabody Developmental Motor Scales). The assessments took place before the intervention, 6 weeks after the intervention, and 12 weeks after the intervention.

What did the researchers find?

Both the treatment and the control group made **significant** (see *Glossary*) gains in motor development. There were no significant differences between the groups.

What do the findings mean?

- The findings suggest that infants with Down syndrome can improve their motor performance over time. The fact that both groups made significant gains is clinically compelling.

The researchers' hypothesis that the group receiving rotary vestibular stimulation would make greater gains than the group not receiving it was not confirmed. One possible explanation is that both groups were receiving sensori-motor training outside the study. That training may have been responsible for the gains. Future investigations with more sophisticated designs might be able to control for the effects of outside treatment.

The results also indicate that the Movement Assessment of Infants and the Gross Motor section of the Peabody Developmental Motor Scales are capable of detecting motor changes in infants with Down syndrome.

- The findings should boost confidence in the validity of the Peabody Gross Motor Scale with children with Down Syndrome. They also suggest a productive direction for research. For example, what are the effects of rotary vestibular stimulation on behavior and social interaction?

What are the study's limitations?

- Only children with Trisomy 21 were included.
- A lengthy recruitment strategy was required to locate 20 subjects.
- Volunteer families only were used; possible bias in who finally agreed to participate.
- The year of cohort was not specified.
- Three treating therapists were "clinically certified;" type of certification was unclear.
- Interreliability of three therapists was not stated.
- Treatment included rotary vestibular movement only.
- The treatment and control groups differed at baseline on both outcome measures.
- Both groups made equivalent changes on outcome measures.
- Subjects were 4–10 months of age.

Glossary

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

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

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 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, whereas 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.

vestibular—relating to balance.

vestibular stimulation—stimulation, through motions like rocking (linear vestibular stimulation) or spinning (rotary vestibular stimulation), of the vestibule of the ear, which controls the sense of balance.

■ 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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