



AOTA Evidence Briefs

Cerebral Palsy

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

CP #10

Aquatic training may improve water-orientation skills of children with cerebral palsy

Hutzler, Y., Chacham, A., Bergman, U., & Reches, I. (1998). Effects of a movement and swimming program on water orientation skills and self-concept of kindergarten children with cerebral palsy. *Perceptual and Motor Skills*, 86, 111–118.

Level: IIA1a

Non-randomized controlled trial, two groups, 20 or more participants per condition, high internal validity, high external validity

Why research this topic?

Psychologists theorize that some people with disabilities may not see themselves as competent or effective because they do not experience mastery frequently. Accepting this theory, professionals in “adaptive physical education” (physical education for people with disabilities) focus on individual achievements in skill development. Aquatic activity is especially suited to people with cerebral palsy because water gives them buoyancy; they do not have to fight the effects of gravity (p. 111).

What did the researchers do?

Hutzler, Chacham, Bergman, and Reches (1998), all affiliated with the Wingate Institute (Netanya, Israel), tested the effects of a movement and swimming program on motor function in the water and on self-perception of children with cerebral palsy. Fifty-eight children with neuromuscular impairments were initially recruited. All were 5–7 years old and were students in four nonresidential kindergartens for children with neuromotor disorders. The researchers excluded children who did not have cerebral palsy, reducing their sample to 46 (32 boys and 14 girls). They designated the 23 children from two of the kindergartens as the experimental group and the 23 children from the other two kindergartens as the “control” group (not a true control group because the assignment to groups was not random).

For 6 months the experimental group participated in two weekly 30-minute sessions of individual aquatic exercise focused on water-orientation skills, and one weekly 30-minute session of group movement exercise in a gymnasium, focused on locomotion and ball-handling skills. The group also received one or two weekly 30-minute sessions of neurodevelopmental stimulation “intended to stabilize muscle tone, conserve range of motion (see Glossary), and increase motor development” (p. 112).

During the same 6 months, the **control group** (see *Glossary*) received four weekly 30-minute sessions of neurodevelopmental stimulation like that which the experimental group received once or twice a week.

The outcome areas of interest were *water orientation* (as measured by the Water Orientation Checklist) and *self-concept* (as measured by the Self-concept Scale).

What did the researchers find?

On the measure of water orientation, the experimental group showed a **significant** (see *Glossary*) improvement—33.5%—from before to after the intervention. The control group was not tested on this measure.

On the measure of self-concept, there were no significant differences between the groups before or after the intervention, and **no significant** (see *Glossary*) differences within either group from the first measurement to the second.

What do the findings mean?

- The findings suggest that training in aquatic skills improves the water readiness and swimming ability of children with cerebral palsy. Although the researchers did not have a true control group with which they could compare the results of the aquatic training, they argue that the 33.5% improvement in the experimental group was very likely the effect of the training and not of some other factor, such as gross motor development.
- The findings suggest some directions for research: replication of the study with a true control group; investigation of the relationship between mastery of an attempted skill and self-concept; and assessment of self-concept using measures of physical and athletic competence, instead of global measures of self-concept (like the Self-concept Scale).

What are the study's limitations?

- Lack of **randomization** (see *Glossary*); groups matched on physical characteristics.
- No control or comparison group for the “water orientation” outcome.
- Generalization limited by subject's age, diagnosis, and geographical area.
- Self-concept scale appears too global to measure change; other measures (e.g., physical or athletic competence) might have been more sensitive.
- Not clear if intensity of treatment for the two groups was equal.

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 were increased.

randomization—Randomization refers to the practice of assigning participants to either the treatment or control group using random allocation. Random allocation methods include flipping a coin or using a random number table. Randomization is meant to prevent the possibility that the experimenter might subconsciously let his or her opinions and preferences influence into which group a participant goes. Randomization also helps to ensure that the two groups are essentially equal on many demographic variables, although randomization does not always create equal groups.

Nonrandomized studies are not considered to be true experiments but are often referred to as quasi-experimental. Serious biases can occur when studies are nonrandomized.

range of motion—Arc of motion through which a joint passes.

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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