



AOTA Evidence Briefs

Cerebral Palsy

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

CP #13

A conventional aquatic program may be as effective as a structured, stimulating one in promoting self-esteem and functional independence in adolescents with cerebral palsy

Dorval, G., Tetreault, S., & Caron, C. (1996). Impact of aquatic programmes on adolescents with cerebral palsy. *Occupational Therapy International*, 3, 241–261.

Level: IIB2b

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

Why research this topic?

A modest amount of research has suggested that an aquatic program can improve various social-emotional attributes (e.g., self-concept) and clinical variables (e.g., symptoms and hospitalizations) of adolescents with cystic fibrosis, mental retardation, or asthma. However, no one has studied the effects of an aquatic program on adolescents with cerebral palsy.

What did the researchers do?

Dorval, Tetreault, and Caron (1996), all of Laval University (Quebec, Canada), decided to study the short- and long-term effects of an aquatic program on social-emotional and functional variables in adolescents with cerebral palsy. From a pool of 218 potential participants who were patients at the Centre Cardinal-Villeneuve, a pediatric rehabilitation center in Quebec City, they invited 40 who were between 10 and 17 years old, had cerebral palsy, could follow simple verbal orders, and resided in the Quebec City area. Twenty (9 boys and 11 girls, average age 13.7 years) accepted. They were assigned to an experimental group (10 adolescents) or a conventional group (10 adolescents) according to their mobility and the availability of transportation. Within each group the participants were divided into two teams so that the maximum number in the pool at one time would be five.

Both groups participated in one 55-minute aquatic session per week for 10 weeks. An occupational therapist and 15 adult volunteers conducted the sessions.

In the experimental group, the 10 sessions all had the same five parts: “(1) preparation and entry in the pool; (2) warm-up; (3) individual exercises; (4) group activities; and (5) relaxation” (p. 247). However, they were different each week. The sessions had global objectives and specific objectives. Global objectives reflected items on the measures of self-esteem (e.g., positive attitude and personal qualities) and functional independence (e.g., mobility and continence). Specific objectives included such aims as reducing muscle tone and increasing **range of motion** (see *Glossary*). The volunteers working with this group had four responsibilities: (1) to be helpers (e.g., during dressing); (2) to be guides, stimulating the adolescents and encouraging them to use their strengths and develop their self-esteem; (3) to discuss the adolescents’ daily life with them; and (4) to give the adolescents tips about self-confidence and functional efficiency.

In the conventional group, all 10 sessions were alike: They began with a warm-up and ended with a relaxation period. In between, there was 15 minutes of practicing swimming skills and playing aquatic games, then a period of free play. The sessions had no therapeutic goals—just the purposes of pleasure and fun. The volunteers helped the participants but without any extra stimulation, encouragement, or discussion.

The researchers were interested in the following outcome areas: *self-esteem* (as measured by Rosenberg's Self-Esteem Scale) and *functional independence* (as measured by the Functional Independence Measure for children). Measurements were made at baseline, at the end of the 10 weeks (for short-term effects), and 9 months later (for long-term effects).

What did the researchers find?

On the measure of self-esteem, from the beginning to the end of the program, both groups showed **significant** (see *Glossary*) improvement. At the 9-month follow-up, however, neither group showed significant improvement compared with their scores at either the beginning of the program or the end. Further, there were **no significant** (see *Glossary*) differences between the groups at any point.

On the measure of functional independence, again, from the beginning to the end of the program, both groups showed significant improvement. Nine months later, the experimental group showed no significant improvement over its scores at the end of the program, but significant improvement over those at the beginning. Between the groups, though, there were no significant differences at any point.

What do the findings mean?

- Overall, an aquatic program is valuable for increasing self-esteem and functional skills in adolescents with cerebral palsy. However, a conventional aquatic program is as effective as a structured, stimulating one.
- The findings should boost confidence in aquatic programs to promote self-esteem and functional independence in adolescents with cerebral palsy. They also suggest some directions for research: for example, replication of the study with a larger sample and a longer treatment period; and a three-way comparison, involving an experimental group, a conventional group, and a **control group** (see *Glossary*).

What are the study's limitations?

- The sample size may have been too small to detect a treatment effect in the experimental group on the outcome variables if, in fact, one existed.
- Convenience sampling from adolescents with a high degree of interest in the activity may have **biased** (see *Glossary*) the results in favor of a positive result for either of the treatment conditions.
- No activity control (i.e., other swimming lessons) was done between assessment at Time 2 and Time 3.
- A fairly large number of subjects were **lost to follow-up** (see *Glossary*) (8 out of 20), which limits the meaningfulness of the follow-up analysis.
- The sample size of 20 was probably too small to answer the multiple regression questions raised in the study, although this problem was addressed in the discussion section.
- Without a “true” control group (i.e., adolescents who did not receive any intervention), it could be that the changes over time in each group were due to factors other than the intervention, such as individualized attention from the volunteers.
- Both conventional and experimental treatment groups used the same volunteers, at least on weekends. This may have resulted in the volunteers acting the same way in both groups, despite the training given at the beginning of the program. Fidelity of treatment protocol was not monitored.
- Generalizability of results is limited to other adolescents with cerebral palsy.

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.

lost to follow-up—Participants who are lost to follow-up may differ from those who remain in the study; for instance, they may be sicker or have family members who are less supportive. If those who were lost to follow-up remained in the study, the results might have been different. In general, a study with more than 20% lost to follow-up is probably biased.

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.

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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