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Phillip Conatser

*University of Texas - Brownsville*, [phillip.conatser@utb.edu](mailto:phillip.conatser@utb.edu)

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# Adapted Aquatics and Rehabilitation: A Literature Synthesis

Phillip Conatser

This article presents a synthesis of literature related to the planning, implementing, and delivery of adapted aquatic and rehabilitation services for individuals with disabilities. The review investigates the potential benefits of aquatics (from the psychomotor, cognitive, affective, and educational domains), certification opportunities, inclusion, federal guidelines, and the classification system for competitive swimming. Furthermore, it includes recommendations for future study and protocols for conducting high-quality research.

**Key Words:** aquatic therapy, aquatic legal issues, aquatic fitness, teaching techniques, water safety

Water recreation, education, and therapy have all been recognized as means of developing physical and motor fitness, social skills, and self-esteem in individuals with disabilities (American Red Cross, 1977; Beaudouin & Keller, 1994; Bull et al., 1985; Christie, 1985; Daniels, 1954; Fait, 1966; Getz, Hutzler, & Vermeer, 2006; Grosse, 1996; Hutzler, Chacham, Bergman, & Reches, 1998; Newman, 1997; Sherrill, 2003; Skinner & Thompson, 1983). Aquatic activities through the years have provided a form of exercise that is socially acceptable and integrated into many facets of our society (Broach & Dattilo, 1996a, 1996b; Koury, 1996; Lepore, Gayle, & Stevens, 1998; Martin, 1983; Morris, 1999). Aquatics has continued to be an enjoyable means to improve muscle strength, motor coordination, flexibility, cardio-respiratory endurance, postural stability, and overall health-related fitness without putting undue pressure on joints (Archer, 2002; Binkley & Schoyer, 2002; Darby & Yaekle, 2000; Grosse, 1995; Horvat & Fobus, 1989; Hutzler, Chacham, Bergman, & Szeinberg, 1997; Reid, 1979). Aquatic activities have also offered opportunities to learn fine motor, locomotor, and object-control skills (Exceptional Parent staff, 1993; Stein, 2004; Wanzer, 2000). Furthermore, aquatic activities have often been associated with decreasing pain and stereotypic behaviors while facilitating normal muscle tone through proprioception and sensory stimulation (Geis, 1975; Horvat, Forbus, & Van Kirk, 1987; Hurley & Turner, 1991; Koury; Langendorfer, 1986; Martinez, 2006; Yilmaz, Yanardag, Birkan, & Bumin, 2004).

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The author is with the Dept. of Health and Human Performance, University of Texas at Brownsville, Brownsville, TX 78520.

Aquatic programs have been shown to be more easily developed than those on land for individuals with difficulty moving against gravity (Angelo & Stewart, 1997; Beason & Gilbert, 1995; Butler, 2002; Doremus, 1992; Lepore et al., 1998; Sova, 2004). The buoyant water supporting the body and lessening the effects of gravity enables a person who might not be able to easily walk or move on land achieve ambulation in water, thus creating a training environment for skill development and muscle reeducation before returning to land-based activities (Coward, 1998; Mayse, 1991; Rider & Modell, 1996; Watson, Cummings, Quan, Bratton, & Weiss, 2001). In most situations aquatic techniques and adaptive equipment are easily obtainable, helping facilitate desired movements while providing a safer instructional environment (Albright, 1995; Elder, 1995; Grosse, 1987; Johnson, 2002; Nearing, Johansen, & Vevea, 1995; Schweer, 1985; Stopka, 2001a, 2001b, 2001c; Summerford, 1993). Once developed, fitness levels and swimming skills have been used as prerequisites for participation in other aquatic activities such as competition, boating, waterskiing, springboard and scuba diving, and surfing (Anderson, 1985; Conlin, 1990; Conner, 2006; Cracraft, 1988; Drewes, Biering-Sorensen, & Andreasen, 1993; Jacobs, 1987; Kay, 2004; Petrofsky, 1994a, 1994b, 1995).

Psychologically, participation in group aquatic activities led by an instructor who has maintained an emotionally safe climate can improve social skills, self-esteem, and independence in the community (American Red Cross, 1977, 2004; Bumin, Uyanik, Yilmaz, Kayihan, & Topcu, 2003; Canadian Red Cross Society, 1980; Driver, O'Connor, Lox, & Rees, 2003; Horvat & Fobus, 1989). The skill levels of individuals with and without disabilities are often equalized once those individuals are in the water, so a person with a disability participating in group activities has been viewed as a member of the group, thus increasing social interaction and acceptance (Martin, Adams-Mushett, & Smith, 1995; Sherrill, 2003; Weiss, McCullagh, Smith, & Berlant, 1998). In the water, individuals without disabilities also have had the opportunity to view those with disabilities without the encumbrance of braces, crutches, walkers, or wheelchairs and hence as equals (Daniels & Dodd, 1996; Lepore, Gayle, & Stevens, 1998; Weiss et al.). Because of water's unique properties, movements that are not possible on land can be achieved in the aquatic environment (Austin, 1987; Getz et al., 2006). For individuals with disabilities, being able to get around without using a wheelchair or crutches can result in a freedom of movement that could foster feelings of success (Frieden, 1989; Langendorfer, 1989; Langendorfer & Bruya, 1995; Sova, 2000).

As an individual with a disability learns to move about and enjoy the water without assistance, both self-respect and self-awareness might improve (Martin, 1999; Martin et al., 1995; Martin, 1983). The opportunity to participate in leisure-time activities has led to increased awareness of age-appropriate community experiences (Austin, 1987; Broach & Dattilo, 2001; Kegel & Peterson, 1989; Lais, 1987; Mayeux, 1988). Benefits have included improvement of mood state and reduction of anxiety and depression (Exceptional Parent Staff, 1993; Webb & Drummond, 2001). A sense of well-being and freedom temporarily releases an individual from the tension and stress that in many cases compound the effects of a physical disability (Grosse & McGill, 1997).

More specifically, adapted aquatics has been shown to (a) improve social skills for children with autism (Huettig & Darden-Melton, 2004; Prupas, Harvey,

& Benjamin, 2006; Reid & O'Conner, 2003a, 2003b), (b) increase mobility for adults and children with multiple sclerosis or cerebral palsy (Attermeier, 1998; Broach & Dattilo, 2001; Dorval, Tetreault, & Caron, 1996; Figuers, 1999; Hutzler, Chacham, Bergman, & Szeinberg, 1998), (c) be beneficial to cardiac-rehabilitation clients (Cider, Sunnerhagen, Schaufelberger, & Andersson, 2005), (d) have dramatic effects in injury rehabilitation (Konlian, 1999; Thein & Brody, 2000; Wykle, 2004), and (e) help improve asthmatic symptoms (Rosimini, 2003; Weisgerber, Guill, Weisgerber, & Butler 2003).

Aquatics activities have been shown to be a fun and enjoyable experience that can have many physical, psychosocial, cognitive, and recreational benefits (Wang & DePauw, 1995). Moreover, the freedom of movement made possible by water not only boosts morale but also gives individuals with disabilities of all ages the incentive to maximize their potential in other aspects of life (Almekinders, 1994; Conatser, 1995; Skinner and Thompson, 1983; Wagner, 1991). One aquatics program's stated objective was "to prepare the handicapped through aquatics to be contributing members of society" (Muhl, 1976, p. 431). Appreciation and awareness of aquatic activities are an added benefit for aquatic programs for individuals with disabilities (Canadian Red Cross Society, 1980; Carter, 1998). Although water activities are not a cure-all for life's problems, aquatic activities have added to quality of life through physical and mental health benefits (American Red Cross, 1992, 2004; Lepore et al., 1998).

## Training

Aquatic instructors' training opportunities for many years have existed on three levels: formal certification programs (preservice), conferences and seminars, and in-house (in-service) training. Formal certification of adapted aquatic instructors in the United States can be obtained by attending a course given by one of four organizations providing specialty certificates for adapted aquatics programs. Attending the American Association of Physical Activity and Recreation, YMCA of the USA, Aquatic Therapy Institute, or Special Olympics courses providing certification can qualify an instructor to work with individuals who have disabilities. Organizations' curriculum models vary for certification. For example, the American Association of Physical Activity and Recreation and YMCA use an educational model, the Aquatic Therapy Institute has a therapeutic model, and the Special Olympics emphasizes athletic competition.

The American Red Cross (2004) discontinued its separate adapted-aquatics certification, opting to include only one chapter on disabilities in its *Water Safety Instructor* book for its certification course. This means those who are certified as Red Cross water safety instructors are considered qualified to teach people with disabilities (American Red Cross, 2004) despite having very little if any experience or training working with individuals who have disabilities. In contrast, the American Association of Physical Activity and Recreation has several levels of adapted-aquatics certification (i.e., adapted aquatic instructor, adjunct, or assistant). Physical or occupational therapists should be encouraged to obtain an aquatic therapy certification because they often have the skill, knowledge, and attitude

for conducting aquatic programs for individuals with disabilities (Dumas, 2001; Matola, 2001). Special Olympics certification allows an instructor to become a swimming coach for Special Olympics athletes.

Whatever aquatic certifications or training a person might have had, very few of these programs have considered factors about inclusion or specificity of disability intervention, and some are competitive in nature rather than instructional (Austin, 1987; Conatser, Block, & Lepore, 2000; Lepore et al., 1998). These deficits are compounded by minimal hours required for class instruction, as well as supervised practicum requisites for certifications. Although the quality of aquatic programs for disabilities has greatly increased over the past years, some areas have scarcely been addressed (Christie, 1985; Grosse, 1996). Conatser et al. discovered that almost all aquatic instructors in their studies needed many additional ideas on training, equipment, and class-management techniques when teaching individuals with disabilities (Conatser & Block, 2001; Conatser, Block, & Gansneder, 2002; Conatser et al. 2000). This was especially interesting because aquatic instructors had an average of 20 years of teaching experience with people with and without disabilities, as well as holding several aquatic certifications (Conatser et al., 2000). A few aquatic instructors had received additional specific in-service training toward working with individuals with disabilities, which increased their confidence, favorable beliefs, inclusion practices, and successful intervention strategies (Conatser & Block; Lieberman & Wilson, 2005).

## **Inclusion and Legislation**

Aquatic programs for individuals with disabilities have traditionally been provided in segregated programs—programs for just individuals with disabilities (Conatser et al., 2002). Unfortunately, many aquatic organizations believed that federal laws emphasizing equality but with no undo hardship did not apply to them (Dummer, 2003; Osinski, 1993). In fact, many aquatic programs around the United States continue to offer only separate aquatic instruction for individuals with disabilities (Conatser & Block, 2001). In some locations there has been a continued trend to include more individuals with disabilities in regular community aquatic programs (Berry, 1990; Suomi & Suomi, 2000). Apparently over the past several decades the impact of federal laws such as the Individuals with Disabilities Education Act and Americans with Disabilities Act, along with the heightened awareness and proactive support of parents and advocacy groups, has led to more inclusive aquatic opportunities for individuals with disabilities (Christie, 1985; Grosse, 1985, 1996; Langendorfer, 1990; Priest, 1979). Many individuals with disabilities and their parents or guardians have chosen to participate in regular aquatic programs (American Red Cross, 2004, Bryant & Graham, 1993; Dummer).

Federal legislation has aided in providing equal access to the benefits of aquatic participation (Clair, 2005; Conatser, 1995, Lepore et al., 1998). Access to community services and facilities, including aquatic facilities and programs, is an entitlement guaranteed by the Americans with Disabilities Act (Department of Justice, Office of the Attorney General, 1991). The Americans with Disabilities Act, passed in 1990, states,

No individual will be discriminated against on the basis of disability in the full and equal enjoyment of the goods, services, facilities, privileges, advantages, or accommodations of any place of public accommodation by any person who owns, leases (or leases to), or operates a place of public accommodation. [302 (a)]

The Americans with Disabilities Act required private businesses to make reasonable accommodations for individuals with disabilities. This civil rights legislation mandates aquatic programs and facilities that are open to the public to provide accommodations for individuals with disabilities and equal opportunities to participate in the programs and services they offer (Gobin, 1998; Osinski, 1993). The legislation included the necessity of providing accessible entrances to aquatic facilities, locker areas, and the pool area (Clair, 2005; Osinski, 1989). In addition to accessibility, programs (e.g., aqua-aerobics, competitive swim teams, instructional swim lessons, lifeguard-training courses, aquatic therapy, etc.) must make reasonable modifications to allow individuals with disabilities to participate in the activities successfully and safely (Conatser, 2004; Osinski, 1998; Sawyer, 2000; West, 1986; Wykle, 2003). Some modifications made in response to the act have included a chair or some modified piece of equipment placed in the water for seating during an aerobics class, an alternative plan for the kicking phase of a swim-team workout for an individual with paraplegia, or providing extra personnel for an individual who has severe mental retardation and is trying to complete a beginning swim class (Austin, 1987; Lieberman, Lytle, & Irwin, 2003).

The spirit of the law does not allow community aquatic programs to offer a segregated class for individuals with disabilities as a substitute for making modifications to integrated programs (Dummer, 2003; Osinski, 1998). Segregated programs (e.g., a separate adapted aquatic program) may be offered as one of the services available, but placement in that program must be based on individual assessment of the swimmer, the demands of the regular program, and the desires of the individual with a disability or his or her caregiver (Lepore et al., 1998). Furthermore, if the individual with a disability is placed in a separate aquatic program (e.g., one-on-one), the cost to the individual cannot be more than what is charged for a group program. This regulation means that no additional cost can be applied because a person has a disability.

Individuals with disabilities might choose to participate in a regular aquatic program if they are "otherwise qualified" (Block, 1995). For those with a qualified disability, civil rights legislation PL 93-112, Section 504, of the rehabilitation acts (1973) applies:

No otherwise qualified handicapped individual in the United States shall solely by reason of his handicap be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance or under any program or activity conducted by an executive agency. (Federal Register, 1980)

Individuals with a disability might not qualify for an activity, but before exclusion can occur aquatic programs must have a written description to be considered evidence of "essential" qualifying aspects and swimming-skill criteria for enrollment and provide tryouts with "reasonable accommodations" (Block, 2006;

Osinski, 1993). For example, if a deaf individual wanted to tryout for a lifeguard job, a reasonable accommodation might be to provide an interpreter. Requiring lifeguards to swim 500 m under a certain time allotment to become eligible for hire when the facility's pool is only 50 m in diameter would not be considered an essential qualifying aspect. A nonessential-skill requirement for program eligibility such as this could be viewed as discriminatory against individuals who are quadriplegics or amputees or who suffer from asthma or other pulmonary disorders.

Similarly, P.L. 108-446, the Individuals with Disabilities Education Act (U.S. Department of Education, 2004), signed by President George W. Bush in 2004, focuses on individual assessment for including individuals with disabilities whenever possible in regular educational programs (The Arc, 2004). Schools must state reasons and justification for noninclusion, as well as provide access to the regular curriculum (Block, 1996). Individual assessment in aquatics should be used to determine modifications to the regular aquatic program, support personnel, equipment needs, and placement options (Apache, Hisey, & Blanchard, 2005; Conatser, 1995; Grosse, 2005; Reid & O'Conner, 2003a).

The Individuals with Disabilities Education Act included aquatic instruction as part of the definition of physical education. Because physical education is a direct service required by law for all students identified as having special needs, aquatic instruction might be part of the education of students with disabilities during their school day (Lepore et al., 1998). With inclusion of students who have disabilities in physical education being strongly emphasized, more individuals with disabilities have been placed in regular aquatic instruction as opposed to being taught in segregated programs (Lepore et al.). Even if individuals are housed in a segregated academic or life-skills classroom, they have been involved in regular aquatics classes (Block, 2006). In these integrated aquatic programs students with disabilities should have the same opportunity to participate as their nondisabled counterparts (Austin, 1987; Lieberman & Wilson 2005; Osinski, 1998). The emphasis on being with peers without disabilities in regular physical education and aquatics classes has forced aquatic instructors to rethink their instructional strategies, teaching methods, and use of equipment (Bloomquist, 1997; Conatser et al., 2000; Gelinis & Reid, 2000).

## **Sport Classifications**

Competitive-swimming classifications (e.g., National Wheelchair Athletic Association, International Paralympic Committee) and the pursuit for equal, fair, and competitive competition are still being developed (Wu, Williams, & Sherrill, 2000). In the early stages of competitive-swimming classification, there was much criticism aimed toward physiological assessments, biomechanical comparisons, point schemes, and reliability between classifiers (Richter, Adams-Mushett, Ferrara, & McCann, 1992). The competition results did not support the classification systems (Gehlsen & Karpuk, 1992). Through systematic observation, adjustments have been made, and currently classification appears to be approaching a level of fairness and competitiveness for most swimmers with disabilities (Daly & Vanlandewijck, 1999; Wu & Williams, 1999). Wu and Williams further suggest that credentials in physical education, certifications in swimming, and ample experience in classifying swimmers will all increase the likelihood of appropriate classification, reliability, and objectivity.

Classifying swimmers (e.g., mental retardation, autism) for Special Olympics competition has been historically successful (Lepore et al., 1998). The Special Olympics method for heating events by performance time ranges, moving swimmers to faster heats if competition time exceeds the range, and minimizing heat sizes all help equalize competitiveness and award opportunities (Special Olympics International, 2006). The Special Olympics classification method works best if athletes submit accurate swim times before competition. This means that coaches must prepare, train, and practice competition before a swim meet.

## Recommendations

After we completed our review, some recommendations emerged. The following suggestions should provide future areas of study and research in the field of adapted aquatics and rehabilitation.

- Develop more highly trained instructors for educational, recreational, therapeutic, and sports intervention.
- Increase the frequency, duration, and effectiveness of certification programs, workshops, and in-service training programs.
- Increase specificity of instructional training.
- Develop training programs for support personnel (e.g., lifeguards, administration) regarding facility accommodations, operational modifications, and supervision techniques.
- Improve inclusion strategies and broaden and popularize inclusive opportunity.
- Improve aquatic instructors' attitudes, social perceptions, control beliefs, and confidence in working with individuals who have disabilities.
- Evaluate facilities, programs, and services to ensure that they are uniformly meeting federal requirements for individuals with disabilities.
- Determine, prioritize, incorporate, and assess safety procedures.
- Develop stronger and more effective working and organizational relationships between programs, agencies, and the community.
- Formulate strategies to increase the participation of individuals with disabilities in planning, evaluating, and implementing aquatic programs.
- Improve competition classification and classifiers' knowledge and experience.
- Increase effectiveness of intervention techniques, equipment strategies, program guidelines, and accessibility for individuals with disabilities.

Systematic research focusing on specific research questions and alternative hypotheses should guide exploration of these suggested areas of interest, looking for determinants that produce successful outcomes through empirical evidence. Sherrill and O'Connor (1999) suggested that when disseminating knowledge, researchers should base their studies on sound theoretical models and use hypotheses; proper sampling techniques (e.g., control group, randomization); large enough sample sizes; valid, reliable, repeatable instrumentation and protocols; and appropriate

inferential statistics (means, standard deviations, effect sizes, *t* tests, ANOVAs, repeated measures, chi-square, factor analysis, etc.) to test significance.

## Conclusion

Aquatic programs throughout the past have been shown to benefit people with disabilities in many ways. In addition, because of federal laws, advocacy groups, and education of the public, more individuals with disabilities are participating in aquatic programs. To date, very little systematic research has been conducted in adapted aquatics and rehabilitation to identify best-practice techniques. As the adapted aquatics area emerges as a defined profession, administrators, instructors, and professionals need to support its expansion with quantifiable results and increase research evidence for appropriate delivery of aquatic services.

## References

- Albright, C. (1995). Swimming techniques for individuals with physical disabilities. *Palaestra*, 11(2), 16-21.
- Almekinders, S.V. (1994). Physical education for college students with physical disabilities. *Palaestra*, 10(4), 34-42.
- American Red Cross. (1977). *Adapted aquatics: Swimming for persons with physical or mental impairments*. Garden City, NY: Doubleday.
- American Red Cross. (1992). *American Red Cross swimming and diving*. St. Louis: Mosby-Year Book.
- American Red Cross. (2004). *Water safety instructors manual*. St. Louis: Mosby-Year Book.
- Anderson, S. (1985). Maiden voyage. *Palaestra*, 2(1), 24-27.
- Angelo, P., & Stewart, C. (1997). You can start your own adapted aquatics program. *Aquatics International*, 9(4), 23-27.
- Apache, R.R., Hisey, P., & Blanchard, L. (2005). An adapted aquatics assessment inventory and curriculum. *Palaestra*, 21(2), 32-37.
- The Arc: A national organization on mental retardation. The New Individual with Disabilities Education Act: Knowing your rights*. (2004). Arlington, TX: The Arc, 500 E. Border St., S-300.
- Archer, S. (2002). Aquatic exercise and arthritis. *Aquatic Therapy Journal*, 16(1), 29-31.
- Attermeier, S. (1998). The use of water as a modality to treat an infant with mild neurological dysfunction: A case report. *Physical Occupational Therapy Pediatrics*, 3, 53-58.
- Austin, D.R. (1987). Recreation and persons with physical disabilities: A literature synthesis. *Therapeutic Recreation Journal*, 21(1), 36-44.
- Beason, K., & Gilbert, J. (1995). Benefits of deep water exercise for ambulatory impaired adults. *Palaestra*, 11(4), 22-28.
- Beaudouin, N.M., & Keller, M.J. (1994). Aquatic-solutions: A continuum of services for individuals with physical disabilities in the community. *Therapeutic Recreation Journal*, 28(4), 193-202.
- Berry, W.D. (1990). Contemporary trends in aquatics. *Journal of Physical Education, Recreation and Dance*, 60(5), 35.
- Binkley, H., & Schoyer, T. (2002). Aquatic therapy in the treatment of upper extremity injuries. *Athletic Therapy Today*, 7(1), 49-54.
- Block, M.E. (1995). Americans with Disabilities Act: Its impact on youth sports. *Journal of Physical Education, Recreation and Dance*, 66(1), 28-32.

- Block, M.E. (1996). Implications of U.S. federal law and court cases for physical education placement of students with disabilities. *Adapted Physical Activity Quarterly*, 12, 127-152.
- Block, M.E. (2006). *A teacher's guide to including students with disabilities in regular physical education*. Baltimore, MA: Brookes.
- Bloomquist, L.E. (1997). *Adapted aquatics programming manual*. Charleston, NC: Colson Publisher Foundation.
- Broach, E., & Dattilo, R. (1996a). Aquatic therapy: A viable therapeutic recreation intervention. *Therapeutic Recreation Journal*, 15, 213-229.
- Broach, E., & Dattilo, R. (1996b). Aquatic therapy: Making waves in therapeutic recreation. *Parks and Recreation*, 31(7), 38-43.
- Broach, E., & Dattilo, R. (2001). Effects of aquatic therapy on adults with multiple sclerosis. *Therapeutic Recreation Journal*, 35, 141-154.
- Bryant, M.D., & Graham, A.M. (1993). *Implementing early intervention from research to effective practice*. New York: Guilford Press.
- Bull, E., Haldorsen, J., Kahrs, N., Mathiesen, G., Mogensen, I., Torheim, A., & Uldal, M. (1985). *In the pool: Swimming instruction for the disabled*. Oslo: Ungdoms-Og Idrettsavdelingen.
- Bumin, G., Uyanik, M., Yilmaz, I., Kayihan, H., & Topcu, M. (2003). Hydrotherapy for Rett syndrome. *Journal of Rehabilitation Medicine*, 35, 44-45.
- Butler, C. (2002). Walking in water. *Inside MS*, 20(3), 66-70.
- Canadian Red Cross Society. (1980). *Manual for teaching swimming to the disabled*. Toronto, Ontario: Author.
- Carter, M. (1998). Aquatics—HPERD linkage to health and human services. *Journal of Physical Education, Recreation and Dance*, 69(3), 6.
- Christie, I. (1985). Aquatics for the handicapped—A review of literature. *Physical Educator*, 42(1), 24-33.
- Cider, A., Sunnerhagen, K.S., Schaufelberger, M., & Andersson, B. (2005). Cardiorespiratory effects of warm water immersion in elderly patients with chronic heart failure. *Clinical Physiology Function Imaging*, 25(6), 313-317.
- Clair, S. (2005, May/June). Universal thinking: Just how accessible is your facility? *Recreational Management*, 22-27.
- Conatser, P. (1995). *Adapted aquatics swimming screening test*. Retrieved from www.adaptedaquatics.org
- Conatser, P. (2004, May 1). Aquatic supervision for individuals with disabilities. PELINKS4U Promoting Active & Healthy Lifestyles section. *Adapted Physical Education*, 6(5). Retrieved from www.pelinks4u.org/archives/adapted/050104.htm
- Conatser, P., & Block, M.E. (2001). Factors that improve aquatic instructors' beliefs toward inclusion. *Therapeutic Recreation Journal*, 35, 170-184.
- Conatser, P., Block, M.E., & Gansneder, B. (2002). Aquatic instructors' beliefs toward inclusion: The theory of planned behavior. *Adapted Physical Activity Quarterly*, 19, 172-187.
- Conatser, P., Block, M.E., & Lepore, M. (2000). Aquatic instructors' attitude toward teaching students with disabilities. *Adapted Physical Activity Quarterly*, 17, 173-183.
- Conlin, D. (1990). Waterski championship for the disabled. *Palaestra*, 6(2), 21-23.
- Conner, C. (2006). Surf wheeling. *Palaestra*, 22(1), 42-44.
- Cowart, J. (1998). Teaching swim skills to the hard to reach student. *Palaestra*, 14(1), 32-38.
- Cracraft, J. (1988). Canoeing and float tripping for the disabled: Some thoughts and reflections. *Palaestra*, 4(3), 33-40.
- Daly, D.J., & Vanlandewijck, Y. (1999). Some criteria for evaluating the fairness of swimming classification. *Adapted Physical Activity Quarterly*, 16, 271-289.

- Daniels, E., & Dodd, C. (1996). The value of cooperative learning: Swim instructors get to the bottom of a lesson. *Strategies*, 9(8), 27-29.
- Daniels, S.A. (1954). *Adapted physical education*. New York: Harper & Brothers.
- Darby, L.A., & Yaeckle, B.C. (2000). Physiological responses during two types of exercise performed on land and in the water. *Journal of Sports Medicine and Physical Fitness*, 40, 303-311.
- Doremus, W.A. (1992). Developmental aquatics: Assessment and instructional programming. *Teaching Exceptional Children*, 24(4), 6-10.
- Dorval, G., Tetreault, S., & Caron, C. (1996). Impact of aquatic programs on adolescents with cerebral palsy. *Occupational Therapy International*, 3, 241-261.
- Drewes, A.M., Biering-Sorensen, F., & Andreassen, A. (1993). Mini 12-meter boats: A sport and recreational activity for persons with spinal cord injuries. *Palaestra*, 9(3), 36-39.
- Driver, S., O'Connor, J., Lox, C.J., & Rees, K. (2003). The effect of aquatic exercise on psychosocial experiences of individuals with brain injuries. *Journal of Cognitive Rehabilitation*, 21(1), 22-31.
- Dumas, H. (2001). Aquatic therapy in pediatrics: Annotated bibliography. *Physical and Occupational Therapy in Pediatrics*, 4(20), 63-73.
- Dummer, G.M. (2003). Reasonable accommodations for swimmers with disabilities. *Palaestra*, 19(1), 44-45.
- Elder, T. (1995). *Water fun and fitness: 99 safe activities*. Champaign, IL: Human Kinetics.
- Exceptional Parent staff. (1993, July-August). Aquatic sports. *Exceptional Parent*, 30-31.
- Fait, H.F. (1966). *Special physical education: Adapted, corrective, developmental*. Philadelphia: W.B. Saunders.
- Federal Register, May 9, 1980. PL 93-112, Section 504 of the Rehabilitation Act of 1973.
- Figuers, C. (1999). Aquatic therapy intervention for a child diagnosed with spinal muscular atrophy. *Physical Therapy Case Report*, 2, 109-112.
- Frieden, D. (1989). Weaver mile lap fitness swim. *Palaestra*, 5(2), 52-62.
- Gehlsen, G.M., & Karpuk, J. (1992). Analysis of the NWAA swimming classification system. *Adapted Physical Activity Quarterly*, 9, 141-147.
- Geis, G.C. (1975). Therapeutic aquatics program for quadriplegia. *American Corrective Therapy Journal*, 29(5), 155-157.
- Gelinas, J.E., & Reid, G. (2000). The developmental validity of traditional learn-to-swim progressions for children with physical disabilities. *Adapted Physical Activity Quarterly*, 17, 269-296.
- Getz, M., Hutzler, Y., & Vermeer, A., (2006). Effects of aquatic interventions in children with neuromotor impairments: A systematic review of the literature. *Clinical Rehabilitation*, 20, 927-937.
- Gobin, B. (1998, April). ADA compliance for pools and wet areas. *Fitness Management*, 36-40.
- Grosse, S. (1985). It's a wet and wonderful world! *Palaestra*, 2(1), 14-17.
- Grosse, S. (1987). Use and misuse of flotation devices in adapted aquatics. *Palaestra*, 4(1), 31-57.
- Grosse, S. (1995). Try a water aerobics course. *Strategies*, 9(3), 18-21.
- Grosse, S. (1996). Aquatics for individuals with disabilities: Challenges for the 21st century. *International Council for Health, Physical Education, Recreation, Sport and Dance*, 33(1), 27-29.
- Grosse, S. (2005). Assessment of swimming in physical education. *Strategies*, 19(1), 35-36.
- Grosse, S., & McGill, C.D. (1997). *Practical pointers: Independent swimming for children with severe physical impairments*. Milwaukee, WI: Milwaukee School System, Department of Physical Education.

- Horvat, M.A., & Forbus, W.R. (1989). *Using the aquatic environment for teaching handicapped children* (2nd ed.). Kearney, NE: Educational Systems Associates.
- Horvat, M.A., Forbus, W.R., & Van Kirk, L. (1987). *Teacher and parent guide for the physical development of mentally handicapped in the aquatic environment*. Athens: University of Georgia, Department of Physical Education.
- Huetig, C., & Darden-Melton, B. (2004). Acquisition of aquatic skills by children with autism. *Palaestra*, 20(2), 20-25.
- Hurley, R., & Turner, C. (1991). Neurology and aquatic therapy. *Clinical Management: The Magazine of the American Physical Therapy Association*, 11(1), 26-29.
- Hutzler, Y., Chacham, A., Bergman, U., & Reches, I. (1998). Effects of a movement swimming program water orientation skills and self concept of kindergarten children with cerebral palsy. *Perceptual Motor Skills*, 86, 111-118.
- Hutzler, Y., Chacham, A., Bergman, U., & Szeinberg, A. (1997). Effects of exercise on respiration in children with cerebral palsy. *Palaestra*, 13(4), 20-24.
- Hutzler, Y., Chacham, A., Bergman, U., & Szeinberg, A. (1998). Effects of a movement and swimming program on vital capacity and water orientation skills of children with cerebral palsy. *Developmental Medicine and Child Neurology*, 40, 176-181.
- Jacobs, S. (1987). Sea kayaking for mobility impaired persons. *Palaestra*, 3(3), 44-46.
- Johnson, B. (2002). UE rehab: Water + broomstick + sponges + motor learning. *Aquatic Therapy Journal*, 4(1), 5-12.
- Kay, J. (2004). When dreams become reality sailing solo. *Palaestra*, 20(2), 30-35.
- Kegel, B., & Peterson, J. (1989). Summer splash: A water sports symposium for the physically challenged. *Palaestra*, 6(1), 17-19.
- Konlian, C. (1999). Aquatic therapy: Making a wave in the treatment of low back injuries. *Orthopaedic Nursing*, 18(1), 11-21.
- Koury, J.M. (1996). *Aquatic therapy programming: Guidelines for orthopedic rehabilitation*. Champaign, IL: Human Kinetics.
- Langendorfer, S.J. (1986). Aquatics for the young child: Facts and myths. *Journal of Physical Education, Recreation and Dance*, 57(6), 61-66.
- Langendorfer, S.J. (1989). Aquatics for young children with handicapping conditions. *Palaestra*, 5(3), 17-19.
- Langendorfer, S.J. (1990). Contemporary trends in infant/preschool aquatics—Into the 1990s and beyond. *Journal of Physical Education, Recreation and Dance*, 60(5), 36-39.
- Langendorfer, S.J., & Bruya, L. (1995). *Aquatic readiness: Developing water competence in young children*. Champaign, IL: Human Kinetics.
- Lais, G. (1987). A remote journey. *Palaestra*, 3(3), 21-31.
- Lepore, M., Gayle, G.W., & Stevens, S.F. (1998). *A professional guide to conducting adapted aquatic programs*. Champaign, IL: Human Kinetics.
- Lieberman, L., Lytle, R., & Irwin, G. (2003). Ideas for including students with quadriplegia into physical education. *Strategies*, 17(2) 21-35.
- Lieberman, L., & Wilson, S. (2005). Effects of a sports camp practicum on attitudes toward children with visual impairments and deafblindness. *Rehabilitation Education for Blindness and Visual Impairment*, 36(4), 141.
- Martin, J.J. (1999). Predictors of social physique anxiety in adolescent swimmers with physical disabilities. *Adapted Physical Activity Quarterly*, 16, 75-85.
- Martin, J.J., Adams-Mushett, C., & Smith, K.L. (1995). Athletic identity and sport orientation of adolescent swimmers with disabilities. *Adapted Physical Activity Quarterly*, 12, 113-123.
- Martin, K. (1983). Therapeutic pool activities for young children in a community facility. *Physical and Occupational Therapy in Pediatrics*, 3, 59-74.

- Martinez, C.A. (2006). Adapted aquatics for children with autism. *Teaching Elementary Physical Education*, 17(5), 34-37.
- Matola, T. (2001). Swim therapy. *Palaestra*, 17(1), 15-16.
- Mayeux, S. (1988). Fourth annual bass fishing championships. *Palaestra*, 4(3), 33-40.
- Mayse, J.S. (1991). Aquacise and aquafitness for adapted aquatics. *Palaestra*, 7(2), 54-56.
- Morris, B. (1999). I just want to be a normal kid at summer camp. *Palaestra*, 15(2), 26-28.
- Muhl, W.T. (1976). Aquatics for the handicapped. *Journal of Physical Education, Recreation and Dance*, 47(2) 42-43.
- Nearing, R.J., Johansen, D.A.K., & Vevea, C. (1995). Gymnastics mats in the pool? *Palaestra*, 11(2), 22-30.
- Newman, J. (1997). *Swimming for children with physical sensory impairments*. Springfield, IL: Charles C. Thomas.
- Osinski, A. (1989, winter). Warm water pool and spa problems. *National Aquatics Journal*, 12-15.
- Osinski, A. (1993). Modifying public swimming pools to comply with provisions of the Americans with Disabilities Act. *Palaestra*, 9(1), 13-18.
- Osinski, A. (1998, April). ADA compliance for pools and wet areas. *Fitness Management*, 36-40.
- Petrofsky, J.S. (1994a). Diving with spinal cord injury: Part I. *Palaestra*, 10(4), 36-41.
- Petrofsky, J.S. (1994b). Diving with spinal cord injury: Part II. *Palaestra*, 11(1), 30-51.
- Petrofsky, J.S. (1995). Diving with spinal cord injury: Part III. *Palaestra*, 11(2), 34-38.
- Priest, L. (1979). Integrating the disabled into aquatics programs. *Journal of Physical Education and Recreation*, 50(2), 57-59.
- Prupas, A., Harvey, J.W., & Benjamin, J. (2006). Early intervention aquatics: A program for children with autism and their families. *Journal of Physical Education, Recreation and Dance*, 77(2), 46-51.
- Reid, G. (1979). Mainstreaming in physical education. *McGill Journal of Education*, 14, 367-377.
- Reid, G., & O'Connor, J. (2003a). The autistic spectrum disorder: Activity selection, assessment, and program organization. *Palaestra*, 19(1), 20-27.
- Reid, G., & O'Connor, J. (2003b). The autistic spectrum disorder: Physical activity instruction. *Palaestra*, 19(2), 20-26.
- Richter, K.J., Adams-Mushett, C., Ferrara, M.S., & McCann, B.C. (1992). Integrated swimming classification: A faulted system. *Adapted Physical Activity Quarterly*, 9, 5-13.
- Rider, R.A., & Modell, S. (1996). Aquatics for children with Angelman syndrome: Earning your water wings. *Palaestra*, 12(4), 28-33.
- Rosimini, C. (2003). Benefits of swim training for children and adolescents with asthma. *Journal of the American Academy of Nurse Practitioners*, 15(6), 247-252.
- Sawyer, T.H. (2000). Supervision of swimmers with disabilities. *Journal of Physical Education, Recreation and Dance*, 71(7), 12.
- Schweer, T. (1985). Feeling your stroke, part I. *Palaestra*, 1(3), 30-31.
- Sherrill, C. (2003). *Adapted physical activity, recreation, and sport* (6th ed.). Madison, WI: WCB/McGraw-Hill.
- Sherrill, C., & O'Connor, J. (1999). Guidelines for improving adapted physical activity research. *Adapted Physical Activity Quarterly*, 16, 1-8.
- Skinner, A.T., & Thompson, A.M. (1983). *Duffield's exercises in water* (3rd ed.). London: Bailliere Tindall.
- Sova, R. (2000). Bringing new clients to facilities with aquatic therapy and rehabilitation. *Parks and Recreation*, 35(11), 74-75.

- Sova, R. (2004). Therapy focus: Aquatic therapy using deep water. *Aquatic Therapy Journal*, 18(3), 42-43.
- Special Olympics International. (2006, March 26). *Aquatic coaching guide*. Retrieved from [www.specialolympics.org/Special+Olympics+Public+Website/English/Coach/Coaching\\_Guides/Aquatics/default.htm](http://www.specialolympics.org/Special+Olympics+Public+Website/English/Coach/Coaching_Guides/Aquatics/default.htm)
- Stein, J. (2004). Motor development, the brain, and aquatic therapy. *Aquatic Therapy Journal*, 6(2), 19-23.
- Stopka, C. (2001a). Equipment to enhance an adapted aquatic program: New twists to conventional equipment—Part 1. *Palaestra*, 17(1), 36-42.
- Stopka, C. (2001b). Equipment to enhance an adapted aquatic program: A look at some unconventional equipment—Part 2. *Palaestra*, 17(2), 40-43.
- Stopka, C. (2001c). Equipment to enhance an adapted aquatic program: But where's the pool—Part 3. *Palaestra*, 17(3), 39-42.
- Summerford, C.F. (1993). Apparatus used in teaching swimming to quadriplegic amputees. *Palaestra*, 9(3), 54-57.
- Suomi, J., & Suomi, R. (2000). Creating an inclusive early childhood swim program: Special needs aquatic program (SNAP). *Palaestra*, 16(2), 20-30.
- Thein, J.M., & Brody, L.T. (2000). Aquatic-based rehabilitation and training for the shoulder. *Journal of Athletic Training*, 35, 382-389.
- U.S. Department of Education Publication. (2004). *Individuals with Disabilities Act of 2004*. Retrieved from [www.nichcy.org/reauth/idea2004regulations.pdf](http://www.nichcy.org/reauth/idea2004regulations.pdf)
- Wagner, P.H. (1991). Adaptive rowing as a therapeutic and athletic outlet for persons with disabilities. *Palaestra*, 7(4), 30-35.
- Wang, W., & DePauw, K.P. (1995). Early sports: Socialization of elite Chinese athletes with physical and sensory disabilities. *Palaestra*, 11(3), 40-46.
- Wanzer, P. (2000). Everybody in the pool. *Exceptional Parent*, 30(7), 40-42.
- Watson, R.S., Cummings, P., Quan, L., Bratton, S., & Weiss, N.S. (2001). Cervical spine injuries among submersion victims. *Journal Trauma*, 51, 658-662.
- Webb, N.L., & Drummond, P.D. (2001). The effect of swimming with dolphins on human well-being and anxiety. *Anthrozoos*, 14(2), 81-85.
- Weisgerber, M.C., Guill, M., Weisgerber, J.M., & Butler, H. (2003). Benefits of swimming in asthma: Effect of a session of swimming lessons on symptoms and PFTs with review of the literature. *Journal of Asthma*, 40, 453-464.
- Weiss, M., McCullagh, P., Smith, A., & Berlant, A. (1998). Influence of peer models on children's performance, self-confidence and fear of swimming. *Observational Learning and the Fearful Child*, 51(6), 1-4.
- West, P.C. (1986). Interorganizational linkage and outdoor recreation for persons with physical and mental disabilities. *Therapeutic Recreation Journal*, 20(1), 63-73.
- Wu, S.K., & Williams, T. (1999). Paralympic swimming performance, impairment, and the functional classification system. *Adapted Physical Activity Quarterly*, 16, 251-270.
- Wu, S.K., Williams, T., & Sherrill, C. (2000). Classifiers as agents of social control in disability swimming. *Adapted Physical Activity Quarterly*, 17, 421-436.
- Wykle, M. (2003). Safety first: Aquatic practice is growing, but therapy pools and practitioners have not had guidelines and safety standards until now. *Rehabilitation Management: The Interdisciplinary Journal of Rehabilitation*, 16(6), 24-27.
- Wykle, M. (2004). Ai Chi for individuals with lower extremity amputation. *Aquatic Therapy Journal*, 6(1), 17-22.
- Yilmaz, L., Yanardag, M., Birkan, B., & Bumin, G. (2004). Effects of swimming training on physical fitness and water orientation in autism. *Pediatrics International*, 46, 624-626.