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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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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.

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