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## The Halliwick Concept: Toward A Collaborative Aquatic Approach

Kokaridas, D<sup>1</sup>, & Lambeck, J<sup>2</sup>

<sup>1</sup>Department of Physical Education and Sports Sciences, University of Thessaly, Trikala, Hellas

<sup>2</sup>Faculty of Kinesiology and Rehabilitation Science, KU Leuven, Belgium

### Abstract

The purpose of this article is to present a contemporary picture of the Halliwick Concept- from Water Specific Therapy (WST) to the Ten-Point-Program (TPP) - and to identify potential areas of further development by proposing a collaborative approach using the Halliwick Concept. The authors acknowledge differences in philosophies of both WST and TPP, and propose that the Halliwick Concept can serve as a key organizing framework within any aquatic program that, depending on its therapeutic, educational or recreational goals, can impact the entire scope of adapted water activities. The article discusses common Halliwick Concept principles through which aquatic personnel could collaborate in the future using a common philosophy and terminology to achieve mutual goals.

Key words: *Halliwick Concept, Water Specific Therapy, adapted aquatics, aquatic therapy*

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## Η Έννοια Halliwick: Προς Μια Συνεργατική Προσέγγιση στο Νερό

Κοκαρίδας Δημήτριος<sup>1</sup>, & Lambeck, J<sup>2</sup>

<sup>1</sup>ΤΕΦΑΑ, Πανεπιστήμιο Θεσσαλίας

<sup>2</sup>Τμήμα Κινησιολογίας και Αποκατάστασης, KU Leuven, Βέλγιο

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### Περίληψη

Ο σκοπός του άρθρου είναι να παρουσιάσει την τρέχουσα συνολική εικόνα της έννοιας Halliwick – από την Water Specific Therapy (WST) έως το Ten-Point-Program (TPP) – και να αναγνωρίσει περιοχές περαιτέρω ανάπτυξης προτείνοντας μία συνεργατική προσέγγιση χρησιμοποιώντας την έννοια αυτή. Οι συγγραφείς αναγνωρίζουν τις διαφορές στην φιλοσοφία των WST και TPP, και προτείνουν ότι η έννοια Halliwick μπορεί να δραματίσει έναν ρόλο - κλειδί μέσα σε ένα οποιοδήποτε πρόγραμμα στο νερό που απευθύνεται σε άτομα με αναπηρίες, που ανάλογα με τους σκοπούς θεραπείας, εκπαίδευσης ή αναψυχής μπορεί να εκφράσει ολόκληρο το φάσμα προσαρμοσμένων δραστηριοτήτων. Το άρθρο συζητά κοινές αρχές της Halliwick μέσα από τις οποίες το επαγγελματικό προσωπικό μπορεί να συνεργαστεί στο μέλλον χρησιμοποιώντας μία κοινή φιλοσοφία και ορολογία προκειμένου να πετύχει κοινούς στόχους.

Keywords: *Halliwick, Water Specific Therapy, προσαρμοσμένη κολύμβηση, υδροθεραπεία*

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## Historical Context of TPP and WST

The Halliwick Method was proposed in 1950 by James McMillan at the Halliwick School (AST, 1992). McMillan started with a goal to teach girls with physical disabilities to swim and to use the independence gained in water as a means to promote their integration into the local community. The rapid and obvious improvements in swimming and social skills that McMillan observed led to the start of swimming clubs organized under the Association of Swimming Therapy (AST).

Halliwick swimming instruction focusing on skill development in water has relations with the model of systematic desensitization (Stillwell, 2011) and of the biomechanics of swimming. The acquisition of stable posture followed by independent movement in the water has become known as the Ten-Point-Program (TPP) of the Halliwick Method (AST, 1992). The purpose of the Halliwick AST is to apply a progressive program of mental adjustment, disengagement, and development of motor and rotational control, to teach individuals mainly those with physical disabilities, balance control, water independence, and swimming.

In 1974 McMillan worked in the Bad Ragaz Medical Center and was in a charge of a project to develop aquatic physical therapy exercises from the Ten-Point-Program, later developed and described by the physiotherapist Urs Gamper (Gamper, 1995) as Water Specific Therapy (WST). This program uses elements of the Ten-Point-Program as a basis for a physical therapy approach using the specific constraints of the aquatic environment.

These elements can be described as “teaching a person to dare to fall and be able to stand up”. In itself this requires many aspects of control of voluntary movement, but is also the basis for the more specific WST exercises like transferring the centre of gravity in medio-lateral stability when searching for the limits of balance while reaching (Lambeck & Gamper, 2010).

WST approaches each individual as a patient, aims to develop an intervention strategy for adults and children with orthopedic, rheumatologic, and neurological problems, and focuses on objectives related to levels of function, structure and activity. Hydrodynamic properties of water are the basis of the WST “constraint-led approach” and are used to force the patient to actively solve a motor control problem. In other words, WST is focused on skill development on land, using a pool to facilitate this process. This part of the Halliwick Concept is taught through the Association International Aquatic Therapy Faculty (IATF) in Valens / Bad Ragaz in Switzerland.

## Assessment Development

Water assessment based on the Ten-Point-Program was first developed by McMillan in the English AST leading to several color badges that indicate a certain level of skill. This assessment system has never been tested for reliability and validity by published studies (Lambeck and Gamper, 2009), but later was the basis for the Swimming With Independent Measures (S.W.I.M.) test. Sršen, Vidmar, Píkl, Vrekar, Burja, and Krušec (2012), compared S.W.I.M. with the Slovenian national evaluation system of swimming abilities (NESSA) and concluded that S.W.I.M. demonstrated sufficient criterion-related validity to be used in future research and practice to follow the progress of swimmers.

Also recently, Tirosh (2005) from the Jerusalem Alyn Hospital reliably assessed the Halliwick Ten-Point skills with the development of the Water Assessment Test Alyn (WOTA 1 & 2), exhibiting excellent test-retest coefficients (Tirosh, Getz, & Katz-Leurer, 2008). Most importantly, Tirosh et al. (2008) provided initial evidence that the WOTA demonstrated criterion-related validity and discrimination ability as an assessment instrument, because it significantly correlated with the widely-used and valid Gross Motor Function Measurement, designed to quantify change in the gross motor skills of children with cerebral palsy.

Assessment of WST skills have occurred in two parts, that is, assessment in water and assessment on land. Land assessment included those test items that are related to the skill to be enhanced on land and which depend on the patient’s category of disability or dysfunction. Additionally, Lambeck developed a water assessment for WST, based on relevant categories drawn from the WOTA in combination with the ICF - International Classification of Functioning, Disability and Health (Lambeck & Gamper, 2009).

ICF, as part of World Health Organization (WHO)’s framework, aims to provide a standard language for describing and organizing information on functioning and disability. ICF is a health strategy based on a univer-

sally accepted conceptual model and taxonomy of human functioning that also includes a list of environmental factors and offers a common basis that helps health professionals to describe changes of body functions and structure, activity and participation for each individual with a health-related condition (Stucki, Cieza, & Melvin, 2007).

In a global survey by Güeita (2013) amongst pediatric physiotherapists, this water assessment appeared to be the most widely used assessment system, but it has not been published and no research on its psychometric properties have been made to date. Thus, there is an obvious need for further reliability studies to establish reliability and validity of Halliwick assessment.

### **Halliwick / WST Research**

Early Halliwick research efforts included the study of Kokaridas, Aggelopoulou and Walters (2000) with a purpose to improve Halliwick procedures using both an individualized approach and activity adaptations according to the disability of individuals with Down syndrome. Positive post-results emphasized the need for a more systematic approach to adapting the Halliwick Method according to disability and individual needs. Bumin, Uyanik, Yilmaz, Kayihan and Topçu (2003) examined the effect of a Halliwick Method program on an 11-year-old girl with Rett syndrome, with post-results revealing an improvement on walking ability, functional use of the hand, and behavior.

Martínez-Gramage et al (2010), examined the effect of a 3-month intervention program combining physical exercise and the Halliwick Method on hypertonia in 7 adults with brain injury. Results showed an improved passive joint range of movement recorded for all participants, although the combination of the aquatic program with dry-land exercise could not verify the exact therapeutic effect and contribution of the Halliwick Method to the results of this study.

Most research studies had included Halliwick in their methodology primarily to examine its effect on neurological conditions of children with cerebral palsy (Jorgic, Dimitrijevic, Aleksandrovic, Okicic, Madic, & Radanovic 2012; Hou, Wan & Li, 2010), patients with cardiovascular accidents (Meneghetti, Carraro, Leonello, Batisella, & Ferracini, 2012), Alzheimer's disease (Myers, Capek, Shill, & Sabbagh, 2013), Parkinson's disease (Vivas, Arias, & Cudeiro 2011), traumatic brain injury (Scarano, Bertogliatti, Bellarosa, Terracciano, Di Tuccio, Palmieri, et al., 2012), and children with meningomyelocele (Calderón-Porras, & Rolón-Lacarrière, 2012).

WST has not been used consistently in English language publications, rather the term Halliwick has been used to describe therapeutic interventions that did not only use swimming. An example of this confusing terminology can be read in the publication by Tripp and Krakow in 2012. Tripp and Krakow (2012) applied WST on a sample of 30 stroke patients and compared WST with the usual neurodevelopmental treatment (NDT) in a design in which WST wasn't an additional treatment, but was given in combination with land treatment. The exercises and activities were adapted to the needs of individual patients. Measurements taken included the Berg Balance Scale (BBS), Functional Reach, Functional Ambulation Categories (FAC) and Rivermead Mobility Index. Results showed WST patients as exhibiting significant better results on the BBS and FAC than the control group with moderate effect sizes in favour of WST. A comprehensive listing of Halliwick / WST research can be found at <http://www.halliwick.net/en/literature/articles>.

### **The Halliwick Concept in Relation to Other Concepts**

WST, Halliwick, BRRM, Ai Chi and Watsu represent the main methods of aquatic rehabilitation, being described in recent textbooks (Brody, & Geigle, 2009; Cole & Becker, 2004). Where the Halliwick AST uses the TPP to be applied in swimming, IATF uses WST in combination with elements of the Ten-Point-Program to train postural control in the context of fall prevention. This has led to the inclusion of Ai Chi, which was developed into Clinical Ai Chi (CAC) as a therapeutic application to regulate postural control with fine tuned muscular activity (Lambeck & Bommer, 2010). None of these methods by themselves can provide all the solutions for all therapy goals of a single patient. An integrated model to connect specific strengths of each of the concepts seems obvious. Noh, Lim, Shin, and Paik (2008) used an integrated model when combining WST-Halliwick and Ai Chi in stroke survivors and concluded that aquatic therapy based on WST-Halliwick and Ai Chi improves postural balance of these individuals.

In itself, the Halliwick Concept thus provides various applications that range from increasing stabilizing in a single knee joint to participation in competitive swimming activities, covering all domains of the ICF. Lambeck and Gamper (2009) proposed that WST could be positioned in the middle of a continuum of aquatic-related concepts. This continuum can be anchored by movement and adapted aquatics for sport and leisure on the left side, and by Ai Chi, BRRM and passive relaxation concepts on the right end. They stated that “a strict difference between the Ten-Point-Program and WST cannot be given” (p. 48). Rather, they proposed that WST and the TPP have their specific roles in the Halliwick Concept, which they envisioned as a systematic intervention used according to individual skills, needs, and restrictions to help the patient to increase function and independence for recreational, vocational, and activities of daily living (ADL) purposes.

In this article we distinguish the term, Halliwick Concept (which includes both the TPP and WST) from the Halliwick Method (as proposed by AST) and from Halliwick Therapy (WST as employed by the IATF). As described in this paper, the Halliwick Concept represents the central core element to move across this wide spectrum of water activities ranging from swimming to aquatic rehabilitation. It is the median starting point from which an aquatic professional decides each time on whether he should move towards the right or the left side of the Halliwick Concept spectrum based on patient characteristics and professional background.

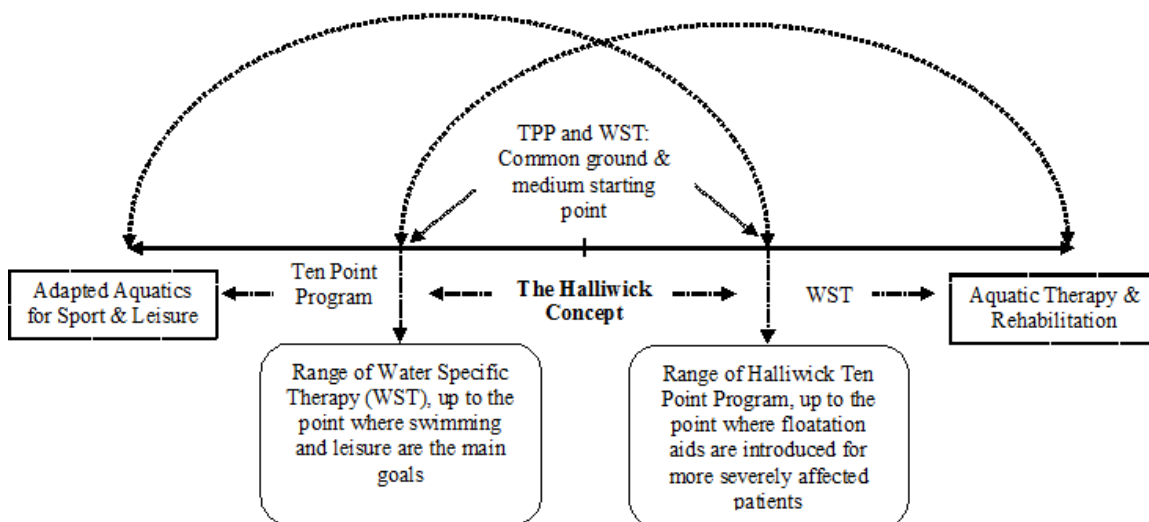


Figure 1. The Halliwick Concept

As we have defined it, the Halliwick Concept possesses a better capability than other methods (e.g., BRRM, Ai Chi) to address a wide spectrum of water activities ranging from swimming to aquatic rehabilitation. It combines the therapeutic effects of aquatic therapy with the advantages of recreational swimming methods. For example, BRRM is mostly used in an early stage of rehabilitation with treatment goals that are strictly related to therapy, compared to the Halliwick goals that vary from activity and participation levels to structural and functional levels of the ICF.

Then again, the use of floatation aids that is often required to achieve therapy goals for more severe cases is not part of the Halliwick philosophy, which advocates teaching without the use of flotation devices. The potential to work in varied areas of aquatics that have been recognized by many aquatic instructors first requires acknowledgement of the fact that the use of flotation devices for more severely affected patients might be the only way to achieve independent movement in water, as long as some independent balance control activities can be facilitated. The use of equipment that offers additional mobile stability is not necessarily contradictory to the principles of the Halliwick Concept where in general no artificial aids are used. The use of aids and devices is consistent with the hydrodynamic properties of water that Halliwick uses and also fits with the ideas of WST

(Lambeck & Gamper, 2009). Even James McMillan himself did not dogmatically refrain from using equipment such as neck collars when it was warranted and appropriate.

The concept of postural control and stability has been recognized for its importance since controlling posture and being stable in the water must precede clients using movement to move from place to place in the water. At the same time, gaining postural control and stability appears to be strongly associated with reduced risk of falls on land and in promoting walking and balance activities like those used in Ai Chi. Thus, obstacle and Ai Chi courses are now suggested or implemented in WST toward an effort to develop balancing strategies functionally at the ICF activity level.

The question still exists about whether the Halliwick Concept has the potential to reflect the entire scope of adapted water activities including swimming, exercise, recreation safety and rehabilitation. If the Halliwick Concept has such potential to deal with a broad set of aquatic activities, what steps are needed to create a unified aquatic framework that can include principles from various models and theories including the Halliwick Concept as a central core element?

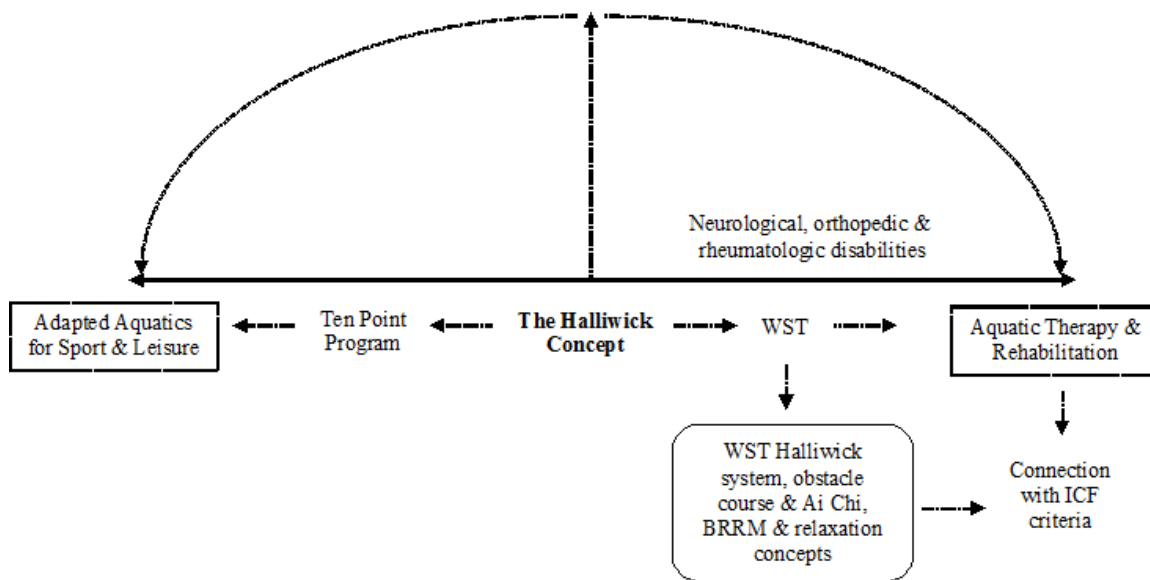
Halliwick swimming and especially water specific therapy (WST) have focused primarily on a biopsychosocial model in health care. Under this model, aquatic allied health professionals employ a clinical reasoning system and apply WST exercises and activities for children and adults with neuro-musculoskeletal impairments. Hydrodynamic properties of water environments which influence the individual's position and movement in the water are the basis of these WST exercises. These exercises are designed using a dynamical systems model related to motor relearning (Newell, Liu & Mayer-Kress, 2003) in which manipulation of mechanical constraints alters the aquatic environment. Similar ideas previously have been described by McMillan in 1977 and activities were used by Dulcy (1983) to propose a treatment including positioning of the patient using movements described from anatomical position in the water that progress through developmental sequences.

### **Promoting Goals of Fun, Enjoyment and Inclusion**

According to Lepore, Gayle, and Stevens (2007) applying the medical therapeutic approach in aquatic settings has several shortcomings and may not allow an adequate view of the whole person. In this approach, therapists often sacrifice fun and enjoyment for exercises created to achieve specific goals. Lepore et al. (2007) felt such an approach loses sight of aquatics as a medium for enjoyable learning which is inherently motivating to clients. James McMillan would start courses by writing on a blackboard "swim is fun", but only with the article of Broach and McKenney (2012), this topic was described comprehensively. She stated that fun is not often recognized as an important motivator in aquatics by improving selective attention, arousal and compliance (Broach, &McKenney 2012). When enjoyment and fun are not central motivational considerations in aquatic activities, patients with cognitive difficulties may lose interest and not achieve water specific goals without the motivation that comes through fun and enjoyable activities.

Of course, one can easily argue that the Halliwick Method, as founded by James McMillan, already can serve purposes from activity to therapy. Halliwick is a method through which all people with physical and/or learning difficulties may participate in water activities and swimming. Through this process, swimmers can achieve physical, personal, recreational, social, and therapeutic benefits.

Nevertheless, Halliwick swimming and WST have focused primarily on applying activities to children and adults with neuro-musculoskeletal impairments. The systematic effort of the Association IATF mainly focused on connecting the Ten-Point-Program and WST with certain evidence level provided by ICF criteria, to establish reliability and validity of an assessment system for physical disabilities that will respond to water specific therapy and develop an aquatic program for therapeutic purposes implementing elements from other aquatic therapy methods.



**Figure 2.** The Halliwick Concept spectrum

According to Lepore et al (2007), the term adapted aquatics "... is a method, program and process that parallels adapted physical education, its equal on land...and strives to change, adapt, or modify any existing swimming stroke, game or activity to meet the needs of individuals with unique needs" (p. 15). Quite clearly, an adapted swimming program intends to modify swimming strokes for individuals who do not have the strength, flexibility, endurance, or other capabilities to perform the standard version. This stroke adaptation is consistent with the actions of the Halliwick Concept, where unique swimming strokes are often fashioned.

Aquatic practices within educational contexts ought to focus on learning theory principles by taking into account the critical role of developmental aquatic readiness (Langendorfer, Harrod & Bruya, 1991). Assessment practices should examine the functional needs and limitations of individuals rather than accept medical diagnoses that assign individuals to general disability 'categories.' Assessments should be able to recommend individual placements by using individualized educational programming and specification of lesson content such as water safety information, aquatic games and swim strokes that the individual ought to acquire in a progressive manner (Lepore et al, 2007).

Furthermore, aquatic practices within educational contexts should consider the term of inclusion that describes the extent to which a school or community through social interaction and play welcomes pupils identified with special educational needs (SEN) as full members of the group and values their contribution. Social interaction plays a fundamental role in the process of a child's cognitive development, creating the 'zone of proximal development' where learning occurs, that represents the distance between a child's ability to perform a task under peer collaboration or adult guidance and the student's ability to perform this task independently (Vygotsky, 1978).

In this regard, Halliwick through its group swimming activities has the potential to provide an excellent socio-cultural environment in which the aquatic instructor and students can act and interact in shared experiences. However, reviewing the literature it seems that no research has been conducted nor has a systematic effort been reported so far to connect Halliwick swimming with current inclusive policies.

In answering the question, "what is the most appropriate place for an individual to learn aquatic skills and water safety", one can argue that "...the educational approach to aquatic programming can take place in any kind of setting; thus, the issue of settings should not dictate what will be learned and how" (Lepore et al. 2007, p. 25). Nevertheless, it remains rather unspecified under which criteria a Halliwick instructor can shift the content of the swimming program from common pedagogy (swimming activities suited to all children), to specific pe-



dagogy (activities suited to children with specific disability-related difficulties) and individual pedagogy (a swimming program suited to unique individual needs), for individualization and inclusion purposes, and also what appropriate roles parents should play in children's swimming programs. A second question raised is whether 'learning progression' and the Ten Point Program are identical notions *or* if the Ten Point Program should develop a learning progression of swimming activities based on learning style, physical, mental and emotional characteristics of the individual, and the difficulty of each swimming task.

Another aspect connected to learning is developmental aquatic readiness, that plays an important role in the willingness of the individual to participate in aquatic activities (Langendorfer, Harrod, & Bruya, 1991). Especially in the case of infants and young children, the issue about the most appropriate purposes and methods represents a very controversial and poorly studied area in aquatic programs. Age does appear to interact to a limited degree with the efficiency of swimming skill acquisition; however, there is limited information about individual variability associated with the order of acquisition of aquatic skills (Langendorfer, Quan, Pia, Fielding, Wernicki, & Markenson, 2009).

According to Langendorfer and Bruya (1995), associated readiness skills (e.g., balance, standing, walking, plus cognitive and social adaptability) may be more appropriate criteria for making individual decisions about when to start aquatic experiences rather than age. In considering the question of which swim stroke may be the "best" one to introduce first, Langendorfer (2013) concluded that rather than focusing on this question aquatic instructors should identify which water competence skills do swimmers need to acquire before even considering which formal (named) stroke they might learn. He proposed five basic safety skills (i.e., entry/exit, buoyancy, breath control, change of body position, change direction of travel) as foundational competencies that any swimmer should adequately demonstrate. According to Langendorfer (2013), "once a swimmer is competent enough to stay up in the water, control their breathing, and change both direction of travel and position in the water" (p. 288), only then should they be considered as minimally water competent to acquire more advanced aquatic skills such as any named swimming stroke. The Halliwick Concept generally follows a sequential progression of water activities similar to what Langendorfer (2013) and Langendorfer and Bruya (1995) have advocated.

In the case of the participant who is afraid of the water, this issue was not addressed systematically until Humphries (2008) developed an assessment instrument adapted from Langendorfer and Bruya's Aquatic Readiness Assessment (ARA) that he called the Humphries Assessment of Aquatic Readiness (HAAR). We believe the HAAR was developed very much according to Halliwick foundational principles.

Pan (2010) designed a water exercise swimming program for children with autism spectrum disorders (ASDs) that used the Humphries Assessment of Aquatic Readiness (HAAR) as its basis. Most importantly, Pan structured swimming teaching according to the Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH) model. As part of this program clear boundary markings of the physical environment and visual prompting using a board with pictures and words to describe the routine and the daily aquatic activity were provided to assist instructors and students. Although Pan (2010) assessed the concept of "aquatic readiness," he described his program of dry land instruction, one to two activities, group activities, and cool down activities as a 'water exercise swimming program' that improved aquatic and social skills of ASD children. He did not necessarily link it with Halliwick intervention principles, although it has similarities.

Other Halliwick-related swimming interventions for individuals with ASDs included the studies of the group of Yilmaz with a purpose to teach swimming rotation skills to three boys 8-9 years old with autism over a 10 week intervention period (Yilmaz, Konukman, Birkan, Özen, Yanardag, Çamursoy, 2010; Yilmaz, Konukman, Birkan, Yanardag, 2010). Yilmaz studies implemented time delay as a practice during swimming intervention that focuses on fading the use of prompts during instructional activities for children with ASDs. At first, there was no delay between the instruction and prompt when each child with autism was learning a new skill. Progressively, a fixed amount of time was used between the instruction and the prompt as the learner became more proficient at using the new rotation skill. Results revealed that all children increased their (vertical and lateral) rotation skills significantly during constant time delay intervention.

Altenbach-Brennan (2010) in her research paper also showed that swimming training and water exercises based on the Halliwick Concept were effective for the development of water orientation and physical fitness capacities of a child with ASD. There remains limited research and few recent studies showing the benefits of the Halliwick Concept for children with ASD and other cognitive difficulties. In fact, it was not until 2013 that the Swiss Halliwick Association in Geneva organized the first trial to investigate the combined pedagogical and



educational elements of Water Specific Therapy (WST) and their impact on ASD. Overall, according to Wittmer & Maki (2013), limitations of the literature (also counting for aquatic therapy) still include inconsistent protocols, small sample sizes, wrong choice of measurement instruments, and limited amount of research.

The authors feel strongly that the Halliwick Concept has the potential to stand in the middle of the aquatic process as a key feature that, depending on therapeutic, educational or recreational purposes, can serve as an organizing principle for the entire range and scope of water activities for the normally-abled, as well as individuals with different abilities. The contribution of the Halliwick Concept principles even to 'mainstream' swimming programs should not be overlooked. For example, the Sršen et al. (2012) study which examined the Swimming with Independent Measure (SWIM), and which was based on the Halliwick Concept, found that a surprising number of students who were able to swim according to the national evaluation system for healthy children could not fully adapt to the water, submerge to the pool floor, or blow bubbles in a controlled manner. As Sršen et al. (2012) noted, this finding indicated that mainstream swimming programs should devote more time teaching children skills related to adjusting to water and breathing control. Although generalizations should not be made to all programs, it would be very interesting to continue to explore whether the Halliwick Concept might contribute to the acquisition of basic aquatic skills such as water adjustment and breath control as Langendorfer and Bruya (1995) have argued.

### **Toward a Collaborative Aquatic Approach**

We propose that a collaborative model might be conceptualized which could provide integrating principles and serve an organizing function around which a variety of existing aquatic intervention programs could unite. Dulcy (1983) recognized much earlier that the division of aquatic programming into therapeutic, recreational and educational approaches does not sufficiently meet the needs of many participants and may cause problems for instructors and participants. For example, the therapeutic approach often may lose sight of the need for aquatics to serve as a medium for enjoyment and learning; recreational models often lack medical evidence to diagnose and prescribe functional activities for participants; and instructors who use an educational approach may be unaware of the value of the therapeutic impact of the aquatic environment (Lepore et al., 2007).

Furthermore, a therapeutic approach doesn't mean that it is applied solely in a therapeutic environment; the same can be said of recreational or educational approaches. As an example, one cannot expect to meet individuals with neurological conditions solely in rehabilitation units. Children with cerebral palsy and other motor disabilities are included in many school settings. It seems obvious to us that a collaborative aquatic program model needs to be developed that can combine the main goals of aquatic therapy without overlooking the enjoyment and peer socialization that can be obtained in an aquatic environment. We propose that developing and articulating a collaborative model around the Halliwick Concept is a key future issue in aquatics.

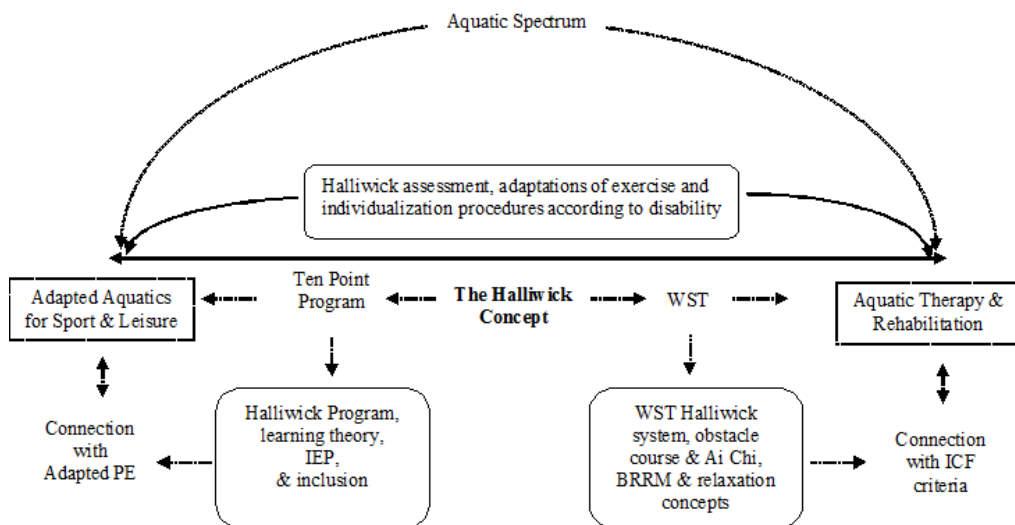


Figure 3. The Halliwick Concept Collaborative Approach

We firmly believe that the Halliwick Concept and its principles have the capacity to reflect the entire spectrum of adapted and non-adapted water activities that may take place in any rehabilitation, community, or school setting that takes place in a swimming pool. We urge the International Halliwick Association, the Association IATF, community organizations, therapists, and aquatic personnel to consider how to foster greater collaboration and better communication, share problems and concerns, and reinforce our mutual goals. In the meantime, researchers from University institutions need to continue to study the reliability and validity of various Halliwick assessment and swimming procedures through collaborative research projects. Modern science requires a strong evidence-based literature upon which to base programs such as those in aquatics.

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