

Aquatic Therapy for Children with Autism Spectrum Disorder: An Evidence-Based Review of Social, Communication, Behavioral, and Adaptive Functioning

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Abstract. Autism Spectrum Disorder (ASD) is a developmental condition characterized by difficulties in communication and social interaction, as well as restricted and repetitive patterns of behavior, activities, or interests. This article aims to review empirical evidence on the use of aquatic therapy in children with ASD, particularly in relation to social, communication, behavioral, adaptive functioning, motor skills, and quality-of-life outcomes. The review synthesizes studies examining aquatic play therapy, aquatic group therapy, multisystem aquatic therapy, hydrotherapy, swimming programs, and speech and language therapy delivered in aquatic settings. Overall, the reviewed evidence suggests potential benefits for social skills and interaction, playfulness, communication and language, adaptive functioning, emotional responses, motor skills and balance, and quality of life. However, findings vary according to intervention type, duration, outcomes, and study design. The implementation of aquatic therapy requires adaptation to each child's individual needs, adequate safety supervision, consistent activity structures, and appropriate involvement of caregivers or therapists. Thus, aquatic therapy may be considered a complementary approach within interventions for children with ASD.

Keywords: aquatic therapy, aquatic play therapy, autism spectrum disorder, social interaction, adaptive functioning

1. Introduction

Autism Spectrum Disorder (ASD) is a complex developmental condition with diverse characteristics. ASD is associated with difficulties in communication and social interaction, as well as restricted patterns of behavior, activities, and interests (APA, 2013; Nevid et al., 2018). The variability of these characteristics means that intervention needs may differ across children; therefore, therapeutic approaches should be tailored to each child's individual needs and abilities (Fabrizi, 2015; Nevid et al., 2018).

Interventions for children with ASD are not aimed solely at reducing autism-related characteristics, but also at supporting children's ability to perform daily activities, communicate, interact with their environment, develop adaptive skills, and participate in meaningful activities. One approach that can be used is play-based therapy. Play therapy provides children with opportunities to learn through enjoyable activities that are appropriate to their developmental characteristics. The aquatic environment can then serve as a medium for therapeutic activities. Activities in water provide sensorimotor experiences that differ from those on land while also creating opportunities for play, motor training, communication, and social interaction. For children with ASD, these activities can be designed as play-based activities or as more structured therapeutic programs.

Phytanza and Burhaein (2019), for example, developed aquatic activities as a form of play therapy involving fishing games, touching balls or other objects, simplified water polo, retrieving objects or coins, and scattering objects. Their study showed an effect of aquatic activities on the social skills of children with ASD. Evidence of the potential benefits of aquatic environments has also emerged from studies using different forms of intervention. Fabrizi (2015) examined an aquatic playgroup and found improvements in playfulness and closeness between children and caregivers. Meanwhile, research on aquatic speech and language therapy has indicated the potential of the aquatic environment to support speech and language development. Another study employed a multisystem aquatic therapy approach to address emotional functioning, adaptation, swimming skills, and social integration. The diversity of these approaches indicates that the term aquatic therapy does not refer to a single standardized form of intervention. Therefore, it is important to examine the available evidence more broadly in order to understand which developmental domains may benefit from water-based interventions.

Based on these considerations, this article aims to provide an evidence-based review of research on aquatic therapy for children with ASD, with particular attention to social skills, communication, behavior, adaptive functioning, motor skills, and quality of life.

2. Methods

This article employed a literature review approach with an evidence-based synthesis. The reviewed literature consisted of studies examining the application of water-based activities or therapies for children with ASD. The literature included studies of aquatic play therapy, aquatic playgroups, aquatic group therapy, multisystem aquatic therapy, hydrotherapy, swimming programs, and communication and language therapy delivered in aquatic settings. The reviewed literature comprised experimental studies, repeated-measures designs, mixed-methods studies, pilot programs, systematic reviews, and articles providing reviews or recommendations regarding water-based exercise.

The findings were synthesized by grouping outcomes according to developmental domains, namely: (1) social skills and interaction, (2) communication and language, (3) behavior and adaptive functioning, (4) motor skills and balance, (5) playfulness and child-caregiver relationships, and (6) quality of life and safety during water-based activities. This approach was used to provide an overview of the consistency of the findings while also examining variation in intervention goals and formats.

3. Results and Discussion

3.1 Aquatic Therapy and Social Skills

Social skills are an important developmental domain in children with ASD. Several of the reviewed studies indicate that aquatic environments can serve as a medium for facilitating social interaction. Phytanza and Burhaein (2019) showed that play-based activities in an aquatic environment can improve social skills in children with ASD. Activities such as fishing, touching balls or objects, playing simplified water polo, retrieving objects, and scattering objects provide opportunities for children to follow instructions, interact with caregivers, and participate in shared activities.

Similar findings were reported in research on Halliwick hydrotherapy. Mortimer et al. (2014), through a systematic review of hydrotherapy for children with ASD, identified potential benefits for social and behavioral outcomes. Güeita-Rodríguez et al. (2021) also found changes in behavior, activity, communication, and social interaction following aquatic therapy. Swimming programs have likewise shown potential benefits for interpersonal skills. Zanolini and Solari (2019) found improvements in relational skills, including a greater tendency to help others and improved social abilities. Positive changes in aquatic skills were also reported to remain evident six months after the program ended.

These findings suggest that the aquatic environment can provide a context for interaction that differs from conventional therapeutic settings. Enjoyable shared activities may create opportunities for children to attend to others, follow rules, respond to instructions, engage in shared activities, and use functional communication. Nevertheless, improvements in social skills were not equally pronounced across all studies. Alaniz et al. (2017), for example, reported that aquatic group therapy was particularly beneficial for water safety, whereas the improvement in social interaction was relatively limited.

Thus, aquatic therapy may be better understood as a medium that facilitates opportunities for social interaction rather than as an intervention that automatically produces improved social skills in every child with ASD.

3.2 Aquatic Therapy and Communication and Language

Communication is another important domain in interventions for children with ASD. The aquatic environment provides opportunities for therapists to integrate verbal instructions, play activities, object identification, responses to instructions, and functional communication. Sourvinos et al. (2021) developed the Aquatic Speech and Language Therapy (ASLT) program, a speech and language therapy program delivered in an aquatic environment. The findings showed improvements in speech and language abilities among children with ASD who participated in the program compared with classroom-based learning.

This finding is noteworthy because it indicates that aquatic environments may be used not only for motor or recreational purposes, but also as a context for communication interventions. Water-based play activities can also provide opportunities to develop functional communication. Children may be encouraged to request objects, follow instructions, name objects, take turns, or respond to therapists and peers. Thus, play elements can serve as a context for practicing communication in more naturalistic situations.

3.3 Aquatic Therapy, Behavior, and Adaptive Functioning

In addition to social and communication skills, several studies indicate potential effects of aquatic therapy on behavioral and adaptive functioning. Caputo et al. (2018) evaluated

multisystem aquatic therapy consisting of several phases, including emotional, adaptation, swimming adaptation, and social integration phases. The intervention was implemented over a 10-month period and was associated with changes in behavioral control and adaptive functioning, emotional responses, adaptability to change, and activity level. These changes were identified, among other measures, using the Vineland Adaptive Behavior Scale and the Childhood Autism Rating Scale.

These findings suggest that a multisystem aquatic program may encompass much more than swimming skills. Aquatic activities can provide a context for practicing adaptation to the environment, following rules, managing emotional responses, and increasing participation. From a clinical perspective, this is important because adaptive functioning is closely related to everyday functioning. However, intervention effectiveness must still be considered in light of individual child characteristics, as responses to the aquatic environment and activity demands may differ from one child to another.

3.4 Aquatic Therapy and Motor Skills

The aquatic environment provides sensorimotor challenges that differ from those encountered on land. Accordingly, several studies have examined the benefits of aquatic activities for motor skills and balance. Ansari et al. (2021) compared aquatic training with kata training in children with ASD to examine static and dynamic balance. Both forms of training improved balance performance. The study also incorporated elements of communication and social interaction into the training process.

These findings indicate that the benefits of aquatic activities are not limited to psychosocial domains. Water-based activities can be used to develop physical and motor abilities while also providing opportunities to incorporate social and communication components into the activities. Faraji et al. (2022) also highlighted the potential of water-based exercise to support rehabilitation in children with ASD, including motor skills and cognitive functioning. However, because the article was a commentary, its level of evidence should be distinguished from that of empirical studies using experimental designs.

3.5 Aquatic Play Therapy, Playfulness, and Child-Caregiver Relationships

One notable characteristic of aquatic play therapy is the use of play as an intervention medium. Fabrizi (2015) investigated an aquatic playgroup for children with autism using a repeated-measures design. The study used the Test of Playfulness (ToP) and the Test of Environmental Supportiveness (TOES) over a six-week period. The findings showed increased happiness or playfulness as well as greater closeness between children and caregivers.

This finding has important implications. Therapy does not always have to be perceived as a formal and highly demanding activity. For children, enjoyable play experiences can provide an entry point for building therapeutic relationships, increasing engagement, and creating opportunities for learning. In the context of ASD, play-based approaches also allow therapists to adjust activity demands to the child's abilities. Thus, playfulness should not be viewed merely as a by-product of therapy, but as a potentially important component of the intervention process.

3.6 Aquatic Therapy and Quality of Life

Several studies have also begun to examine broader outcomes, including quality of life. Güeita-Rodríguez et al. (2021) used a mixed-methods approach to evaluate the effects of aquatic therapy on social competence and quality of life in children with ASD. The findings

indicated positive changes in behavior, activity, communication, and social interaction. The inclusion of quality-of-life outcomes is important because intervention success is not determined solely by changes in symptom scores or specific abilities. Ultimately, effective interventions are expected to improve children's ability to participate, interact, and engage in meaningful activities in their daily lives.

3.7 Safety as an Essential Component of Aquatic Therapy

Although aquatic environments may provide a range of benefits, safety is an inseparable component of the intervention. Alaniz et al. (2017) specifically developed aquatic group therapy to improve water safety and social interaction in children with ASD. The program provided instruction on pool safety while also offering opportunities to develop social skills.

This is particularly relevant because participation in water-based activities must be accompanied by an understanding of boundaries and safety rules. Therefore, aquatic therapy should not be viewed merely as play in a swimming pool, but as an activity requiring structure, supervision, and risk management.

4. Principles for Implementing Aquatic Therapy

Based on the synthesis of the reviewed literature, several principles should be considered when implementing aquatic therapy for children with ASD. First, a therapeutic relationship should be established among the therapist, child, and, when appropriate, the caregiver. Familiarization with the environment and therapist should take place before the child engages in more complex activities. Second, activities should be adapted to the child's individual abilities and needs. Communication, motor, adaptive, and behavioral characteristics should be considered when selecting activities.

Third, instructions should be simple, clear, and consistent. Pool rules should be explained before activities begin and reinforced consistently throughout the session. Fourth, adequate adult supervision should be provided. Supervision is fundamental because activities are conducted in a water environment. Fifth, an environment that supports emotional regulation should be provided. Overly crowded or highly stimulating environments may be challenging for some children; therefore, conditions should allow the child to regulate emotions and behavior.

Sixth, play, motor activities, and social interaction should be integrated. Games such as fishing, touching objects, retrieving objects from the water, and group activities can be used as media for achieving therapeutic goals. Seventh, activities should have a structured beginning and ending, including relaxation before entering the water, the main activity, swimming or play activities, and a cool-down period.

5. Evidence Synthesis

Based on the reviewed studies, aquatic therapy shows potential benefits across several developmental domains in children with ASD. The table 1 indicates that the available evidence generally points toward multidimensional benefits. However, variation in study design, intervention type, duration, measurement instruments, and outcomes means that the findings cannot be reduced to a single conclusion that all forms of aquatic therapy are equally effective.

Table 1. Synthesis of evidence on aquatic therapy for children with ASD

Domain	Intervention format	Key findings	Source
Social & interaction	Aquatic play, hydrotherapy, swimming program	Improved interaction and social skills in several studies	Phytanza & Burhaein, 2019; Mortimer et al., 2014; Zanolini & Solari, 2019
Playfulness	Aquatic playgroup	Increased playfulness and child-caregiver closeness	Fabrizi, 2015
Communication & language	Aquatic Speech and Language Therapy	Improved speech and language abilities	Sourvinos et al., 2021
Behavior & adaptation	Multisystem aquatic therapy	Improved adaptive functioning and emotional responses	Caputo et al., 2018
Motor skills & balance	Aquatic exercise	Improved balance abilities	Ansari et al., 2021
Social competence & quality of life	Aquatic therapy	Changes in behavior, communication, interaction, and quality of life	Güeita-Rodríguez et al., 2021
Water safety	Aquatic group therapy	Improved water-safety skills; more limited social changes	Alaniz et al., 2017

6. Clinical Implications

From a clinical perspective, aquatic therapy may be considered a complementary approach within interventions for children with ASD. Its potential advantage lies in the ability of the aquatic environment to combine physical activity, play, communication, social interaction, and adaptive learning within a single context.

This approach also allows therapeutic goals to be designed in a multidimensional manner. For example, a game involving retrieving an object from the water can simultaneously be used to practice responding to instructions, motor skills, communication, attention, and interaction with the therapist. In addition, professional competence and safety must be considered key priorities. The aquatic environment involves risks that cannot be overlooked; therefore, activities should be conducted under appropriate supervision and with adequate safety procedures.

7. Limitations of the Evidence

Although the review findings indicate potential benefits of aquatic therapy, several limitations of the available evidence should be considered. First, the studies use a wide range of intervention formats. The term aquatic therapy encompasses aquatic play therapy,

hydrotherapy, swimming programs, multisystem aquatic therapy, and speech and language therapy delivered in aquatic settings. Therefore, findings from one type of intervention cannot be directly generalized to all forms of aquatic therapy.

Second, the outcomes assessed also vary, ranging from social skills, communication, behavior, and adaptive functioning to motor skills and quality of life. This variation limits direct comparisons across studies. Third, study designs vary in methodological strength. The reviewed literature includes experimental studies, repeated-measures designs, mixed-methods studies, pilot studies, systematic reviews, and commentaries. Accordingly, the level of certainty associated with the evidence should be taken into account when drawing conclusions.

Fourth, the available research is not sufficient to conclude that aquatic therapy can replace other approaches. Instead, the existing evidence more strongly supports its role as a complementary approach that can be integrated into individualized intervention programs.

8. Conclusion

Based on the available literature, aquatic therapy shows potential as an intervention approach that can support various aspects of development in children with Autism Spectrum Disorder. The reviewed evidence indicates promising benefits for social skills and interaction, communication and language, playfulness, adaptive functioning, emotional responses, motor skills and balance, and quality of life. A distinctive feature of aquatic therapy is its ability to integrate physical activity, play, communication, and social interaction within an environment that differs from conventional therapeutic settings. Activities such as playing with objects, retrieving items from the water, group games, and swimming exercises can be designed to address specific therapeutic goals.

Nevertheless, the available evidence remains heterogeneous in terms of intervention type, study design, duration, and outcomes. Therefore, aquatic therapy should not be positioned as a single intervention applicable to all children with ASD. Its use should be guided by individual assessment, clearly defined therapeutic goals, practitioner competence, and appropriate safety procedures.

Considering these findings, aquatic therapy may serve as a complementary intervention option for children with ASD, particularly when programs are structured and integrate social, communication, adaptive, and motor goals.

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