

Effects of Physical Activity and Aquatics Programs on Problem Behaviors in Children with  
Diagnosed Disabilities and Behavior Disorders

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**Abstract**

The aim of this study was to determine the potential benefits physical activity, specifically aquatic based programs, could provide in minimizing problem behaviors that are common with certain disabilities or behavior disorders. Autism Spectrum Disorders (ASD) and Attention-Deficit/Hyperactivity Disorder (ADHD) were the two disabilities examined, as these are becoming more commonly diagnosed in our society. A literature review was completed examining the effects aquatics programs and physical activity in general could provide to typical problem behaviors, such as trouble with social interaction, self-stimulatory behaviors, attention, and communication. The aim of the program and how the program was administered, the qualifications and backgrounds of the instructors, and the size of groups in the programs were all factors considered when examining the successes of the programs in minimizing problem behaviors. Results showed the clear benefits of creating a legitimate and quality movement program, particularly an aquatics program, for children with ASD and ADHD to help minimize problematic behaviors and improve social behaviors. Proper structure along with designing the program to specifically benefit the previously stated populations were key factors in creating more success for the children.

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## **Introduction**

ASD and ADHD are medical conditions that can compromise one's quality of life. Because of this, adjustments and changes need to be made to help improve the everyday lives of those who have these medical conditions. One symptom that is common to these disabilities is problematic behaviors. Physical activity has been shown to help improve overall health and cognition, and has potential to help with medical conditions and the symptoms of that condition. This paper looks at how physical activity and movement programs can benefit the lives of those with ASD and ADHD. These potential benefits include developing guidelines for successful movement programs to minimize problematic behaviors.

## **Hypothesis**

In this investigation, structured movement programs, in particular aquatics programs, were examined to determine their benefits with regard to minimizing problematic behaviors in children with ASD and ADHD. A review of existing literature was conducted to find the benefits, or lack thereof, of physical activity for children with ASD and ADHD. Specifically, the research looked at programs that succeeded in reducing problematic behaviors and/or improved in social behaviors. What types of programs were successful and what specific methods were employed that created successful changes were also examined. We examined the methodologies of these investigations in order to create a successful movement program designed to minimize problem behaviors in students with ASD and ADHD.

## **Background**

ASD is characterized by difficulties with social skill development, persistent difficult behavior, and sometimes occupational and intellectual impairments ("Autism Spectrum Disorders", 2014). Autism is a spectrum disorder which means that there are a range of levels

within ASD. Some individuals are more impaired socially, while others struggle more with occupational skills. Some individuals are more severely impaired intellectually and can't communicate verbally, while others' impairments are hardly noticeable to others. It is common for children with ASD to have perseverating behaviors that can be undesirable or inappropriate ("Autism Spectrum Disorders", 2014). A number of studies have been conducted to see if physical education and movement programs help minimize these behaviors ("Autism Spectrum Disorders", 2014).

ADHD is a condition that has unknown causes. Some of the common symptoms of ADHD include trouble focusing, difficulty controlling behavior, and over-activity ("Attention Deficit Hyperactivity Disorder", 2014). There are three subtypes: predominantly hyperactive-impulsive, predominantly inattentive, and combined hyperactive-impulsive and inattentive ("Attention Deficit Hyperactivity Disorder", 2014). Depending on the subtype of ADHD, the person with the condition might act out when they aren't receiving enough attention or have trouble focusing. Sometimes, people with ADHD have difficulty following instructions or don't seem to be listening. Some might talk nonstop or have trouble sitting still, or speak at inappropriate times ("Attention Deficit Hyperactivity Disorder", 2014).

Several studies, that are included in this literature review, have examined movement programs and physical education programs to determine if there are benefits with regard to behavior problems. This paper used a literature review to examine the results of these studies. Specifically, what approaches or techniques were helpful, or not helpful, in minimizing unwanted behaviors, and secondarily, were certain types of exercise more successful than others. Aquatics programs will be examined carefully in order to determine their benefits. The results of this literature review will be used to a) establish guidelines for a movement program that

minimizes problem behaviors and promotes new positive behaviors, and b) presents the benefits of physical activity for children with behavior disorders.

### **Literature Review**

Children with ASD and ADHD, like all children, are expected to meet physical activity standards, through exercising in all five categories of health related fitness (Altenbach-Brennan, 2010). Swimming is an activity that can be beneficial in working on aerobic fitness, muscular endurance, and body composition as well as positively impacting behavioral issues.

In a study by Altenbach-Brennan (2010), children with ASD worked in an organized swim lesson program on gaining aquatics skills while simultaneously reducing negative behaviors such as not wanting to leave, being too loud, or demonstrating perseverating behavior. The instructor was certified with the American Red Cross in water safety instruction, lifeguard/CPR/AED certified, and was a certified therapeutic recreation specialist. The lessons were very much geared towards children with ASD with an initial survey being conducted regarding negative stimuli, such as environmental conditions that resulted in negative behavior, as well as surveying preferred equipment and activities and the students' swim history. There were seven exit skills tested relating to aquatic skills, and data were recorded regarding the children's compliance, if they engaged in problem behavior when a skill was requested. A trial block included nine requests of the task and when the skill was completed three times consecutively by the child, training on the skill could be started and trials could begin for a new task. When students responded well to tasks, they were given preferred activity time and praise. If a response was incorrect or interfering problem behaviors took place, the attempt was ignored or blocked and the prompts were repeated. The three phases in this study included instruction teach the skill, practicing the skill, and observing what students learned and how the program

affected their behavior. According to Altenbach-Brennan (2010), children with ASD can benefit from an aquatics program, but that the program may need to be altered to be more precisely geared towards children with ASD. Exit skills were met, but more research needs to be done with regards to different environments, different demographics and changes in instructors. Behavioral techniques such as prompting and shaping were effective in diminishing problem behaviors; however, the results differed depending on the child and the specific skill being taught (Altenbach-Brennan, 2010).

Research by Dubois (2011) has suggested that aquatic activity can provide the sensory stimulation that children with ASD need. Dubois' research reviewed studies that used therapeutic approaches such as occupational therapy or physical therapy coupled with an aquatic component, and then used a literature review to create a questionnaire for therapists in order to determine the benefits of an aquatics program for children with ASD. Aquatic therapy has been used to help with daily living activities for people with ASD. A study by Vonder Hulls, Walker, and Powell (2006) that surveyed occupational therapists that used aquatic therapy with children with ASD noted improvements in eye contact, touch tolerance, and attention. The aforementioned behaviors are often inhibited in children with ASD. Research from Pan (2010) that was also cited by Dubois showed a decrease in self-stimulatory behaviors in teenagers with ASD who participated in a swim program. The children in this particular study worked with an occupational therapist on an aquatic therapy program.

Dubois sent surveys to occupational therapists who reported their experiences with aquatic therapy and children with ASD. The survey took into account their years of experience, experience with children with ASD, as well as aquatic instruction certifications. The occupational therapists responded about the frequency of their use of aquatic therapy with

children with ASD as well as the ages of the children with ASD. Most occupational therapists reported keeping groups at a one to one or one to two student teacher ratio while, less frequently, using groups that were larger. The respondents generally noted that aquatic therapy was beneficial for proprioceptive input, muscular strength and coordination. As well, children with ASD generally enjoyed aquatic time. They also, generally, stated that aquatics programs aided in relaxation. Some respondents found aquatic therapy to help with activities of daily living such as bathing, dressing, and eating. Two of the major goals used in aquatic therapy, for these occupational therapists, were to improve attention and sensory processing, major contributors to problem behaviors in children with ASD (Dubois, 2011). Overall, respondents found aquatic therapy to be beneficial for social skill development, general affect, motor skill development, and comfort in the water. (Dubois, 2011 )

A study by Pan (2010) looked at a water exercise swimming program and the benefits it might have for social skill development and communication, which are often overlooked in developing physical activity programs for children with ASD. While children with ASD often struggle to participate in physical activity that has a social component, or find certain physical activities undesirable and difficult, the ability to swim has been found to be more accepted by children with ASD. Because there is less physical stress on specific body parts, the water allows for freer, independent movement (Pan, 2010). Three assessments occurred during a 10 week Water Exercise Swimming Program (WESP) program in order to accord improvements in both social and aquatic skills. The children worked in pairs with one researcher, who had completed a WESP instruction program, in the water for a portion of the lesson. There were also group warm ups, cool downs and a whole group activity piece in the session. Students were grouped based on the level of their spectrum disorder and swimming experience. Many of the students in this

study had Asperger's syndrome or a mild form of autism (Pan, 2010). Additionally, some participants had an attention disorder in combination with their ASD. Their social skills were rated by their classroom teachers, who were blind to the treatment, before and after the program on a standardized, norm referenced test, the School Social Behavior Scales (SBSS). After the WSEP program, children had higher scores for academic behavior and lower scores for anti-social behavior, meaning their problem behaviors were reduced and their academic behaviors improved. There were no significant differences in the amount of improvement in scores between the different groups of children with ASD. While the antisocial behaviors decreased, there weren't significant changes in levels of social competence (Pan, 2010).

A study by Yilmaz, Yanarda, Birkan, & Bumin (2004) looked at the physical fitness levels, aquatic skills, as well as aquatic behaviors of nine year old children with ASD. Subsequently, they did an aquatic intervention and post test to determine the effectiveness of aquatics programs on children with ASD. The Checklists were used to rate their behaviors as well as aquatic skill before and after the intervention. Stereotypical movements such as rocking and swinging were looked at, in addition to the tests previously listed, to determine the effectiveness of the aquatics interventions. The aquatic program was a hydrotherapy program, during which the children worked with an occupational therapist in the water, as opposed to a typical swim program. The 10 week long program showed that a hydrotherapy program as well as increased interest in aquatic programming among children with ASD, leading to a more positive experience in physical activity. This could ultimately lead to better behaviors due to more confidence and enjoyment, which could also be generalized beyond the water (Yilmaz et al, 2004).

The Aquatic Nursery (AN) program was a different approach to using aquatic therapy for preschool children with autism and their families. In a study done by Prupas, Harvey & Benjamin (2006), an AN program was used. The AN program is similar to the therapeutic aquatics approach previously mentioned (Yilmaz et al, 2004); however this program was geared towards a very young ASD population. The AN program was designed with techniques of adapted physical activity programs, in terms of structure and teaching methodology. The program also targeted families of the children and were included in the therapeutic nursery process. The instructor of the aquatics program had either adapted physical activity or therapeutic recreation as a background (Prupas et. al, 2006).

The AN program first focused on building aquatic skills, creating success and self-confidence in aquatic movement, and, later in the program, building communication and socialization skills. Swimming was found to be attractive for the families because it is a functional lifetime activity that is easily accessible for all age ranges and families with locations for participation in the community (Prupas et. al, 2006). The assessment in this program showed the development of physical and social skills of the individuals due to this program. Based on the initial observations, individual treatment plans were created for children in the AN programs. Individual Treatment Plans for the Aquatic Nursery program focused on social skills, communication and behavioral skills in addition to the aquatic skills. The individual treatment plan was reviewed at the conclusion of the AN program to see what goals were met and how it could be modified for the future. By working with the parents in the AN program, goals were set to increase adult directiveness with the child suffering from ASD. The AN program also provided empowerment for the child when working on aquatic skills. The parents gained skills and strategies on how to educate their children in the area of social skills and communication.

The program also helped strengthen the bond between parent and child and, therefore, creates more success with the social and behavioral development of the child (Prupas et. al, 2006). The AN program provided a structured environment, something recommended for children with ASD, thus creating a better chance for success with the skills in the program. Even changing clothes and locker room time were beneficial for parents in order to help teach their children functional life skills (Prupas et al, 2006).

A review of literature by Morin (2014) showed as vigor is increased in a swim program, self-stimulatory behaviors were seen to decrease. This reduction is thought to be due to replacing the self-stimulatory behavior with a movement that helps break the feedback loop at the same sensory input level that causes the stimulatory behavior. Additionally, the water has been shown to calm children with ASD because of it surrounding and supporting the student thus sending them different sensory signals (Morin, 2014 ).

Traditional exercise has been shown to reduce problem behaviors as well (Morin, 2014). Similar to the connection between increased vigor and a reduction in self-stimulatory behaviors, exercise intensity is thought to be part of what contributes to reduction of problem behaviors (Morin, 2014 ). As noted, many, but not all, children with ASD suffer from social and behavioral problems which can affect their participation in physical activities especially when working with other children. Morin suggests (2014) that due to the fact children with ASD have trouble socializing; they are generally less active than their peers and infrequently participate in physical activity with peers. Additionally, children with ASD have difficulty with sensory processing due to problems with the vestibular system. Kinetic movement has been shown to be an effective therapy for improving vestibular function (Morin, 2014). Studies on movement based on static balance were shown to help improve vestibular function. As movement intensity and repetition

were increased, children's behavior began to change based on feedback (Morin, 2014 ). This suggests that the improvement of the vestibular system, balance, muscle strength and coordination, are associated with improvements in behavior and attention in children with ASD as well (Morin, 2014). Morin (2014) suggests that repetitive behaviors typically seen in ASD are tied to receiving sensory input. By receiving sensory input through movement, repetitive behaviors are reduced because of external stimuli provide to the cortex. Exercise is thought to break the feedback loop that causes the child to engage in self-stimulatory behaviors that can distract from performing the correct skill or cues. Exercise is most effective when it is intense enough to replace the behavior, and the motor pattern is similar to the self-stimulatory behavior (Morin, 2014 ). In terms of social interaction, Morin's study found that when the movement is emphasized and the socialization is deemphasized, socialization was improved in students with ASD. One example of this is creative dance, where students with ASD worked alongside other students but the focus was on creativity and developing movements. Similarly, horseback riding, or hippotherapy, was beneficial because of the repetitive movement of the horse and the slow, gradual socialization of the student with the horse, without the social pressures of a more verbal physical activity (Morin, 2014 ).

Sowa and Meulenbroek (2012) examined movement programs for children with ASD and then designed their own program using components they found to be most beneficial. Subsequently, they measured their programs success. Often times, treatment for ASD focused on movement rigidity and stereotypical movements, but also examined aggression problems, rage, hyperactivity and mood changes. One study looked into how sport programs might help or hinder the aforementioned characteristics. Not much research had compared group versus individual treatments, so prior to completing the study, Sowa & Meulenbroek looked at this.

There are benefits to both. Individual instruction can cater more to the needs of the student with ASD, with less stress due to unpredictable events and less stress from communication. However, group interventions also have advantages, such as learning teamwork and communication (Sowa & Meulenbroek, 2012). Sowa and Meulenbroek's meta-analysis also looked at different types of exercise programs used in the past and what seemed most beneficial. These exercises included swimming, cycling, jogging, walking, weight training and horseback riding. (Sowa & Meulenbroek, 2012).

A study completed by Verret, Guay, Berthiaume Gardiner, & Beliveau (2012) showed that aerobic fitness and physical activity helped to improve cognitive function (such as planning) in children with ADHD, but did not improve attention or stimulation. Children with ADHD have also shown changes in behaviors and attention through physical activity. Academic performance is the major area researched in children with ADHD, and there have not been many studies conclusively demonstrating the benefits of physical activity as they relate to academic performance, but there also haven't been any studies showing negative effects of physical activity on academic performance. Another study (Azrin, Ehle, & Beaumont, 2006) showed physical activity and aerobic fitness could help, similarly to how it helps self-stimulatory behaviors like echolalia in ASD, with attention and stimulation problems in children with ADHD. While in conditions similar to ADHD, where there is a lack of impulse control benefit from physical activity, it has been harder to conclude that there are benefits of physical activity for individuals with ADHD (Verret et. al, 2012).

Verret, Guay, Berthiaume Gardiner, & Beliveau (2012) looked at moderate to high intensity physical activity that worked on fitness, cognitive function and behavioral issues with children with ADHD. Half of the group participated in the physical activity, while the other half

was a control group. The physical activity took place three times a week for 45 minutes each time and was supervised by a physical activity specialist. A variety of activities were used to maintain interest and motivation of the students. To measure behavior changes, parents filled out a Child Behavior Checklist before and after the physical activity intervention (Verret et. al, 2012). This checklist looks at behavioral problems, attention problems, and other social competencies. The results showed that some benefit can come from physical activity with regard to decreasing social anxiety, decreasing impulsiveness, improving attention and thought as well as improving other social behaviors (Verret et. al, 2012).

Not much research has been done examining aquatics programs specifically for the benefits of children with ADHD. A study by Chang, Hung, and Huang (2014) used an aquatics program for motor improvement with children with ADHD but did not look at benefits regarding behavior. Based on research from physical activity programs for children with ADHD, one might speculate that the same or similar benefits for attention and behavior might apply to an aquatic program. The research by Chang et al (2014) examined progress made in motor skills and no-go stimulus, which helps the restraint inhibition component of behavior. This means they were able to respond better to stimuli in the environment in terms of demonstrating restraint, demonstrating some behavior improvement (Chang et. al, 2014).

### **Results and Findings**

A variety of information can be taken from these studies to apply to movement programs for children with ASD and ADHD. For children with ASD, smaller groups or one on one work with an occupational therapist might result in better attention and social skills, leading to fewer problem behaviors. Having students work with an occupational therapist or someone who is trained in therapy as well as water instruction might be more beneficial in minimizing problem

behaviors than working with an instructor trained only in aquatics, that is, an ordinary swim program. Well-designed aquatics programs have consistently shown improvements, although sometimes minor, in eye contact, social skills, stereotypic behaviors, and attention in children with ASD. Swimming and aquatic therapy have proven beneficial for development of many different functions in children with ASD; however much of the research was done in environments with occupational therapists. Working with a traditional swim instructor might yield different, and/or less beneficial, results (Dubois, 2011, p 3-23).

Another reason an aquatics program specifically designed for children with ASD might be more beneficial is the individualized instruction. The reduction in antisocial behaviors could be due to more positive feedback as well as the individualized instruction, as well as increased social interaction while engaging in physical activity, and watching positive social interactions. Working on specific strategies, like lining up for turns in a very small group, allows for more feedback and physical help through a skill, resulting in a better response (Pan, 2010). Using these strategies including, but not limited to, individual attention, could lead to better perceived social competence and, again, more positive responses. This attention not only creates a bond between instructor and student but helps to work on these social skills in a smaller more individualized setting while gaining aquatic skills. Parents also noted that the improvement in social skills and athletic potential gave the children improved self-confidence (Pan, 2010). WESP programs in this study proved successful, but the social behavior development was imbedded into the program, which makes it differ from a traditional swim program. Some of these aspects such as developing social behaviors and communication as well as individual attention might be found in a traditional swim program; however, less emphasis is placed on the social aspects of these programs (Pan, 2010).

Having a very organized and structured program, such as the AN program, helped to lessen the anxiety that can be caused by activity transitions or activities that don't resonate with children with ASD. Another reason why certain programs were successful is the organization and choice for children with ASD. One example of the benefits of organization was having a set routine as well as having pool toys set out ahead of time for planned transitions. This, in combination with set goals of the individual treatment plans, are factors that could have increased the success of this program in developing the children's' social skills and behaviors (Prupas et al, 2006). The same structure of tasks each session, while varying the tasks within that structure, was helpful in maintaining interest and helping plan for transitions. For example, each session in the AN had an introductory song, individual instruction, free time, and a goodbye song. This allowed for some choice as well as individual instruction and small group cooperative activities to benefit for socialization and play skills. The same few tasks were rotated to allow for change between sessions but also repetition and practice of skills. The response prompting continuum was beneficial because it provides verbal, physical and visual prompts, thus increase in the understanding of specific aquatic skills for children with ASD (Prupas et al, 2006). A structured program with designed goals and targeted towards young children with ASD and their families was an enjoyable and effective way to begin with early intervention for most. This approach again differs greatly from most traditional swim programs, and the benefits were clear for social and aquatic skill development in young children. With the help of the instructor on various behavior related strategies as well as aquatic skills, the families and children found success in a family physical activity, often for the first time (Prupas et al, 2006).

Regardless of whether the program is aquatics related or another type of exercise program, it is important to consider the age of the students. Many participants were young

children or adolescents, which means their brain is still forming. The earlier exercise is implemented, the more effective it can be, as the brain is still developing quickly and has more plasticity. If the child does not appreciate an activity, it will be less effective for their overall development (Morin, 2014). Additionally, if the exercise is enjoyed it will feel less like therapy and serve more as fun and exercise for the child. This will also help when integrating children with their non-disabled peers in the least restrictive environment. Exercise has been shown to help children with ASD minimize depression, anxiety, temper tantrums, and improve attention, which leads to an improved quality of life. Teaching children the value of physical activity will also encourage their participation in exercise for a lifetime, make it more enjoyable for them and improve their overall health. A gradual transition and keeping the child comfortable is crucial to their continued enjoyment and overall improvement in health and behaviors (Morin, 2014).

Sowa and Meulenbroek (2012) found that while the motor and social skills of children with ASD improved through physical activity, there was not conclusive evidence that physical activity could improve their communication. By looking at both group and individual interventions, as well as a variety of physical activities, a better base of evidence could be created to support improvements in the motor and social skill areas. Sowa and Meulenbroek's investigation showed a 35% improvement rate in motor and social skills as a result of physical activity. Overall their study shows physical activity can benefit not just the overall health of people with ASD, but also their motor and social skills (Sowa & Meulenbroek, 2012).

Physical activity was shown to have benefits for children with ADHD as well (Verret et al, 2012). Not only did physical activity help motor performance, but also reduced social problems, attention problems, thought problems, and other behavior problems associated with ADHD. However, physical activity did not significantly help the hyperactivity or impulsivity

found in children with ADHD. Importantly, the study by Verret et. al, (2012) showed that physical activity did lead to significant improvement in behavior and socializing. Because children with ADHD have difficulty socializing and often isolate themselves, physical activity could provide a very important breakthrough. Physical activity also showed benefits with respect to information processing in the group that had the physical activity intervention, which could help lead to improved cognitive function and academic performance (Verret et. al, 2012).

There is still minimal research on the benefits of physical activity regarding behavior for students with ADHD, especially in terms of aquatic programs; however the motor improvement shows the potential of aquatic programs for children with ADHD. The improvement in response to no-go stimuli suggests there is promise for behavior improvement through aquatics programs, as these programs helps improve restraint behavior (Chang et. al, 2014). The correlation between physical activity and behavior and social improvements with children with ADHD could mean that these improvements carry over into an aquatic program that involves moderate to vigorous physical activity. The aquatic program would likely have to have similar conditions to those found in the successful physical activity programs in terms of intensity and activity structure.

### **Application**

As previously stated, there are many aspects to consider when designing an exercise program, specifically an aquatics program, for these two disability populations, particularly if the purpose is in part to improve social skill and minimize problematic behaviors. While the reviewed programs have been found to be successful in various ways, each had different components to consider that might have contributed to the overall success.

Aquatics programs have clear benefits for children with ASD, and potential benefits for children with ADHD as well. For children with ASD, the weightlessness and calming sensation

can lead to a more enjoyable experience and less stress on the joints, allowing for greater success. Not having to bear weight can help them develop motor patterns in a way that is simpler. Finding success in physical activity is one way problem behaviors can diminish a bit in children with ASD. A group exercise aquatic program can allow children with ASD to learn to interact with others and thus improve social skills. Individual instruction can allow for specific feedback and assistance leading to increased success and higher self-efficacy. Group exercise can be as simple as being in the pool with others at the same time, while being instructed in a one on one setting. This is something to consider when creating an aquatic program, especially if it is geared toward an ASD population. Adding goals or tasks teaching students to wait their turn or working in a group of two students to one instructor can all be beneficial in improving social skills and learning proper social behaviors. These are ways that social and behavior skills can be improved during a movement program. More than just motor skill improvement must be emphasized. Working with an occupational therapist provides appropriate physical activity as well as targeted work on social and behavior problems that a more traditional aquatics program might not be able to improve. Finally, aquatics programs are attractive for families because pools are easily accessible, and swimming is a lifetime physical activity that they can continue and participate in with friends and family.

For children with ADHD, we can hypothesize that aquatics programs would have similar affects as general physical activity programs. This would mean that there would be improvement in motor skills, improvement with restraint and the 'no-go' stimulus, and improved social and attentional abilities. These programs could also decrease the isolation many children with ADHD experience. More research should be done in order to identify the type of program that is most beneficial to children with ADHD.

Most of what is true for aquatics programs seems to carry over to general physical activity programs for children with ASD. As was stated, working with an occupational therapist or someone certified in recreation therapy might improve behavior and social abilities, due to their specialized training. Individual instruction might lead to more self-efficacy because it allows more individual feedback and time to improve the skills. Improving self-efficacy should be a goal of a physical activity program for children with ASD, because self-efficacy can lead to better behavior. This could come about due to greater success and skill improvement. Depending on the child and their level of ASD, small group work was effective in providing social opportunities and learning opportunities regarding social behaviors and interactions. However this organization can cause unpredictable situations which are difficult for children with ASD to handle. This is something that should be considered if a program is being designed for a child with ASD. Depending on their placement on the spectrum, small group work might be less beneficial than individual attention. It is important, when planning a specific physical activity program, to structure the environment to the needs of the student, as this helps to minimize their anxiety and negativity about physical activity. Allow for choice so children will enjoy the program; otherwise, it will be difficult to make improvements in their skill as they will be opposed to participation. Early intervention is important as a program will be more beneficial if it is started when the child is young. This applies to motor skills, physical activity and issues around behavior.

In children with ADHD, more research needs to be done. While the specific physical activity programs reviewed haven't shown to help hyperactivity, benefits suggesting improved cognitive function have been identified. This could mean an early intervention is more beneficial, and a program geared towards these social and behavioral skills might give students a

greater chance of success. A physical activity program could easily add in behavioral and social components, important to consider when designing a program for children with ADHD.

Increased physical activity could provide needed social interaction and help improve the social skills students with ADHD often lack.

It is important to individualize your physical education program, movement program, or aquatics program when working with individuals with disabilities such as children with ADHD and ASD, especially if the program is directly geared towards these students. Everyone deserves the opportunity to succeed in our society, be healthy, and be integrated comfortably regardless of a condition that could bring them difficulty in physical activity. Looking ahead and planning for behavioral and social skill development can help to reduce problem behaviors beyond what could take place in a traditional movement program. Integrating work with an adapted physical education teacher or a professional certified in movement education/movement therapy and who understands the disability would be very helpful with regard to the success of the program. These suggestions could lead to improvements in social skills and a reduction in problem behaviors.

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