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# The Effects of Aquatic Therapy on the Motor Skill and Behavioral Development of Children with Autism or Autism Spectrum Disorder

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**Ouachita Baptist University**

**Arkadelphia, Arkansas**

**Carl Goodson Honors Program**

“The effects of aquatic therapy on the motor skill and behavioral development of  
children with autism or autism spectrum disorder”

A Thesis Paper

By

Elysian Majeske

Arkadelphia, Arkansas

2021-2022

**Background Information:**

Autism is described as an individual having an “impaired social interaction, problems with verbal and nonverbal communication, and unusual, repetitive, or severely limited activities and interests” (Anonymous, 2009). The term “autism spectrum disorder” coins from the wide range of conditions that fall under the term autism. Under the ASD umbrella includes the five disorders: Autistic Disorders, Asperger’s Disorder, Pervasive Developmental Disorder or atypical autism disorder, Childhood Disintegrative Disorder and Rett’s Disorder (Phetrasuwan, 2006). Autistic Disorder, the major diagnosis of these, has three main areas of developmental complications among children. This includes difficulty in social interaction, impairment in language and communication skills, and repetitive patterns of behavior. The other four share aspects of these core deficits, but can occur in different severities, can begin at different ages, and can show different levels of intellectual function (Phetrasuwan, 2009). The CDC, American Academy of Pediatrics and the Autism Society have enacted the “Learn the Signs, Act Early” campaign, to help parents, medical professionals, and those that work with children to be able to identify these behaviors early on, rather than months or years after symptoms have actually been present (Phetrasuwan, 2009). With no definitive biological tests for these disorders, developmental screenings, algorithms, and questionnaires have been created to diagnose ASD.

These screening instruments rely heavily on parents’ observations of their child. There are specific checklists with different signs and symptoms that parents and doctors will look for when potentially diagnosing a child with ASD. A specific screening instrument, known as the ABC checklist, is a questionnaire done by a parent or teacher to help a professional diagnose a child with autism. Parents may decide to do these screening from noticing an unusual lack of responsiveness from their child. The child may have a particular focus on one item, while

ignoring other items. These children may avoid eye contact with others and lack the ability to understand the feelings and social cues of others (Miranda, 2002). This can lead to inappropriate behavior in certain situations. Pertaining to a physical aspect, children with autism may engage in stimming. Stimming is characterized as repetitive motions, including “rocking, twirling, biting, or head-banging” (Anonymous, 2009). Many children with autism will show a reduced sensitivity to pain, but will show severe sensitivity to sound or touch. Echolalia is considered to be another sign of autism. It is defined as the repetition of sounds, words, or phrases (Grossi, 2013). There is no cure for autism, but there are many types of treatments and activities that can alter the intensity of these signs. This includes educational and behavioral intervention, medications, therapies, specifically, one of them being aquatic therapy.

### **Problem Statement**

Aquatic therapy is seen to be beneficial in improving the lives of children who have autism and autism spectrum disorder. There have been previous studies done that developed a swim program for these children. These children and the instructor would complete normal swim activities including, blowing bubbles, jumping off the wall, completing the strokes, and going underwater. Behavioral interactions with other students and motor skill developments were examined before, during and after the program. Results showed that many of these participants improved in their social relations with other participants, in their muscle control and aerobic capabilities, and in their engagement and responsiveness. These improvements will provide these children with confidence in themselves, while preventing the feeling of seclusion from the rest of society.

## Research on Previous Studies

Activities in the water have been found to improve cardiovascular and muscular function in children with autism. Immersing the body in the water has been seen to increase volume of the heart, increase cardiac output, increase oxygen delivery, and suppress the sympathetic nervous system activity (Phytanza, 2019). A study done by Yilmaz, on a nine-year-old child with autism, implemented a ten-week swimming training program. Before and after this program, physical tests were done to evaluate improvements. Cardiorespiratory endurance, balance, lower extremity strength, and power scores were seen to increase following the program (Yilmaz, 2004). Another study was done on a group of eleven children diagnosed with autism spectrum disorder, where the children also performed a ten-week aquatic program. Parent feedback was given following the program. Many of the parents noticed an improvement in their child's strength and endurance, while showing less fear towards the water (Ennis, 2011).

Aquatic therapy has also been found to improve locomotion and motor skill for children with autism. A study done by Battaglia involved three children with autism who completed a CI-MAT program. This program included an "emotional adaptation phase, swimming adaption phase and a social integration phase" to implement different interactions in the water (Battaglia, 2019). Locomotion and object control skills were analyzed in these phases; some of the skills included were running, galloping, jumping, catching a ball, throwing a ball, and kicking a ball (Battaglia, 2019). After they had completed the program, results showed improvements in these tasks for the three participants. Also, the previously discussed experiment by Yilmaz, with the nine-year-old boy, was found to have fewer stereotypical autistic movements, such as stimming and echolalia, after the aquatic program. Thus, showing improvement in motor control due to water intervention (Yilmaz, 2004).

Progress in the social and behavioral interactions of children with autism has been seen, following the intervention of aquatic therapy as well. Aquatic activity programs provide these children with a sense of freedom, confidence, and an opportunity to interact with other children with ASD (Phytanza, 2019). The hydrostatic pressure and buoyancy of the water help to facilitate enhancements in sensory and social behaviors, such as eye contact and paying attention to instruction (Battaglia, 2019). The social integration phase from the Battaglia study demonstrated great improvement in students complying to it being another's turn, sharing attention and playing together during the water activities (Battaglia, 2019). Participating in these group-based programs promote children with ASD to interact with others, but also provide parents with support from their community based on a shared situation.

### **Hypothesis for this Project**

The use of an aquatic therapy program will improve the motor skill and behavioral development for children who have autism or autism spectrum disorder.

### **Definitions**

Echolalia: repetitive noises, words, or phrases said by the participant

Stimming: repetitive movements done by different body parts of the participant

Distance kicked: how far the participant flutter kicked on their own, while holding a kickboard

Qualitative Data: based on instructor's opinion of the participants success in each skill

ASD: Autism Spectrum Disorder

### **Assumptions and Limitations**

The experiment will be executed with the assumption that the subject has been diagnosed with either autism or autism spectrum disorder. It will also be assumed that the participant has had past experience in water, has independent mobility, and can follow simple instruction.

Another assumption will be that the parent is fully aware of the aspects of the experiment and has cleared their child to participate. Limitations will include the parts that are out of the instructor's control. This will consist of the pool temperature, insects that may have entered the pool area from outside, and the mood of the participant at each lesson.

### **Significance of Study**

It's important to know how aquatic therapy can impact the physical and emotional aspects of a child with autism. Past research has shown that types of water interaction for these children can greatly advance their locomotion, neuromuscular development, and social interaction with other children. Knowing how aquatic therapy, through swim lessons, connects to autism will help to develop new and unique treatments. These treatments can be used as preventative to avoid muscular atrophy and the feeling of seclusion. They can be used as a therapy that feels more like play than exercise due to the low gravity. The study could show a potential way to change how autism effects on children are managed by medical professionals, parents, and educators.

### **Methodology**

#### **Participants**

The participant in the study was a nine-year-old boy diagnosed with mild autism disorder. A parent of a student on the club swim team in the area is the special needs teacher at an Arkadelphia elementary school. She promoted this study and the opportunity for free swim lessons to the parents of her students. The mother of this nine-year-old boy was interested in the program and volunteered to participate. The child was accepted into the program due to his experience with water from going to the lake. His skills and comfort level in the water were

evaluated at the first lesson to ensure safety moving forward. Consent forms were signed by the mother and the child. These forms can be found in the appendix.

### **Instrumentation**

The subject was provided with goggles and a kickboard to perform the swim skills more efficiently. The pool location was provided through permission from the head coach of the Ouachita Baptist University swim team. Evaluation was done through qualitative and quantitative values. These were recorded through my observations, with a measuring tape, and with the pace clock on the pool walls. A parent questionnaire was created and given to the parent to fill out following the conclusion of the lesson.

### **Qualitative Evaluation**

Numerical values were recorded based on the number of times the subject showed echolalia and stimming behaviors, the distance kicked, and the time spent with face in the water. A tally mark was written on a chart under echolalia each time the subject repeated a phrase, word, or sound. A tally mark was marked on a chart under stimming each time the subject repeated a movement with his upper body, lower body, or whole body. A mark was placed at the farthest point the subject could kick using the kickboard and then was measured with a tape measurer following the lesson. The subject was given three attempts and the farthest distance, in feet, was recorded on the chart. The pace clock was used to find the number of seconds the subject could keep his face underwater. Time did not begin until the participant's goggles were touching the water. The subject was given three attempts and the longest time, in seconds, was recorded on the chart. The subject was given three attempts to kick as far as possible and to get used to putting their face in the water. Each of these processes were repeated every two weeks.

## **Quantitative Evaluation**

For the quantitative assessment, subjective assumptions were made and they were ranked on a scale of 1-5. One stood for poor, two for fair, three for satisfactory, four for good, and five for excellent. The three behaviors analyzed were the subject's response to instruction, response to facial expressions, and response to touch. The rankings were chosen based on the instructor's opinion on the participant's performance of each category. This was based on how well the subject followed direction, reacted with physical help from the instructor, and reacted to the instructor's expressions and communication. The number was recorded on the chart immediately following the conclusion of the lesson. This was repeated every two weeks.

## **Parent Questionnaire**

An outline of a previous parent questionnaire was used. It was found from a website with an abundant amount of parent survey templates that could be downloaded as a PDF or Word document. The specific outline chosen was an evaluation of an after-school program due to it closely matching the specifics of this experiment ("Free..." #13). This outline was retitled and the questions were altered or completely changed. Questions, specifically designed for the swim program were added. The questionnaire used the Likert Scale as the answer choices for the questions. The Likert Scale uses the terms strongly agree, agree, disagree, strongly disagree, and no opinion as the answer choices. The parent was instructed to place a mark in the box that most accurately reflects their response. This can be found on page 18 and 19.

## **Procedure**

### **Week 1:**

2 lessons, 30 minutes each

Introduction: Instructor was introduced to the parent and the subject. The subject slowly introduced the subject to the water and to the equipment. Demonstrations were given on how to use a kickboard and how to put on goggles. The instructor helped the subject feel comfortable moving around in the water and begin learning basic skills. These basic skills included kicking, blowing bubbles, and floating on the back. These were introduced by demonstration and by practice with the instructors help.

### **Weeks 2-8:**

2 days/week, 30 minutes each

Lesson Breakdown: Kicking with assistance, kicking without assistance using a board, moving arms in freestyle stroke motion standing, moving arms in freestyle motion while floating with assistance, putting face in water using goggles, blowing bubbles while face is in the water, floating with assistance, floating with limited help. A game or activity was chosen by the subject to conclude lesson.

### **Measurements:**

Evaluations were done at the end of week two, six and eight based on subjective and objective values. The instructor measured the subject's performance in certain categories through qualitative and quantitative analysis. Specifics will be shown in following section.

### **Participant Analysis**

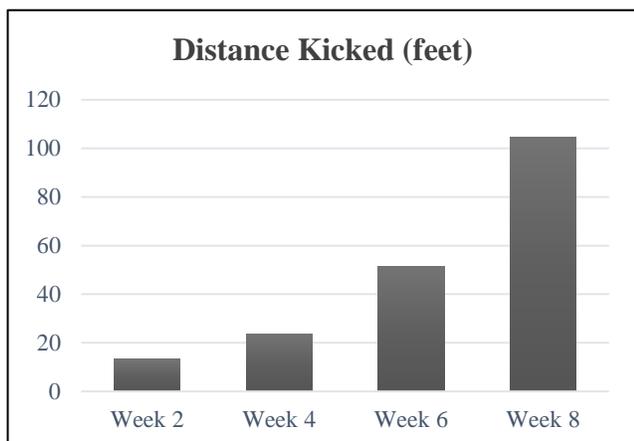
The progress of the study will be measured through the performance of the subject. Measurements include distance kicked with a kickboard and time spent with face in water. The distance was measured in feet and the time was measured in seconds. Observations on the number of repetitive motions and repetitive speech were made by the instructor. These were tallied throughout the testing lesson and totaled at the end. Assessments on how well the subject

responded to touch, facial expressions, and instruction were done by the instructor. These were ranked on a scale of 1-5, five being the best. The data on this analysis can be found on page 11. Specifics on the subject's performance were added. Possible reasons for lack of improvement were written at the conclusion of each testing week.

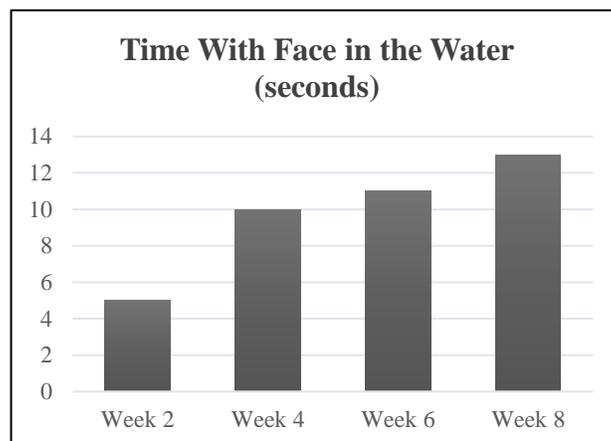
### **Ethical Considerations**

The study was approved by the Institutional Review Board, Human Subjects Review Committee. Parental consent and child consent were required before beginning the swim lessons. Risks and benefits were shared with the subject and parents, as well as being included in the consent forms. The subject and parent were informed that the lesson could stop at any time needed by either person. The results of each testing week were kept confidential to the researcher. Potential risks to the subject include drowning, hypothermia and any injury sustained while in the pool area. Injury could be due to slipping on the deck or accidentally hitting a body part on the wall. Drowning could occur if the instructor is not paying attention and hypothermia could occur if the pool is not heated correctly. Precautions to prevent these situations include checking the pool temperature, paying close attention to the subject by the parent and instructor, and explaining the rules of walking on the pool deck.

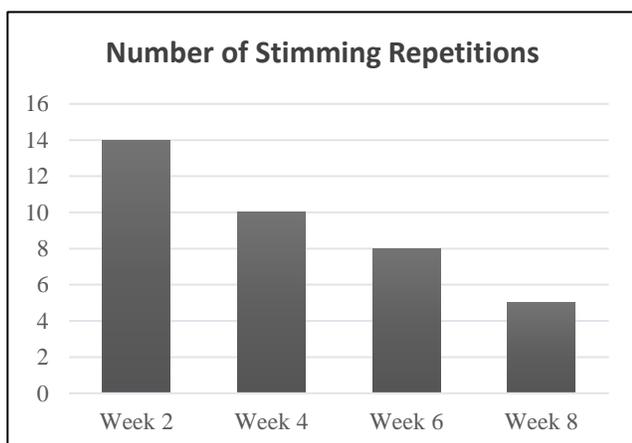
## Data



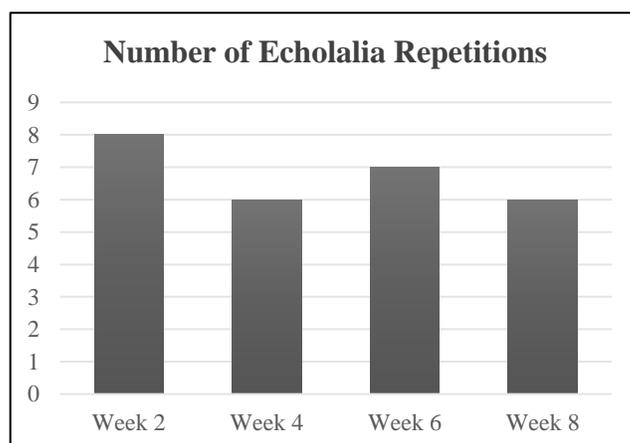
**Chart 1:** The subject kicked the flutter kick as far as possible without touching the bottom of the pool. Three attempts were allowed at each testing day. The farthest distance of all three attempts was measured using a tape measurer. The measurement was taken in feet. This value was placed on the chart for that week. This process was repeated at one lesson every two weeks.



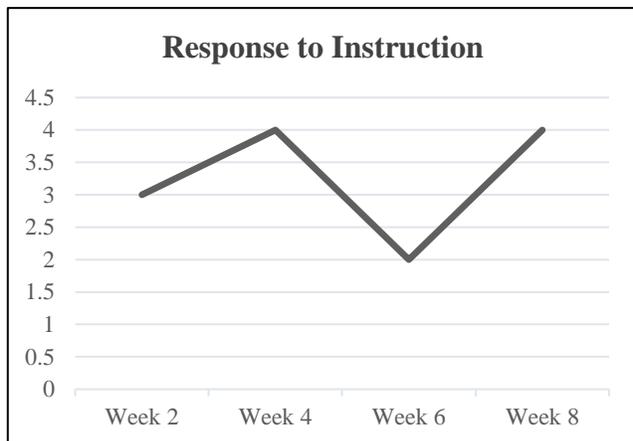
**Chart 2:** The subject placed face in the water and blew bubbles. Three attempts were allowed to give the participant time to get used to the water on their face. The longest time of the attempts was recorded. Time was taken from the pace clocks on the wall of the pool area. Time did not start until the mouth, nose and goggles touched the water. The time for that week was placed on the chart. This was repeated at one lesson every two weeks.



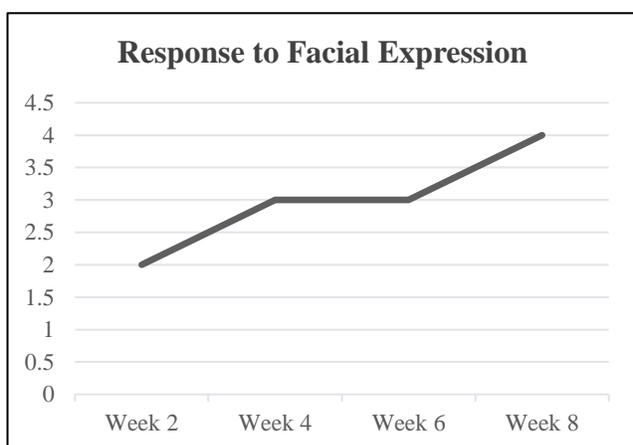
**Chart 3:** Each repeated movement was tallied by the instructor throughout each testing lesson. Total tallies were added at the end of the lesson and placed on the chart for that certain week. Repeated movements of the body were analyzed, including arm circles, jumping on one leg, and thumbs up. This was done at one lesson every two weeks.



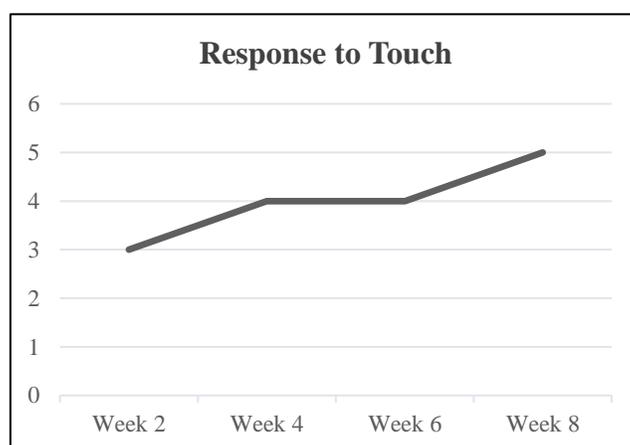
**Chart 4:** Each repeated phrase or word was tallied by the instructor throughout each testing lesson. Total tallies were added at the end of the lesson and placed on the chart for that certain week. Repeated phrases were analyzed, including “c’mon it’s cold”, “that was a warmup”, and “only one more”. This was done at one lesson every two weeks.



**Chart 5:** The instructor analyzed the subject's response to instructions given. The performance was scored on a 1-5 scale, 5 being excellent and 1 being poor. The instructor decided this subjectively, based on how well and quickly the subject followed direction for kicking, blowing bubbles and floating. The score chosen was marked on the chart for that week. Performance was scored at one lesson every two weeks.



**Chart 6:** The instructor analyzed the subject's response to facial expressions. The performance was scored on a 1-5 scale, 5 being excellent and 1 being poor. The instructor decided this subjectively, based on if the subject noticed changes in the instructor's expression, whether it be frustrated or excited. The score chosen was marked on the chart for that week. Performance was scored at one lesson every two weeks.



**Chart 7:** The instructor analyzed the subject's response to touch through assistance. The performance was scored on a 1-5 scale, 5 being excellent and 1 being poor. The instructor decided this subjectively, based on if the subject reacted well to them holding their back, hands and helping to put on goggles. The score chosen was marked on the chart for that week. Performance was scored at one lesson every two weeks.

## **Discussion**

### **Practical Applications**

As stated previously, aquatic therapy has been found to improve multiple behavioral and motor developments for children with autism. Previous studies have shown improvements in nervous, locomotive, and social interactions. This study was done to further analyze the specific improvements that go along with aquatic exercise and activity for children with autism. These specific improvements are focused on the acts of stimming, echolalia, and behavioral response. The data does show that the implementation of water interaction, through swim lessons, has decreased the number of repeated movements and speech and improved interactive behavior. According to the parent of the subject, these lessons also improved day to day living. The water interaction improved shower and bath time, specifically with the subject being more willing to get their face wet. Further research could be done to confirm more benefits, leading to an increase in treatments using aquatic intervention.

### **Contribution to Knowledge and Profession**

The results of this study can be used further in the profession of physical therapy. Aquatic therapy is a type of treatment used in this profession, therefore, the research correlates. Specifically, the study would benefit the pediatric specialty and physical therapists who work with children diagnosed with autism and autism spectrum disorder. Along with physical therapy, this knowledge could be spread and promoted to other areas. These areas could include the special education departments in school districts, occupational therapy clinics, pediatric sections of hospitals, and to parents of children with autism. Educated parents can implement aquatic activity into their child's life, helping to lower their symptoms and increase their social

interaction with the community. Healthcare must do their part to inform parents on treatments that can be fun and enjoyable for these children.

### **Limitations**

Limitations that could have caused skewed results include the presence of a spider in the pool, the pool and building temperature being cold, and the subject having to miss a lesson. During week 6 of lessons, the subject noticed a spider sitting in the gutter of the pool area. The subject became fearful that the spider would come closer. This caused the subject to avoid that area of the pool, argue with instruction if it required going to that area, and mention the spider multiple times. Over the next few weeks, the subject continued to check for spiders before entering the water. The pool used is an indoor pool and used for collegiate athletes. Because of these two factors, the pool is kept at a temperature according to USA swimming requirements and for athletes to practice without overheating. This causes the temperature to seem cooler because the sun is not shining on the water, as it would at an outdoor pool. A swim lesson had to be rescheduled due to scheduling complications. To make up for missing a Thursday lesson, an hour lesson was done the following Tuesday. This could have thrown off the pattern of progress for the subject and with a longer lesson, staying focused on the task was more difficult.

### **Recommendations for Future Research**

Future research should emphasize on how activities in the water will affect the daily living and interactions of children with autism. This study focused on movement and behavioral improvements during the lessons and how the subject progressed in water skill. A parent survey was included to evaluate progress outside of the swim lessons, but this should be the focus moving forward. Future studies should use the baseline of this study on how to administer swim lessons. Data collection would assess the child's improvements in daily living activities and

social interactions. These could include communication with classmates, brushing their teeth, or taking a bath or shower.

Limitations from this study should be addressed in future research. An outdoor pool or a YMCA style indoor pool that is heated at a higher temperature should be used. Certain insects, that the subject fears, should be moved from the area before starting each lesson. Avoiding bugs at an outdoor pool would be difficult, so being aware of how this can alter results would be necessary. Scheduling lessons needs to be done ahead of time to ensure the family will be available for each date. If a conflict arises, the instructor will need to reschedule the most efficient way for the subject and evaluate how it can alter results at the end of the study.

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## Appendix

## Learn to Swim Program Parent Survey

Please read each statement carefully and indicate your level of agreement in the columns on the right. Please place an "X" inside the box that most clearly reflects your response. If you have no experience with the subject of the statement, mark "No Opinion".

		Level of Agreement				
		Strongly Agree	Agree	Disagree	Strongly Disagree	No Opinion
1.	I feel that I have a clear understanding of the Program's goals and objectives.	✓				
2.	The Program is a safe place for my child to work, learn and have fun.	✓				
3.	The Program instructor maintains open communication with me, on my child's performance and goals for the lesson.	✓				
4.	The rules and policies on safety have been clearly communicated to me.	✓				
5.	The program leader recognizes my child's needs for comfort.	✓				
6.	There is adequate supervision provided in the Program.	✓				
7.	The Program has helped to improve my child's responsiveness to instruction.	✓				
8.	The Program has helped to improve my child's actions in daily life.	✓✓				
9.	The Program has helped to improve my child's response to expression and touch from others.	✓				
8.	The Program has helped improve the motor movements of my child.		✓			
9.	The Program has helped improve my child's language development.					✓
10.	The Program has helped to improve the overall mood of my child.	✓				
11.	I am satisfied with the instruction given to my child during each lesson.	✓				
12.	My child usually enjoys the time he/she spends in the lessons.	✓				
13.	I would recommend the Program to other parents for their children.	✓				

ammon

*Please add any comments you have about the program and how it impacted your child.*

This program has helped with so many things. Bath time is easier because he is more comfortable with getting his head wet and his confidence has gone up. He has loved everything about this experience.

## Informed Consent Agreement

Project Title: Effects of Aquatic Therapy on Children with Autism

Please read this consent agreement carefully before you decide to take part in the study.

The purpose of the study is to analyze how integration of aquatic exercise will affect the physical and emotional aspects of a child with autism. I will do this by teaching the child with autism how to swim at the Ouachita pool. My program will be based on my experience of teaching swim lessons for the past six years. I will be observing the child's posture, coordination, responsiveness to instruction, and overall mood. A comparison of behavior will be done before, during and after each lesson.

What you will do in the study: The child will attend 30-minute swim lessons twice a week for 8 weeks over the summer. They will be taught the basics of how to interact with the water, how to float, and how to swim the freestyle stroke. Their progress and improvement will be evaluated over the time period of the program.

You will spend about 30 minutes in each session. The total experiment will require about 8 hours.

The risks to you as a participant in this study are:

Risks could include drowning, hypothermia, and any injury sustained while in the pool area. Injury could happen in the pool from accidentally kicking the wall or hitting their head on the wall. Injury on the pool deck could occur from slipping on the wet ground and falling. There is a chance for hypothermia if the pool is not heated correctly and there is a chance of drowning if the instructor is not paying close attention.

The study may help us to understand the effects of aquatic therapy on children with autism and if it could be integrated in their lives to improve their health.

The participant will benefit by developing the skills for water safety and by learning how to swim. This will reduce the risk for drowning when they choose to continue swimming in the future, whether that's in the lake, ocean, or the pool. These new skills will give the parents peace of mind knowing their child is safe in the water.

The autism community can benefit from this knowledge on the potential benefits from aquatic therapy. Families could integrate swimming into their child's life if it brings them joy. Therapy clinics can also use this information to integrate into their treatment programs.

The information you provide in the study will be handled confidentially and may be assigned a code number. Any list connecting your name to this number will be secure. Regardless, your name will not be used in any report.

Your participation in the study is completely voluntary, and you have the right to withdraw from the study at any time.

You will receive no payment for participating in the study.

If you have questions or concerns about the study, please contact  
Elysian Majeske, Student  
OBU Box 3945  
410 Ouachita Street  
Ouachita Baptist University Arkadelphia, AR 71998-0001.

(870) 245-5423 Hallie Clark, Faculty Advisor  
OBU Box 3656  
410 Ouachita Street  
Ouachita Baptist University Arkadelphia, AR 71998-0001

You may contact the following person regarding your rights in this study:  
Jeanie Curry, Chair Institutional Review Board  
OBU Box 3671  
410 Ouachita Street  
Ouachita Baptist University Arkadelphia, AR 71998-0001.  
Telephone: (870) 245-5248

I have read and understand this document and have had the opportunity to have my questions answered. I agree to participate in the research study described above.

Signature or Participant: \_\_\_\_\_ Date: \_\_\_\_\_

Signature of Parent: \_\_\_\_\_ Date: \_\_\_\_\_

If you would like a copy of the aggregate results of this study, please contact the principal researcher.

# Assent Form – Ages 7 to 10

Institutional Review Board | Ouachita Baptist University

*This form is distributed to subjects in approved IRB studies who are ages 7 to 10.*

## About the Study Leader

My name is Elysian Majeske. I go to school at Ouachita Baptist University. I am inviting you to participate in a research study about the effects of aquatic therapy on children with autism.

## About the Study

Your parent knows about this study and gave permission for you to be involved. If you agree, I will ask you to attend 30-minute swim lessons twice a week for 8 weeks over the summer. You will be taught the basics of how to interact with the water, how to float, and how to swim the freestyle stroke. You will be asked to follow my instruction to the best of your ability and to follow the rules explained to you. I will analyze your progress and improvement over the time period of the program.

## About Your Participation in the Study

You do not have to be in this study. No one will be mad at you if you decide not to do this study. Even if you start the study, you can stop later if you want. You may ask questions about the study at any time. If you decide to be in the study, I will not tell anyone else how you respond or act as part of the study. Even if your parents or teachers ask, I will not tell them about what you say or do in the study.

## Agreement

Signing here means that you have read this form or have had it read to you and that you are willing to be in this study.

**Printed Name of Participant**

**Signature of Participant**

**Date**

*Your parent will receive a copy of this completed form.*

# Parental Permission Form

Institutional Review Board | Ouachita Baptist University

*This form is distributed to parents of minors participating in approved IRB studies.*

**Please read this agreement carefully before you decide to allow your child to take part in the study.**

## Project Title

Effects of Aquatic Therapy on Children with Autism

## Purpose of Study

The purpose of this study is to analyze how integration of aquatic exercise will affect the physical and emotional aspects of a child with autism. I will do this by teaching the child with autism how to swim at the Ouachita pool. My program will be based on my experience of teaching swim lessons for the past six years. I will be observing the child's posture, coordination, responsiveness to instruction, and overall mood. A comparison of behavior will be done before, during and after each lesson.

## Required Tasks in the Study

If you agree for your child to participate in the study, she or he will be asked to do the following: The child will attend 30-minute swim lessons twice a week for 8 weeks over the summer. They will be taught the basics of how to interact with the water, how to float, and how to swim the freestyle stroke. Their progress and improvement will be evaluated over the time period of the program.

## Dates of Study

June 8<sup>th</sup>, 2021 to April 15, 2022

## Location of Study

Ouachita Baptist University

## Time Commitment

Number of Sessions	16	Time Per Session (minutes or hours)	30 minutes	Total Project Time (hours)	8 hours
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## Risks of Participation

There are minimal risks and inconveniences to participating in this study. These include: Risks could include drowning, hypothermia, and any injury sustained while in the pool area. Injury could happen in the pool from accidentally kicking the wall or hitting their head on the wall. Injury on the pool deck could occur from slipping on the wet ground and falling. There is a chance for hypothermia if the pool is not heated correctly and there is a chance of drowning if the instructor is not paying close attention.

## **Safeguards**

To minimize these risks and inconveniences, the following measures will be taken:  
Rules for the pool area will be explained to the participant and to the parent before the first lesson begins. The instructor will be in the water with the participant and will always have eyes on the child. The instructor will ensure that the child's head is above the water at all times unless they are performing a task that involves their face being in the water. The parent will also be present during the lessons providing another set of eyes on the child. The parent and instructor will also make sure that the participant walks carefully on the wet pool deck to prevent slipping.

## **Benefits of Participation**

This study may help us understand the effects of aquatic therapy on children with autism and if it could be integrated in their lives to improve their health.

The participant will benefit by developing the skills for water safety and by learning how to swim. This will reduce the risk for drowning when they choose to continue swimming in the future, whether that's in the lake, ocean, or the pool. These new skills will give the parents peace of mind knowing their child is safe in the water.

The autism community can benefit from this knowledge on the potential benefits from aquatic therapy. Families could integrate swimming into their child's life if it brings them joy. Therapy clinics can also use this information to integrate into their treatment programs.

## **Compensation**

Neither you nor your child will receive payment for participating in this study.

## **Confidentiality**

Your child's responses and information will be handled confidentially and may be assigned a code number. Any list connecting you or your child's name to this number will be secure. Regardless, neither your name nor your child's name will be used in any report.

Data collected from the study will be used in a thesis paper. In the paper the words "participant", "child", or "participant's parent" will be used instead of names.

The data collected will be presented for Scholar's Day, but names will not be included.

## **Voluntary Participation**

Your child's participation in the study is completely voluntary. Your child may decline participation at any time. You may also withdraw your child from the study at any time. There will be no penalty.

## Contacts

For questions and concerns about the study, contact:

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870-245-5423

For questions regarding your rights in this study, contact:

Jeanie Curry, Chair  
Institutional Review Board  
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Arkadelphia, Arkansas 71998-0001  
  
(870) 245-5248

## Parent's Consent

By signing below, you are giving consent for your child to participate in the above study. If audio and/or video recording is involved in this study, please indicate your preference by checking one of the following options:

- I give permission for my child to be audio and/or video recorded.  
 I do not give permission for my child to be audio and/or video recorded.

**Child's Name**

**Parent's Name**

**Parent's Signature**

**Date**

*You will receive a copy of this completed form.*

*If you would like a summary of the results of this study, please contact the principal researcher.*