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Children's Adaptive Swim Instruction for Caregivers

Evelyn C. Hernandez

Children's Adaptive Swim Instruction for Caregivers

by

Evelyn Hernandez

A Capstone Project Presented to the

FACULTY OF OCCUPATIONAL THERAPY

GEORGIA STATE UNIVERSITY

In Partial Fulfillment of the

Requirements for the Degree

OCCUPATIONAL THERAPY DOCTORATE

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Capstone Final Paper Approval Form

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CAPSTONE FINAL PAPER APPROVAL FORM

The Capstone Final Paper is the final product that the OTD students need to complete to report his/her Capstone Project and his/her Capstone Experience.

Student's Name	**Evelyn C Hernandez**
Degree Sought	Occupational Therapy Doctorate (OTD)
Department	Occupational Therapy
Program	Occupational Therapy Doctorate (OTD)

We, the undersigned, recommend that the Capstone Final Paper completed by the student listed above, in partial fulfillment of the degree requirements, be accepted by the Georgia State University.

Pey-Shan Wen		4/25/2024
Faculty Mentor's Printed Name	Faculty Mentor's Signature	Date
Shea Wilhelm		4/25/24
Site Mentor's Printed Name	Site Mentor's Signature	Date
Carolyn R Podolski	Carolyn Podolski	4/25/24
Capstone Coordinator's Printed Name	Capstone Coordinator's Signature	Date

Capstone Project Approval Form

INSTITUTIONAL REVIEW BOARD

Mail: P.O. Box 3999
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February 16, 2024

Principal Investigator: Pey-Shan Wen, PhD

Key Personnel: Hernandez, Evelyn C; Wen, Pey-Shan, PhD

Study Department: Department of Occupational Therapy

Study Title: Children's adaptive swim instruction for caregivers

Review Type: Expedited Category 7

IRB Number: H24363 Reference Number: 377851

Approval Date: 02/14/2024

Status Check Due By: 02/13/2027

The Georgia State University Institutional Review Board (IRB) reviewed and approved the above-referenced study in accordance with 45 CFR 46.111. The IRB has reviewed and approved the study and any informed consent forms, recruitment materials, and other research materials that are marked as approved in the application. The approval period is listed above. Research that has been approved by the IRB may be subject to further appropriate review and approval or disapproval by officials of the Institution.

It is the Principal Investigator's responsibility to ensure that the IRB's requirements as detailed in the Institutional Review Board Policies and Procedures For Faculty, Staff, and Student Researchers (available at gsu.edu/irb) are observed and to ensure that relevant laws and regulations of any jurisdiction where the research takes place are observed in its conduct.

Federal regulations require researchers to follow specific procedures in a timely manner. For the protection of all concerned, the IRB calls your attention to the following obligations that you have as Principal Investigator of this study.

1. For any changes to the study (except to protect the safety of participants), an AmendmentFormmust be submitted to the IRB.The AmendmentFormmust be

reviewed and approved before any changes can take place.

2. Any unanticipated problems occurring as a result of participation in this study must be reported immediately to the IRB using the Unanticipated Problem Form.

3. Principal investigators are responsible for ensuring that informed consent is properly documented in accordance with 45 CFR 46.116.

   - The Informed Consent Form (ICF) used must be the one reviewed and approved by the IRB with the approval dates stamped on each page.
   - A Waiver of Assent has been approved for this study in accordance with the requirements set forth in 45 CFR 46.408(a)

4. A Status Check must be submitted three years from the approval date indicated above.

5. When the study is completed, a Study Closure Form must be submitted to the IRB.

All of the above-referenced forms are available online at http://protocol.gsu.edu. Please do not hesitate to contact the Office of Research Integrity (404-413-3500) if you have any questions or concerns.

Sincerely,

Lisa Cranwell-Bruce, IRB Member

Capstone Project Amendment Form

INSTITUTIONAL REVIEW BOARD

Mail: P.O. Box 3999
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March 06, 2024

Principal Investigator: Pey-Shan Wen, PhD

Key Personnel: Hernandez, Evelyn C; Wen, Pey-Shan, PhD

Study Department: Department of Occupational Therapy

Study Title: Children's adaptive swim instruction for caregivers

Review Type: Expedited Amendment

IRB Number: H24363 Reference Number: 378888

Approval Date: 02/14/2024

Expiration Date: 02/13/2027

Amendment Effective Date: 03/05/2024

The Georgia State University Institutional Review Board reviewed and **approved** the amendment to your above referenced Study.

This amendment is approved for the following modification(s):

- Update Flyer and Pre/Post Survey
- Add a caregiver education packet

The amendment does not alter the approval period, which is listed above, and the study must be renewed at least 30 days before the expiration date if research is to continue beyond that time frame. Any unanticipated events or problems resulting from this investigation must be reported immediately to the University Institutional Review Board.

For more information visit our website at www.gsu.edu/irb.

Sincerely,

Lisa Cranwell-Bruce, IRB Member

Acknowledgement

I am deeply grateful to my faculty advisor, Pey-Shan Wen, whose guidance, and mentorship have been invaluable throughout my capstone project journey. I am equally indebted to my site mentor, Shea Wilkey, whose unwavering dedication to fostering inclusive environments and expertise has significantly contributed to the development of this project.

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To my partner, family, and friends, I owe an immeasurable debt of gratitude. Your unwavering love, encouragement, and belief in me have helped me throughout my clinical doctorate journey. I would not have been able to do this without you all.

Thank you.

Abstract

Aquatic interventions have emerged as an effective therapeutic approach for children and youth with disabilities. However, accessibility remains limited due to various factors, such as limited facilities, lack of public funding, or insurance coverage. To address this accessibility gap, this capstone project developed a caregiver group adaptive aquatic swim program within an Occupational therapy framework. Through an Occupational Therapy framework, caregivers can acquire practical insights into functional and sensory interventions, enhancing their ability to support their children in aquatic settings. This capstone project explores whether providing caregivers of children with disabilities with instructional adaptive aquatic swim lessons will increase their knowledge and ability to implement the program independently with their children either at home or in aquatic environments. These project objectives include the development of an adaptive aquatic program with integrated caregiver education, piloting the program, and providing guides for the program implementation at a local community center. The program's effectiveness was measured through an initial and post-survey, measuring caregiver adaptive aquatic knowledge and confidence. This capstone project aimed to enhance the understanding of adaptive aquatics for caregivers of children with disabilities while creating safe aquatic recreation environments. Long-term potential gains are to help future adaptive aquatic instructors and curriculum developers provide efficient and evidence-based adaptive aquatic lessons.

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Summary

Background/ Problems

Therapeutic aquatic exercise programs have been found to be highly effective in pediatric settings because they provide a playful and motivating approach to physical activity while also supporting the physical, social, and emotional well-being of children and youth (Güeita-Rodríguez et al., 2018; Muñoz-Blanco et al., 2020). Studies have shown that therapeutic aquatic exercise programs can be highly beneficial for children and adolescents with physiological, chronic conditions, and developmental differences, including Cerebral Palsy (CP), Autism Spectrum Disorder (ASD) , Attention-deficit/hyperactivity disorder (ADHD), Global Developmental Delays (GDD), Down Syndrome (DS), Serious Mental Illness (SMI), and Acute Lymphoblastic Leukemia (ALL) (Alaniz et al., 2017; Boer & de Beer, 2019; Elnaggar & Mohamed, 2021; Lai et al., 2015; Seoane-Bouzas et al., 2022).

However, these programs are often not widely available due to their specialized nature, resulting in limited facilities that offer accessible aquatic programming, a lack of public financing, and challenges in obtaining insurance coverage (Güeita-Rodríguez et al., 2018). A solution to this problem may be to provide caregivers with therapeutic adaptive aquatic education programming in group settings. Caregiver aquatic programming can help increase the availability of adaptive aquatic programming within the community and bridge the information gap between aquatic therapists, instructors, and caregivers of children with disabilities.

Purpose

The purpose of this capstone project is to make adaptive aquatic programming more accessible in the community while creating safe aquatic recreation environments through the development of a caregiver adaptive aquatics swim program. Specifically, this capstone project

will explore whether providing caregivers of children with disabilities with instructional adaptive aquatic swim lessons they can independently implement with their children will increase the caregiver's knowledge and carryover of the program implementation at home or in aquatic settings.

Specific Aims / Learning Objectives and Outputs

Learning Objective 1: Student will familiarize themselves with the Carl E. Sanders Family YMCA location and their needs.

Learning Objective 2: Student will develop an aquatic caregiver education program and present to site mentor and capstone mentor.

Learning objective 3: Student will implement a pilot aquatic caregiver education program for a total of 5 weeks at the Carl E. Sanders Family YMCA.

Learning Objective 4: Student will survey caregivers to obtain information on caregiver adaptive aquatic program experience.

Learning Objective 5: Student will revise pilot program, finalize program paper for final submission to OTD program.

Short-term / Long-term impact

This capstone's short-term goal is to develop an adaptive aquatic program with caregiver education and to pilot the adaptive aquatic program and provide guidelines for the program implementation at a local community center. The goal is to enhance caregivers of children with disabilities understanding of adaptive aquatics while creating safe aquatic recreation environments. This capstone's potential long-term impact will help future adaptive aquatic instructors and curriculum developers provide efficient and evidence-based adaptive aquatic lessons.

Chapter 1

Literature Review

Currently, over 3 million children are living with a disability in the United States of America (U.S.), which accounts for 4.3% of the population under the age of 18 (Young & Crankshaw, 2021). Children with disabilities in the U.S. often receive various rehabilitation services such as Physical Therapy, Occupational Therapy, Speech Therapy, and other recreational programs. Research has shown that aquatic interventions are an effective alternative form of therapy and therapeutic aquatic exercise program for children and youth with disabilities. It has demonstrated similar outcomes, if not more significant, than land-based therapies. A single-blind, quasi-experimental prospective study with 24 participants with cerebral palsy found aquatic therapy effective, even for children with poor Gross Motor Function Classification System levels (Lai et al., 2015). Two qualitative studies involving children with cerebral palsy, their parents, special education teachers, and healthcare professionals suggest that aquatic therapy can lead to improvements in an array of areas, such as reduced muscle tone, increased attention, better communication, greater self-awareness, and improved autonomy (Güeita-Rodríguez et al., 2018; Muñoz-Blanco et al., 2020). Additionally, some parents also saw improvements in their children's activity and participation due to the resulting increased mobility, balanced engagement, and play (Güeita-Rodríguez et al., 2018).

Recreational aquatic activities such as Aqua-PLYO exercises, which involve dynamic strength training exercises like jumping, hopping, and bounding while taking advantage of water properties such as buoyancy and viscosity, have shown promising results. A prospective single-blinded quasi-experimental study with 30 participants indicated that incorporating these exercises can help improve bone health, increase functional capacity, and promote a better quality of life in

long-term survivors of childhood acute lymphoblastic leukemia while being more enjoyable and increasing interest in overall exercises, in addition to regular physical therapy (Elnaggar & Mohamed, 2021).

Aquatic interventions have also shown positive results for social, behavioral, emotional, and physical function and improvements in water safety and aquatic skills for children and youth with autism spectrum disorder (Alaniz et al., 2017; Güeita-Rodríguez et al., 2021; Mortimer et al., 2014; Munn et al., 2021; Pan, 2011; Vodakova et al., 2022). Improvements in water safety and aquatic skills are significant for all children, especially for children and youth with autism spectrum disorder; according to the National Autism Association, drowning was the leading cause of death for children with autism spectrum disorder in 2009, 2010, and 2011, "accidental drowning accounted for 91% of total U.S. deaths reporting in children with autism spectrum disorder ages 14 and younger subsequent to wandering/elopement"(*Autism & Safety Facts* 2023). Unlike children without disabilities, children with disabilities are more likely to experience nonfatal and fatal drowning, which is the reason why it is essential for all children, especially children with disabilities, to receive adaptive aquatic programming (*Drowning prevention & facts*, n.d.). Research conducted by Alaniz and the college's aquatic-based occupational therapy pilot program revealed that children with autism spectrum disorder demonstrated improved water safety and swim skills following only 8 hours of weekly 1-hour intervention (Alaniz et al., 2017). These improvements were observed among children with mild to severe autism spectrum disorder. Similarly, Munn and colleagues found that a 5-day 45 to 60-minute adapted learn-to-swim program resulted in increased swim levels among a cohort of children with autism spectrum disorder and secondary diagnoses such as attention-deficit/hyperactivity disorder apraxia,

epilepsy, language delay, oppositional defiant disorder, sensory processing disorder, and speech impairments, among other diagnoses (Munn et al., 2021).

Evidence has also shown that aquatic programs can significantly positively impact the health of adolescents with down syndrome. Naczk and colleagues found that a 33-week water-based exercise and swimming program significantly increased the aerobic capacity, improvement in static arm strength, truck strength, endurance/functional strength, and aquatic skills in the experimental group versus the control group of adolescents with down syndrome (Naczk et al., 2021). These programs can improve their aerobic capacity, strength, and swimming skills, potentially reducing their risk of developing age-related and chronic conditions at an earlier stage (Boer & de Beer, 2019; Naczk et al., 2021).

The effects of aquatic intervention can be categorized as mechanical and thermal. Mechanical effects can be categorized into buoyancy, hydrostatic pressure, and hydrodynamic force, which can help slow down movements, giving children more grace with poor gait, balance, and muscle tone, as well as motor planning and control and balance (Bates & Hanson, 1996). The mechanical properties, such as buoyancy and hydrostatic pressure, can also provide children with autism spectrum disorder with a robust sensory-stimulating environment, allowing them to self-regulate, increasing focus and attention, and creating an optimal learning environment. Thermal properties such as water temperature can improve soft tissue elasticity, reduce pain, and decrease spasticity, often seen in children with cerebral palsy. These mechanical and thermal properties make aquatic therapy and instruction an effective modality to help children with physical impairments such as cerebral palsy or motor learning difficulties and sensory stimulation conditions such as autism spectrum disorder and down syndrome (Alaniz et al., 2017; Güeita-

Rodríguez et al., 2018; Güeita-Rodríguez et al., 2021; Lai et al., 2015; Mortimer et al., 2014; Munn et al., 2021; Muñoz-Blanco et al., 2020; Pan, 2011; Vodakova et al., 2022).

Many specialized aquatic programs that cater to children with disabilities are not easily accessible. Parents point to limited facilities, lack of public funding, and insurance coverage issues as the root of the inaccessibility in Gueita-Rodriguez and college's qualitative study, where they explored caregivers of children with disabilities' experiences with aquatic programs (Güeita-Rodríguez et al., 2018). Providing caregivers with therapeutic adaptive aquatic education programming in group settings can be a potential solution to address this challenge. Caregiver aquatic programming can help increase the availability of adaptive aquatic programming within the community and bridge the information gap between aquatic therapists, instructors, and caregivers of children with disabilities.

This issue falls into the occupational therapy practice domain, which aims to foster clients' health, well-being, and active participation in life through meaningful engagement in various occupations, including aquatic activities and adapted swimming programs ("Occupational Therapy in the Promotion of Health and Well-Being," 2020). With an emphasis on creating inclusive environments, Occupational Therapists play an essential role in ensuring that individuals of all abilities can access and benefit from such programs ("Inclusive Environments: Home, Work, Public Spaces, Technology, and Specialty Environments within Occupational Therapy Practice," 2023). By giving clients, the necessary support, adaptations, and education, Occupational Therapists can empower them to lead safe and fulfilling lives, particularly when addressing critical areas such as drowning prevention, water safety, and swimming proficiency. By offering caregivers tailored adaptive aquatic swim lessons through an Occupational Therapy framework,

caregivers can acquire practical insights into functional and sensory interventions, enhancing their ability to support their children in aquatic settings.

Purpose

The purpose of this capstone project is to develop a caregiver adaptive aquatics swim program that makes adaptive aquatic programming more accessible in the community while creating safe aquatic recreation environments. The project aims to explore whether providing caregivers of children with disabilities with instructional adaptive aquatic swim lessons will increase their knowledge and ability to implement the program independently with their children either at home or in aquatic settings.

Research Question

1) Will a five-week, children's adaptive swim instruction program for caregivers with children with disabilities increase their adaptive aquatics knowledge?

2) After five- weeks, will the caregivers feel confident independently carrying over the program with their child?

Chapter 2

Site Description

The Carl E. Sanders Family YMCA has partnered with Extra Special People, a community program in Watkinsville, to bring more accessible programs to the Atlanta metro area. The research team worked with the YMCA to create and pilot the Caregiver Adaptive Aquatic Program. This program aims to provide adaptive swim instruction for caregivers and children, making aquatic programs more accessible in the metro Atlanta community. The center features various amenities, including indoor and outdoor pools, childcare, an indoor track, and tennis/pickleball courts. It is an excellent location for developing and implementing the Caregiver Adaptive Aquatic Program. The community center serves a diverse membership base and continuously strives to offer accessible services to its diverse community, ensuring safe aquatic recreational environments for individuals with diverse abilities.

Recruitment

Participants for the Caregiver Adaptive Aquatic Program were recruited through flyer distribution. These flyers contained all the necessary information, such as the purpose of the capstone project, its location, inclusion criteria, the type of participation needed from the participants, and the meeting dates and times. The flyers also had a QR code that participants could scan to receive a phone call or email for a screen. Upon scanning the QR code, the participants were directed to a Qualtrics form requiring their name, email, and convenient phone number. Subsequently, the participants were contacted by the student principal investigator (SPI) for a screening at their convenience. During the screening call or email, SPI reviewed the inclusion and exclusion criteria with the participants and confirmed if they met the requirements.

Participants: Inclusion/exclusion criteria

Screen: Participants were screened for this capstone project based on the following inclusion and exclusion criteria.

Table 1. Caregivers/Parents Inclusion Criteria

Caregivers/Parents Inclusion criteria	Caregivers/Parents Exclusion criteria
1) Over 18 years of age 2) Caregiver to a child with disabilities between ages 3 to 12 3) Able to understand English	1) Caregiver having open wounds 2) Caregiver being incontinent

Table 2. Children's Inclusion Criteria

Children Inclusion criteria	Children Exclusion criteria
1) Child with a disability between ages 3 to 12 2) Able to understand English	1) Child having open wounds 2) Child being incontinent

Intervention

Program Development Procedure

To develop the Caregiver Adaptive Aquatic Program curriculum, a combination of research articles focused on aquatic programming while utilizing the tools and education provided by the Level 3 Adaptive Swim Whisperer® certification program, an online training resource for aquatic professionals created by a physical and occupational therapist duo. The overall resources primarily centered on children and young adults with diagnoses such as autism spectrum disorder, down syndrome, cerebral palsy, and attention-deficit/hyperactivity disorder.

The focus topics for the Caregiver Adaptive Aquatic Program were established as general mental adjustment, water safety, and basic swimming skills following researcher Vodakova, who established these areas of focus in her aquatic program centering children with autism spectrum disorder following the Water Orientation Test Alyn 1 (WOTA 1) (Vodakova et al., 2022). The WOTA 1 is an aquatic functional assessment test that evaluates individual's aquatic environment competence based on the Halliwick concepts with satisfactory internal consistency, test-retest reliability (Tirosh et al., 2008; Vicente et al., 2019). The Halliwick concept is a standard and popular approach used "to teaching all people, in particular, focusing on those with physical and/or learning difficulties, to participate in water activities, to move independently in water, and to swim" by many aquatic instructors and therapists within the aquatic field (Alaniz et al., 2017; Gresswell et al., n.d.; Lai et al., 2015; Muñoz-Blanco et al., 2020; Seoane-Bouzas et al., 2022; Vodakova et al., 2022)

The skills targeted within each focus topic were selected based on detailed program description by researchers Alaniz, Güeita-Rodriguez, Munn and the Swim Whisperer® methodology and are as follow, general mental adjustment: sensory modulation, splashing water and prone and supine positions response, water safety: entering and exiting the pool by stairs and deck, pool deck navigation, and basic swimming skills: breath control, propulsion, floatation, changing positions and core strength (Alaniz et al., 2017; Güeita-Rodríguez et al., 2021; Munn et al., 2021; Tisser & Freedman, 2023, n.d.). The mentioned skills have resulted in an improvement in water safety skills, physical competence, functional abilities, especially those with low experience with water with no adverse effects (Alaniz et al., 2017; Güeita-Rodríguez et al., 2021; Munn et al., 2021; Tisser & Freedman, 2023, n.d.)

Table 3. Caregiver Adaptive Aquatic Program Focus Topics and skill breakdown

Caregiver Adaptive Aquatic Program Focus Topics and skill breakdown		
Skills		Activities
General mental adjustment	Sensory modulation	Splashing water Warm-up activities (w/ barbell or song) Prone and supine positions
Water safety	Entering and exiting the pool routine	Entering/exiting via stairs & via pool deck
	Pool navigation	Holding & navigating along the pool deck
Basic swimming skills	Breath control	Blowing bubbles on the surface of the water Bringing individual facial features to the surface of the water Blowing bubbles while underwater
	Propulsion	Prone kicking with equipment (barbell or noodle) with & without caregiver Prone alternate scooping with equipment (barbell, dumbbells, or toys) with & without caregiver
	Floatation	Supine flotation with caregiver and/or equipment aids (noodle or neck-doodle)
	Changing positions	With & without caregiver and equipment (barbell, dumbbells, or noodles)
	Core strength	Trunk rotation Supine, sitting, and prone positioning on noodle

The Caregiver Adaptative Aquatic Program's mission is to make adaptive aquatics more accessible in the community while creating safe aquatic recreational environments for individuals with diverse abilities. This program prioritized water safety and basic swim skills while also educating caregivers on those skills about the properties of the water and the sensory system. Caregivers were educated on the sensory integration framework, prioritizing proprioception, and the vestibular senses. Evidence has shown that incorporating sensory activities within swim instruction can increase focus, attention, and overall program enjoyment (Güeita-Rodríguez et al., 2018; Güeita-Rodríguez et al., 2021; Mortimer et al., 2014; Muñoz-Blanco et al., 2020).

Program implementation (dose)

The Caregiver Adaptive Program curriculum was split into three sessions based on age: the first session for ages 3 to 5, the second for ages 6 to 8, and the third for ages 9 to 12. The curriculum was divided by age to remain age appropriate. Program participants met once a week for five weeks in a group format, with each session lasting 40 minutes. Children were present during the program, but the study was designed to teach parents/caregivers of children with disabilities adaptive aquatic techniques to enhance their knowledge of adaptive aquatics, enabling them to implement the program independently with their child. The program was led by Evelyn Hernandez, student principal investigator, Occupational Therapy student, and Level 3 Adaptive Swim Whisperer® aquatic certified instructor with five years of experience working in adaptive aquatics.

Each adaptive aquatic session consisted of three main parts. The beginning of the aquatic caregiver lesson focused on introducing that day's focus topics and goals, followed by transitioning into the water. The second part of the lesson consisted of in-water warm-up activities such as a

social song or barbell activity, target skills: general mental adjustment, water safety, and basic swimming skills, followed by a cool-down social activity and caregiver education. Finally, the end of the session focused on transitioning out of the water and Q and A time allotment caregiver questions. Each skill was adaptive based on the caregiver's child's skill and need, focusing on grading activities to create the "Just right challenge" for each child and caregiver.

At the end of the 5-week Caregiver Adaptive Aquatic Program, caregivers were given a take-home adaptive aquatics education packet that synthesized the material learned and skills worked on throughout the program.

Instruments for Evaluation

The study assessed the effectiveness of the caregiver adaptive aquatic program through initial and post-online surveys administered via the Qualtrics platform. Participants accessed the survey using a QR code provided to them. Data collected through Qualtrics was securely stored on a server accessible only to the principal investigator and student principal investigator.

The survey encompassed initial demographic inquiries, questions regarding general water properties, sensory experiences, behavioral observations, involvement levels, and satisfaction ratings. By comparing participants' responses before and after participating in the adaptive aquatic program, the study aimed to evaluate the program's overall effectiveness.

Chapter 3

Results

Program recruitment and attendance

A total of 12 participants were recruited for this pilot program, 6 of whom were caregivers and their respective children. The program attendance rate for the five weeks was 67%, with an average of 8 participants per week and no dropouts.

Table 4. Program attendance rate

	Attendance rate
Week 1	8 out of 12 (67%)
Week 2	8 out of 12 (67%)
Week 3	6 out of 12 (50%)
Week 4	12 out of 12 (100%)
Week 5	6 out of 12 (50%)
Overall attendance rate 8 (67%)	

Survey

The initial and post-survey were distributed to caregivers by email through the community centers, swim program welcoming and goodbye letters via a QR code. The initial survey response rate was 83%, receiving 5 out of 6. The post-survey response rate was 50%, receiving 3 out of 6.

Table 5. Survey response rate

	Survey response rate
Initial Survey	5 out of 6 (83%)
Post Survey	3 out of 6 (50%)

Demographics

Overall, 12 participants were recruited for this pilot program: 6 children (ages 4 to 12, dig: autism spectrum disorder, Down syndrome, developmental delay, and cri du chat, gender: 3M/3F, race/ethnicity: 2 White, 2 Black/African American, and 2 Hispanic) and 6 caregivers (ages 27 to 42, gender: 6F, race/ethnicity: 2 White, 2 Black/African American, and 2 Hispanic).

Table 6. Children demographics

	Initial survey (n=5)	Post survey (n=3)
Age		
3 to 5	3 (60%)	3 (100%)
6 to 8	0 (0%)	0 (0%)
9 to 12	2 (40%)	0 (0%)
Gender		
Male	3 (60%)	2 (67%)
Female	2 (40%)	1 (33%)
Race/Ethnicity		
White	1 (20%)	1 (33%)
Black/African American	2 (40%)	0 (0%)
Hispanic	2 (40%)	2 (67%)
Diagnosis		
ASD	3 (60%)	2 (67%)
Down Syndrome	0 (0%)	1 (33%)
Cri Du Chat	1(20%)	0 (0%)
Developmental Delay	1 (20%)	0 (0%)

Table 7. Caregiver survey demographics

	Initial survey (n=5)	Post survey (n= 3)
Age		
18 to 20	0 (0%)	0 (0%)
21 to 30	1 (20%)	0 (0%)
31 to 42	3 (60%)	3 (100%)
Gender		
Male	0 (0%)	0 (0%)
Female	5 (100%)	3 (100%)
Race/Ethnicity		
White	1 (20%)	1 (33%)
Black/African American	2 (40%)	0 (0%)
Hispanic	2 (40%)	2 (67%)

Adaptive Aquatic Knowledge

General adaptive aquatic knowledge was divided into two categories: general water properties and sensory system knowledge. The charts below compare the initial and post-survey results, with each letter representing a participant.

General water property knowledge

Below are the general water property knowledge questions and answers for the initial and post-survey. The correct answers were buoyancy, hydrostatic pressure, viscosity, surface tension, and streamline.

Table 8. General water property knowledge

	Initial survey (n=5)	Post survey (n=3)
We know water has unique characteristics. To your knowledge, what are the properties of water? Select all that apply. **Buoyancy (1)** **Hydrostatic pressure (1)** **Viscosity (1)** **Surface Tension (1)** **Streamline (1)** Polarization (-1) Amplitude (-1)	A = 2 B = 0 C = 2 D = 0 E = 1 F = Missing	A = Missing B = Missing C = Missing D = 1 E = 0 F = 2

Total correct answer possible = 5, correct answers = 1, incorrect answer = -1

General sensory system knowledge

Below is the general sensory knowledge question and answers for the initial and post-survey. The correct answers were proprioception, interoception, and vestibular sense. Participants showed increased general sensory knowledge when comparing the initial and post-survey.

Table 9. General sensory knowledge

	Initial survey (n=5)	Post survey (n=3)
Apart from the traditional 5 senses of the human body (taste, smell, hearing, touch, and sight) to your knowledge, what are the other 3 hidden senses of the human body? **Proprioception (1)** **Interoception (1)** **Vestibular (1)** Speed (-1) Temperature (-1)	A = -1 B = -1 C = 3 D = 3 E = 3 F = Missing	A = Missing B = Missing C = Missing D = 3 E = 3 F = 1

Total correct answer possible = 3, correct answers = 1, incorrect answer = -1

Caregiver aquatic routine confidence

Below are the caregiver aquatic routine confidence questions. In the initial survey, caregivers mentioned, through a fill-in-the-blank elaboration section, that they mostly felt unprepared when teaching their kids water safety and swimming skills.

Table 10. Caregiver aquatic routine confidence

	Initial survey (n=5)	Post survey (n=3)
In a pool setting, how confident are you independently teaching your child swim skills (ex, front float, back float, rollovers, freestyle, backstroke)? Very Confident (2) Somewhat Confident (1) Not Confident (0)	A = 0 B = 0 C = 1 D = 0 E = 0 F = Missing	A = Missing B = Missing C = Missing D = 0 E = 1 F = 1
How confident are you with your child's swimming skills? Very Confident (2) Somewhat Confident (1) Not Confident (0)	A = 0 B = 1 C = 0 D = 0 E = 0 F = Missing	A = Missing B = Missing C = Missing D = 0 E = 1 F = 0

*Very confident = 2, somewhat confident = 1, and not confident = 0)

Construct of satisfaction (only for post survey)

The satisfaction construct was analyzed during the post-survey phase to assess participants' overall contentment with the program, employing close-ended and open-ended questions. Most participants were satisfied with the program, stating that the information provided was easily digestible and expressing confidence in their ability to apply the adaptive swimming techniques. Many indicated their willingness to recommend the program to others. Open-ended questions were included in the survey to get a comprehensive understanding of parents' satisfaction with the program. Responses were categorized into themes to highlight aspects participants appreciated or found lacking. Participants praised the instructor's teaching style, the engaging presentation of information, and the interactive play that facilitated skill acquisition. One participant remarked, "Exceeded expectations! Taught true skills in addition to playing," while another appreciated the "Good environment" fostered by the program.

Participants valued the intimate setting of small group sessions and the personalized attention offered, all at no cost. However, a common concern raised was the water temperature, which some deemed too cold. Participants expressed a desire for warmer water in future sessions.

Table 11. Construct of satisfaction close-ended questions

Post survey close-ended questions (n=3)		
Was the material presented in the caregiver adaptive aquatic program easy to understand?	Yes Maybe No	3 (100%) 0 (0%) 0 (0%)
Do you feel confident in your adaptive aquatic knowledge after the caregiver adaptive aquatic program?	Yes Maybe No	3 (100%) 0 (0%) 0 (0%)
Do you feel confident carrying over the material learned in the caregiver adaptive aquatic program independently?	Yes Maybe No	3 (100%) 0 (0%) 0 (0%)
Would you recommend this caregiver adaptive aquatic program to friends and colleagues?	Yes Maybe No	3 (100%) 0 (0%) 0 (0%)
Would you participate in another caregiver adaptive aquatic program?	Yes Maybe No	1 (33%) 2 (67%) 0 (0%)

Chapter 4

Discussion and Impact

This capstone project aimed to develop a group caregiver adaptive aquatics swim program, thereby enhancing the accessibility of adaptive aquatic programming within the community while creating safe aquatic recreation environments. Addressing concerns highlighted by parents in Gueita-Rodriguez and college's qualitative study, which identified challenges such as limited facilities, lack of public funding, and insurance coverage issues hindering access to specialized aquatic programs for children with disabilities (Güeita-Rodríguez et al., 2018), this capstone project sought to bridge these gaps. In collaboration with the Carl E. Sanders Family YMCA's community center, the Caregiver Adaptive Aquatics Program was developed and piloted, offered free of charge to participants. The project aimed to explore whether providing caregivers of children with disabilities with instructional adaptive aquatic swim lessons for 5-weeks would increase their knowledge in adaptive aquatics and their ability to carry over the program independently with their child.

Research questions

1) *Will a five-week children's adaptive swim instruction program for caregivers with children with disabilities increase their adaptive aquatics knowledge?*

The assessment of adaptive aquatic knowledge was categorized in two main concepts: general water properties and sensory systems. However, due to the low and inconsistent survey response rate for the initial and post survey adaptive aquatic knowledge, no concrete conclusion can be drawn.

In future studies, prioritizing in-person survey completion would ensure comprehensive data collection and address any questions or concerns participants may have. Additionally, exploring alternative teaching and learning techniques for presenting adaptive aquatic knowledge to caregivers is essential. While this study predominantly utilized verbal instruction and supplemented it with a visual PDF packet distributed at the end of the program, investigating various instructional methods could enhance caregiver comprehension and retention of information.

2) *After five- weeks, will the caregivers feel confident independently carrying over the program with their child?*

Based on survey results, participation in the Caregiver Adaptive Aquatics Program left caregivers feeling more confident in independently carrying over the program routine. They particularly appreciated the small group setting, which allowed intimate practice and discussions of skills and topics. With a maximum of five caregivers and five children per session held consistently, the program provided a stable routine appreciated by both caregivers and children.

Caregivers expressed satisfaction with the instructional approach, encouraging an open learning environment and creating a sense of community among parents of children with disabilities. They found the program playful yet educational, appreciating the focus on water safety and basic swimming skills.

Future studies should prioritize creating an open and welcoming learning environment, ensuring instructors are thoroughly trained to teach adaptive aquatics programs with a strong

emphasis on intentional skill instruction. Maintaining low-class ratios and offering free, low-cost classes can further enhance accessibility.

Caregivers identified water temperature as an area for improvement, highlighting in the open-ended portion of the satisfaction construct that the water was often too cold. To address this concern, future programs could consider utilizing warmer pools, such as therapeutic or outdoor pools, during the summer months. Additionally, caregivers could be encouraged to bring their children in wetsuits for all sessions to help mitigate discomfort.

Limitations

It should be noted that the Caregiver Adaptive Aquatic Program had a limited sample size and a low survey response rate. Only a few diagnoses, such as autism spectrum disorder, cerebral palsy, developmental delay, and cri du chat, were observed among the child participants. The caregivers in the study were mainly female and had no males, likely due to the limited sample size. Future studies would benefit from a larger sample size of caregivers and children with disabilities. Another area for improvement in this capstone project would be the program's length, which was only 5 weeks due to time constraints. Future studies could benefit from a more extended program of at least 8 weeks, similar to Alaniz and colleagues' pilot program that saw improvements in water safety and skill skills after only 8 hours of weekly interventions, or perhaps a 5-week intensive continuous program, such as with Munns and colleagues' ISWIM program (Alaniz et al., 2017; Munn et al., 2021).

Sustainability Plan

For the Caregiver Adaptive Aquatics Program to be sustainable and accessible within the Carl E. Sanders Family YMCA's community center, the principal student investigator will provide the final program lesson plans, caregiver education packets, program flyers, and recommended equipment to purchase will be given to the community center aquatic director. After speaking with the site's aquatic director, the aquatic program is estimated to run again mid-summer and will be instructed by the aquatic director, who is now certified in the Adaptive Swim Whisperer® aquatic methodology, or a trained adaptive aquatic instructor.

It is important for instructors planning to teach this adaptive aquatic program to receive the course in adaptive aquatics apart from their swim instructor training, such as the Swim Whisperer® adaptive aquatic methodology course, an online training resource for aquatic professionals created by a physical and occupational therapist. The training resource covers topics such as the sensory system, properties of the water, common diagnoses seen within adaptive aquatics, and how to incorporate swimming skills while also considering the sensory system and water properties.

Thanks to the Carl E. Sanders Family YMCA partnership with Gas South, the Caregiver Adaptive Aquatics Program will remain free, aiming to increase the accessibility of the aquatic program for more families with children with disabilities within metro Atlanta.

Conclusions

In conclusion, this capstone project aimed to enhance the accessibility of adaptive aquatic programming within the community while fostering safe aquatic recreation environments through the development of a caregiver adaptive aquatics swim program. By investigating whether instructional adaptive aquatic swim lessons for caregivers of children with disabilities could increase their knowledge and ability to implement the program independently, the project sought to address a significant gap in community-based aquatic therapy services. The short-term impact of this project focused on gathering information on caregivers' adaptive aquatic knowledge and their application of program-acquired skills through the development and piloting of the Caregiver Adaptive Aquatics Program. The program's effectiveness was evaluated by comparing initial and post-survey results, focusing on assessing curriculum effectiveness and overall implementation to ensure sustainability within the YMCA community center.

The potential long-term impact of this capstone project is to provide insights and guidelines for future adaptive aquatic instructors and curriculum developers to contribute to delivering efficient and evidence-based adaptive aquatic lessons. Ultimately, this project aims to improve the quality of life for children with disabilities and their caregivers by enhancing access to therapeutic aquatic activities and promoting inclusive recreational opportunities within the community.

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Appendix 1: Learning Objectives

Specific Aims/Learning Objectives and outputs

I. *Learning Objective 1: Student will familiarize themselves with the Carl E. Sanders Family YMCA location and their needs.*

- **STG 1A:** Student will tour the Carl E. Sanders Family YMCA location with the Aquatic director (site mentor) and will establish the pool space that will be used during the pilot group.
- **STG 1B:** Student will complete a needs assessment interview with the Carl E. Sanders Family YMCA aquatic director to establish what they are looking to have in this aquatic program and program parameters.
- **STG 1C:** Student will complete onboarding training and background check required by the Carl E. Sanders Family YMCA.

II. *Learning Objective 2: Student will develop an aquatic caregiver education program and present to site mentor and capstone mentor.*

- **STG 2A:** Student will complete a detailed literature review on aquatic therapy and adaptive aquatic swim lessons.
- **STG 2B:** Student will complete addition level 2 and level 3 online adaptive swim whisperer certification program provided by the Swim Anglefish agency
- **STG 2C:** Student will create a draft of the aquatic caregiver education program and will present to site mentor and capstone mentor
- **STG 2D:** Student will create final aquatic caregiver education program

III. *Learning objective 3: Student will implement a pilot aquatic caregiver education program for a total of 5 weeks at the Carl E. Sanders Family YMCA.*

- **STG 3A:** Student will screen participant that will participate in the *pilot aquatic caregiver education program.*
- **STG 3B:** Student will implement the pilot aquatic caregiver program during March 2024

IV. *Learning Objective 4: Student will survey caregivers to obtain information on caregiver adaptive aquatic program experience.*

- **STG 4A:** Student will develop the pre and post survey and present to faculty mentor and will create a QR code containing the GSU Qualtrics link for the survey.
- **STG 4B:** Student will provide caregivers with the initial program survey via a GSU Qualtrics QR code.
- **STG 4C:** Student will provide caregivers with the post program survey via a GSU Qualtrics QR code.
- **STG 4D:** Student will synthesize data from the pre and post pilot caregiver aquatic education program.

V. *Learning Objective 5: Student will revise pilot program, finalize program paper for final submission to OTD program.*

- **STG 5A:** Student will synthesize data gathered from caregiver survey and personal experience with the pilot program.
- STG 5B: Student will draft capstone project paper and present to faculty member
- STG 5C: Student will finalize and submit capstone project paper to GSU