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Aquatic Therapy: An Interprofessional Resource Focusing On Children With Developmental And Intellectual Disabilities

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AQUATIC THERAPY: AN INTERPROFESSIONAL RESOURCE FOCUSING ON CHILDREN WITH DEVELOPMENTAL AND INTELLECTUAL DISABILITIES

by

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APPROVAL PAGE

This scholarly project, submitted by Mackenzie Martha Brokaw in partial fulfillment of the requirements of the Degree of Occupational Therapy Doctorate from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.

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PERMISSION

Title: Aquatic Therapy: An Interprofessional Resource Focusing on Children with Developmental and Intellectual Disabilities

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Mackenzie Martha Brokaw
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TABLE OF CONTENTS

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ABSTRACT

Background

Children with intellectual and developmental disabilities (I/DD) experience impairments with physical development, learning, language, and behavior (Center for Disease Control and Prevention [CDC], 2021b). These impairments lead to impacts with day to day functioning and meaningful occupations such as play, education, social participation, and activities of daily living (ADLs) (CDC, 2021b). Occupational therapy has the skilled knowledge to assist with these challenges from a variety of approaches. Aquatic therapy is one tool shown to be beneficial as the physical properties of water create an environment that can be very supportive to an individual and their needs (Pocius & Riley, 2019).

Purpose

There are limited aquatic play-based resources focusing on the pediatric population. In addition, access to therapy pools can be restricted due to the high cost, lack of knowledge, and limited aquatic facilities. Therefore, the purpose of this scholarly project is to create a resource for therapy practitioners to reference in providing fun aquatic therapy services to children with I/DD. The author speculates that the creation of the interprofessional aquatic resource will enhance the performance range of children with disabilities when participating in meaningful occupations on land.

Methods

A thorough literature search was conducted finding articles related to the aquatic benefits for children with I/DD. Through examining various research articles, emotional regulation,

motor coordination, strength, brain development, and positive effects on the sensory system were a primary theme. The Ecology of Human Performance (Dunn, 2017; Dunn, Brown, McGuigan, 1994) was the theoretical framework used to organize the information and guide development of this resource.

Conclusion

The aquatic environment provides multiple therapeutic benefits for children with disabilities. These therapeutic experiences facilitate the opportunity for children to generalize these therapeutic benefits to performing and participating in meaningful occupations occurring on land. This product was created to provide interprofessional practitioners with a play based aquatic resource to be implemented with children with I/DD. The resource also serves to educate caregivers on the therapeutic benefits of aquatic environments for children with disabilities.

CHAPTER I

Introduction

Problem Statement

Aquatic therapy is a service that is limited in many communities due to the lack of space, high cost, maintenance, seasonal changes, and knowledge. The author has paired with an outpatient clinic located in a town with limited access to aquatic therapy services. Aquatic therapy pools and swimming pools can act similarly, however, therapy pools house accessible and supportive equipment as well as thermodynamic properties to support an individual's needs. The community currently has a water park that is open to the public in the summertime, several hotels with indoor swimming pools, and a university with a recreational pool for students to utilize. In addition, some housing units on the local college campus and housing developments in town have swimming pools for residents.

Aside from the number of swimming pools available to the public, the only aquatic therapy pools in town are located at the hospital and the outpatient clinic the author has paired with. These facilities require either a referral, paying a daily fee, or obtaining a membership for aquatic access. The therapy pool at the hospital is located on the second floor in the therapy department. Access to the therapy pool is challenging, requiring individuals to park in the visitors parking lot, enter from the main entrance, and make their way to the therapy department on the second floor. This can also be very intimidating to some that may have a fear of hospitals or doctors' offices. The outpatient clinic the author has paired with is one story and has a parking lot in front of the main entrance of the building. There is also a separate door at the front of the building directly from the therapy pool to the parking lot which makes for an easy exit following an aquatic therapy session. The outpatient clinic provides physical therapy, occupational therapy, and sports medicine to individuals across the lifespan with a variety of needs. Occupational

therapy is provided to the pediatric population mostly through contract with the school districts, however, the outpatient clinic does have pediatric clients that come into the clinic for services. With the limited knowledge and access to aquatic therapy in the community, the outpatient clinic is the perfect site to create a resource for the interprofessional team to use with the pediatric population, in addition to land-based therapy services that are already provided.

Purpose

The purpose of this project is to provide an interprofessional aquatic resource built on the basis of the Ecology of Human Performance (EHP; Dunn, Brown, & McGuigan, 1994) framework for the interprofessional team at the outpatient clinic. The intent of this resource is to not only support the interprofessional team with motivating play-based activities, but to support the pediatric population with intellectual and developmental disabilities (I/DD) through use of an aquatic context. The aquatic context will support sensory, cognitive, and motor functioning, enhance social participation, breathing skills and support community integration in children to reach developmental and therapy goals.

Objectives

The overall goal of the aquatic resource is to enhance the performance range of the pediatric population when participating in meaningful occupations. The author has established five project objectives.

1. The child will demonstrate increased sleep duration throughout the night by 1 hour by the end of 8 aquatic sessions.
2. The child will utilize breathing technique for 10 seconds by the end of 8 aquatic sessions to increase self-regulation.

3. The child will increase motor coordination demonstrated through 5 consecutive balloon bats by the end of 8 aquatic sessions.
4. The child will demonstrate increased strength by 1 manual muscle test (MMT) grade in 8 sessions for functional independence in daily life.
5. The caregiver will identify 3 benefits to the aquatic therapy service by the end of 8 sessions.

Theoretical Framework

The author chose the EHP framework to guide the pediatric aquatic resource. EHP was developed by Winnie Dunn in 1980 and focuses on the dynamic relationship between the person, context, and task to enhance the individual's overall performance range (Dunn, 2017; Dunn et al., 1994). The person brings past experiences, personal values and interests, in addition to sensorimotor, cognitive, and psychosocial skills. The context consists of a set of interrelated conditions that surround the person and can both support and inhibit an individual. The task includes observable behaviors that allow an individual to meet a goal. EHP also serves as an interdisciplinary framework that utilizes common terminology designed to be used and understood by the interprofessional team. The term “task” is common in everyday language and more easily understood. The author has created the aquatic resource for the interprofessional team, not just exclusively for occupational therapy. EHP has 5 intervention approaches including establish/restore, adapt/modify, create, prevent, and alter. These approaches are designed to help improve or widen an individual's performance range by applying the approaches to the concepts of EHP to better fit the needs of an individual (Dunn, 2017). The following chapters will help guide the reader in a better understanding of EHP’s application to program development as it relates to children with (I/DD) and aquatic therapy.

Significance

Pediatric aquatic therapy is a safe and effective modality that can be used in conjunction with or separate from land-based therapy (Lai et al., 2014). Occupational therapy has the skilled knowledge to integrate aquatic therapy as a tool alongside land-based therapy.

Overview

Chapter II includes an extensive literature review with evidence-based content supporting the effects of aquatic therapy and children with I/DD. Chapter III includes the methodology of the scholarly project and use of theoretical framework, timeline, procedures, ethical considerations, and inclusion and exclusion criteria. Chapter IV is a narrative of the product including the purpose, guiding theory, organization, and implications. Chapter V includes a summary of the scholarly project, strengths and limitations to the product, and future recommendations.

CHAPTER II

Literature Review

Children with developmental and intellectual disabilities experience impairments with physical development, learning, language, and behavior areas (Center for Disease Control and Prevention [CDC], 2021b). These impairments lead to impacts with day to day functioning and meaningful occupations such as play, education, social participation, and activities of daily living (ADLs). The percentage of children diagnosed with developmental and intellectual disabilities has increased between 2009 and 2017, and with this growth there is a need for accessibility of services and interventions to improve long-term outcomes for those diagnosed (Zablotsky et al., 2019). Land based occupational therapy interventions are often used to address these challenges, however aquatic therapy has also been utilized. While aquatic therapy has shown to be supportive for children with developmental and intellectual disabilities in a variety of social, physical, and behavioral ways, there is limited data (Caputo et al., 2018; Vonder Hulls & Francesoni, 2009). In addition, access to this type of service can be challenging due to the cost and lack of therapy pools. This emphasizes the need to make available and expand aquatic therapy services for children with disabilities.

Occupation/Occupational Therapy

Occupations are activities carried out every day that people need and want to do. They can be completed individually, with family and friends, or in the community to bring meaning and quality to everyday life. Occupations are crucial to a client's health, identity, and sense of skill and ability (American Occupational Therapy Association [AOTA], 2020b). Occupational therapy helps individuals across the lifespan to do the things they want and need to do through the therapeutic use of daily activities. Occupational therapists are skilled in the transactional

relationships between clients, occupations, and the context to facilitate engagement and functional performance in meaningful occupations. Occupational therapy services can be provided for habilitation, rehabilitation, and promotion of health and wellness for clients across the lifespan with disability or non-disability related needs (AOTA, 2022b). As a collaborative client centered practice, the client is a vital team member when it comes to their plan of care.

Aquatic Therapy

Aquatic therapy is a creative and unique approach to therapy allowing clients to maximize function in a completely new environment. Aquatic therapy is used as a form of exercise or therapeutic treatment that is carried out in the water. The physical properties of water create an environment that can be very supportive to an individual and their needs (Dumas & Francesoni, 2001). Aquatic therapy provides a dynamic sensory environment with vestibular stimulation, auditory feedback, proprioceptive feedback, and many other benefits for self-regulation, confidence, and improved functional independence (Dumas & Francesoni, 2001). According to Pocius and Riley (2019), aquatic therapy can be used as a safe addition or an alternative to land-based therapy due to the water's viscosity and buoyancy. The zero-gravity effect allows for unique positioning of the client in ways that may not be safe or practical when on land. The properties in the water provide support for clients in many aspects such as cardiovascular and muscle endurance (Pocius & Riley, 2019). Most aquatic therapy pools are heated to 88-94 degrees Fahrenheit, which allows for joint flexibility, range of motion, and improvements to circulation (Laskowski, 2020; Pocius & Riley, 2019; Sherlock, 2012). Some therapy pools also have resistance jets which help to improve static and dynamic

balance (Lim, 2020). Aquatic therapy can be just as individualized as therapy on land and is used across the lifespan with a variety of populations.

Occupational Therapy and Aquatics

The ultimate goal of occupational therapy is to increase functional independence as well as increase satisfaction, performance, and engagement across the lifespan with activities that are motivating and most meaningful to the client. With the beneficial properties aquatic therapy provides, occupational therapists and other professions such as physical therapy and speech therapy utilize this service to help meet therapy goals along with therapy provided on land. The activities performed in the water provide a significant carry over effect onto land (Ballington & Naidoo, 2018).

Theoretical Framework

The Ecology of Human Performance

The Ecology of Human Performance (EHP) is a framework that considers the relationship between the person, context, and task (Dunn, 2017). The person construct is described as a person's abilities and experiences, along with the sensorimotor, cognitive, and psychosocial skills of an individual. The task includes behaviors that are observable allowing an individual to accomplish an overall goal. The context is the interrelated conditions surrounding a person. The dynamic interaction between these three concepts impacts the client's overall performance. A therapeutic approach is selected and utilized to increase an individual's performance range. The five therapeutic approaches consistent with EHP include establish/restore, alter, adapt/modify, prevent, and create (Dunn, 2017).

The *establish/restore* approach focuses on a change within the person factor and aims to improve the person's skills that were present prior to a problem or those that have not been

integrated. For example, a child who has not had postural reflexes integrated will need to work to establish the reflex by use of therapeutic activities for learning and development.

The *alter* approach focuses on a change within the context in which the person performs the task. For example, an individual with mobility difficulties may move from a two-story home to a single level home, therefore the context has been altered to support the clients' needs and support independence with meaningful tasks. An aquatic example of this includes moving from a 75-degree swimming pool without jets to a therapy pool of 90 degrees and can provide resistance with jets.

The *adapt/modify* approach requires a change or modification to the context or task the client is performing. For example, an individual with a history of falls may need adaptations/modifications to the home environment by removing loose rugs and installing grab bars and a shower bench to eliminate the risk of a fall. An aquatic example of this includes modifying the environment by adding drop in pool steps, grab bars, or adapting the activity by increasing weight or by moving from the shallow end to the deeper end.

The *prevent* approach is used to reduce the development of performance problems that are occurring. For example, a therapist may have a child take a break during challenging activities to prevent behaviors and promote self-regulation. An aquatic example of prevention includes reducing fall risk during land therapy by carrying out activities in the water.

Lastly, the *create* approach focuses on "creating circumstances that support optimal performance for populations" (Dunn, 2017, p. 217). An aquatic example of create would include allowing individuals from the community of all abilities to participate in an aquatic program. The development of an aquatic therapy program for all populations is an example of

utilizing the create approach. The goal of each intervention approach is to support performance needs and keep the interests of the person at the center of therapy (Dunn, 2017).

Person

The target population for this aquatic resource includes children ages 3-10 with developmental or intellectual disabilities. A developmental delay is defined as "a delay in meeting developmental milestones in one or more streams of development in comparison to peers of the same age. Children with delays are assessed in "expressive and receptive language, including social communication; visual problem solving; motor development; neurobehavioral development; and social emotional development" (Ying Ying, Agarwal, How How, & Padmini Yeleswarapu, 2019, p. 119). Intellectual disabilities are defined by below average cognitive abilities compared to peers and experiences in emotional, behavioral, or mental health difficulties (Mora, Sebille, & Neill, 2018). The target population may include, but is not limited to, individuals with attention deficit hyperactivity disorder (ADHD), autism spectrum disorder (ASD), cerebral palsy (CP), down syndrome (DS), and Angelman syndrome (AS).

attention deficit hyperactivity disorder.

Attention deficit hyperactivity disorder (ADHD) is a chronic condition leading to attention and distractibility difficulties, hyperactivity, and impulsivity or emotional reactivity. Individuals may also experience sensory sensitivities and avoidance (Little, Dean, Tomchek & Dunn, 2018). Movement related skills and difficulty with fine motor, especially bilateral coordination, may also be present in children with ADHD (Dail & Smith, 2016). These behaviors show implications for participation in daily activities and are linked to decreased social participation and school performance (Little et al., 2018).

According to Dail and Smith (2016), children with ADHD would benefit from aquatic therapy in a variety of ways. Because children with ADHD are distracted by external stimuli the water can be used as a barrier to sound. When submerging your ears in the water, sound is blocked out, allowing the child to focus on therapeutic activities to support motor development carried out in the pool. Wearing goggles during aquatic therapy is also a great tool as it creates a tunnel vision effect allowing the child to focus on the activity at hand. Many children with ADHD take medications that are stimulants, non-stimulants, or antidepressants. These medications also cause side effects such as low appetite, insomnia, aggressiveness, or irritability especially when the medication wears off. The physical activity from aquatic therapy may help to eliminate the intake of prescribed medication (Dail & Smith, 2016).

autism spectrum disorder.

Autism spectrum disorder (ASD) is a developmental disability caused by differences in the brain (CDC, 2021a). Children with ASD experience increased sensory sensitivities such as sensory seeking or sensory avoiding behaviors. Children may also experience challenges with auditory processing, communication, social interaction, and gross motor skills (Walsh, Kemp, & Woodson, 2021). Mealtime, community activities, and many other daily occupations are just a few examples that may be impacted by the day-to-day challenges of ASD (Little et al., 2018).

Children with ASD would benefit from aquatic therapy because of the consistent sensory input that is provided throughout the session. The sensory system includes visual, auditory, tactile, olfactory, gustatory, vestibular, proprioceptive, and interoception. All these senses provide stimuli from the environment and send impulses to the brain resulting in a behavioral response (Star Institute, 2022). Responses to sensory input can look different for many individuals. Over responsiveness to sensory stimuli or a child with hyperactivity may present

difficulty with selecting and attending to important input in the environment and filtering out background input. For example, a child that is overly aware of noises (whispers of students, cars outside, etc.) may not be able to focus on the teacher's voice in a classroom resulting in disruptions to learning (Middletown Centre for Autism, 2022). Common behaviors of those that are over responsive show defensiveness, avoidance, distractibility, sensory overload, avoids close proximity to others, and may become easily upset (Middletown Centre for Autism, 2022). Under responsiveness to sensory stimuli or a child that is hyporeactive refers to the inability to register sensory input. This may display as low registration or sensory seeking, clinically presenting as disengaged, lethargic, slow processing of information, becoming more alert and engaged in active and multisensory activities, and difficulty completing work (Middletown Centre for Autism, 2022). Sensory seeking presents as enjoying fast movement, frequently fidgets, touches objects and people, enjoys rough play, and swinging in a chair (Middletown Centre for Autism, 2022). Sensory based therapies help organize the sensory system so that individuals can maintain attention to tasks, respond to their environment, and participate in positive social interactions. A benefit of aquatic therapy is the constant pressure on a child's body while submerged in the water (Adapt and Learn, 2018). In addition, the warmth of the water provides a calming effect on the sensory system resulting in increased sleep patterns and decreased hyperactivity following therapy.

Water play has been reported by parents as a favored activity for many children with ASD (Walsh et al., 2020). Drowning in water is also the leading cause of accidental death for individuals with ASD and occupational therapy is positioned to develop effective interventions to address water safety and skills (Alaniz, Rosenberg, Beard, & Rosario, 2020). In a recent study, Alaniz et al. (2020) studied the effects of group occupational aquatic therapy on water safety and

social skills in children with ASD. They found that children with mild to severe autism can achieve water safety skills within 8 hours and peak skill performance observed after 16 hours. The learned skills include breath control, propulsions, and changing positions while in the water. Aquatic based occupational therapy addresses several childhood occupations and is a promising and lifesaving intervention for children with ASD, allowing children to safely participate in a desired family occupation (Alaniz et al., 2020; Walsh et al., 2020).

Aquatics are a powerful sensory stimulus for children with ASD. There is an improvement to behavior which may include reduced aggression, reduced stereotypical movements, reduced opposition, improved emotional state, improved willpower, increased coordination and dexterity, and improved communication between play partners (Musiyenko, Chopyk, & Kitzlo, 2020). An additional benefit for individuals with ASD participating in aquatic therapy is an improvement in cardiorespiratory functioning (Caputo et al., 2018).

A recent mixed method study conducted by Gueita-Rodriguez et al. (2021) explored the benefits of aquatic therapy for children with ASD. The study results revealed that the greatest potential benefits of aquatic therapy included stimulation and vocalization of language, improved tolerance of physical contact, increased eye contact, and improved self-confidence. These benefits can have a holistic effect on relationships with peers and siblings and a greater social acceptance (Gueita- Rodriguez et al., 2021).

cerebral palsy.

Cerebral Palsy (CP) is a disorder that presents at birth causing abnormal brain development. CP affects movement, muscle tone, and posture contributing to abnormal gross and fine motor function, abnormal motor control, reduced joint range of motion, disturbed bone and joint development, and reduced muscle elasticity (Akinola, Gbiri, & Odebiyi, 2019). Individuals

with CP have difficulties with walking, feeding, swallowing, coordinated eye movements, articulation of speech, musculoskeletal function, behavior, and participation in society. Strengthening, stretching, balance, and functional tasks are used for rehabilitation with individuals with CP (Akinola et al., 2019).

Aquatic therapy is beneficial with this population because the water provides antigravity positioning for weight reduction and decreased compression on joints, resulting in a more fluid active movement for children who have difficulty with activities on land. For example, stretching is reported as the most painful type of exercise to individuals with CP (Akinola et al., 2019), however the warm temperatures in aquatic therapy help with muscle relaxation allowing for improved passive range of motion (PROM) through pain free stretching. Lasting effects for 3 - 6 months following aquatic intervention have shown improvements in walking efficiency, lower limb muscle strength, and reduced spasticity (Akinola et al., 2019). Aquatic therapy also provides improvements to the cardiorespiratory systems for individuals with CP (Bairaktaridou et al., 2021).

trisomy 21.

Trisomy 21 or down syndrome (DS) is a genetic disorder associated with delays in physical growth, mild to moderate intellectual disabilities, and characteristic facial features. Individuals with down syndrome experience poor visual acuity, stress on joints which can cause dislocations, hypotonicity, hypermobile joints, poor motor planning skills and gait, poor social communication skills and participation, and developmentally slow learning (Gordon, Schanzenbacher, Case-Smith, & Carrasco, 1996). In addition, the lungs of children with down syndrome do not develop as fully compared to the general population resulting in difficulty with breathing and endurance (National Down Syndrome Society, 2022).

In a recent pilot study, nine children with DS participated in an aquatic physical therapy 8-week program. Balance, gait, and strength activities were carried out over the 8 weeks. The children with DS that participated in the program showed improvements in overall functional ability while in the water as well as a transfer of balance skills while on land (Hartlage, Nicholson, Silvius, & Ennis, 2021). Aquatic therapy is a great modality to improve balance and strength in individuals with DS.

Individuals with down syndrome may also experience sensory integration challenges (Barbu et al., 2021). Professionals have encouraged individuals with down syndrome to take part in activities to improve the sensory system, specifically targeting visual and auditory skills, to increase inclusion and social adaptation (Barbu et al., 2021). Aquatic therapy provides a multi-sensory experience that individuals with down syndrome may strongly benefit from in order to increase participation and engagement in occupation.

angelman syndrome.

Angelman syndrome (AS) is a genetic disorder affecting the nervous system causing developmental delays, ataxia, speech deficits, sensitivity to heat, vision difficulties, toe walking and jerky movements, seizures, short attention span and poor concentration (Williams, Driscoll, & Dagli, 2010). Individuals with Angelman syndrome express excessive smiling and laughter while having difficulty with sleeping, feeding, and social participation (Williams et al., 2010).

Children with AS show a preference for activities with water related objects or activities which can be connected to a sensory compulsive behavior. Water fascination is described as loving to swim and take baths, enjoying moving water, and or bubbles. Individuals with AS may benefit from aquatic therapy as water is motivating and the aquatic elements will help with

hypotonia, hypertonia, spasticity, and contracture as they age, as well as address sensory needs (Grieco, Romero, Flood, Cabo, & Visootsak, 2018).

client factors.

The previous paragraphs on diagnosis specific symptomatology contribute to our understanding of client characteristics that may be unique to a specific diagnosis as well as characteristics that may be similar across diagnoses. Viewing these characteristics from an occupational therapy lens is better situated and explored by focusing on client factors. Client factors are capabilities, characteristics, or beliefs that lie within the person, group, or population and influence performance in occupations (AOTA, 2020b). Client factors that may be impacted in individuals with intellectual and developmental disabilities (I/DD) include challenges in mental functions, sensory functions, cardiovascular and respiratory functions, neuromusculoskeletal and movement-related functions, and voice and speech functions. See Table 1 for a list of diagnoses and the client factors that may be impacted. There are many commonalities and overlap among the client factors and diagnoses. An aquatic therapy program and environment may positively impact the client factors thus enhancing participation in everyday occupations for individuals with I/DD (AOTA, 2020b).

Table 1: Client factors impacted with intellectual and developmental disabilities

Specific Client Factors Impacted	ADHD	Autism Spectrum Disorder	Cerebral Palsy	Trisomy 21	Angelman
Mental Functions	X	X		X	X
Sensory Functions	X	X		X	X
Neuromusculoskeletal and Movement-Related Functions		X	X	X	X
Cardiovascular, hematological, immune, and respiratory system functions		X	X	X	
Voice and speech functions; digestive, metabolic, and endocrine system functions; genitourinary and reproductive functions		X – voice/ speech	X – voice/ speech	X – voice/ speech	X – voice/ speech
Skin and Related Structure Functions					

Task

Tasks are behaviors or activities that are completed to accomplish a goal and can be combined to form a child's occupation (Dunn, 2017). Many occupations of the pediatric population can be grouped within the following areas of occupation: play, self-care, sleep, education, and social participation. It is important for children to engage in play as it builds performance skills that later facilitate engagement in leisure and work (AOTA, 2020b). Self-care skills such as feeding, dressing, toileting, and bathing contribute to the development of motor skills, cognition, and independence. With this, children also develop qualities such as patience, concentration, self-help, cooperation, and self-discipline. Education includes activities that are necessary for exploration and learning and take place in a formal and informal setting (AOTA,

2020b). Social participation involves participation at home and in the community with family, friends, and peers (AOTA, 2020b). Lastly, sleep is the foundation for occupational performance and engagement in everyday life (AOTA, 2022a). Sleep is a restorative occupation that helps a person recover for daytime occupations (Ho & Siu, 2018). The tasks that make up these occupations include many different aspects. For example, a child's occupation of education is made up of many tasks. These tasks may require activities with multistep directions, sequencing, various motor and coordination skills, sitting in a chair, or canceling out distractions in order to fully participate in and perform the occupation of education. The more tasks the child can accomplish the better they are able to perform those meaningful occupations, thus increasing their performance range.

Context

The context refers to the environment or conditions a person is surrounded by and can be an aspect that provides both supports and barriers to an individual's performance in occupations (Dunn, 2017). The context is a critical and continuously changing influence on an individual and is a key factor when intervention planning. When the context is interpreted incorrectly, it could lead to inappropriate choices with therapeutic interventions (Dunn, Brown, & McGuigan, 1994). The four contextual factors to consider include temporal, physical, social, and cultural.

temporal.

The temporal context includes the "aspects of chronological age, developmental stage, life cycle, and health status" (Dunn, 2017, p. 212). The temporal context of the pediatric population is their age and depends on the developmental stage of each pediatric client. For children with I/DD, health related challenges and developmental delay may be present throughout their life. The temporal context can be supportive to an individual as they may

perform better earlier in the day than later when completing tasks. A barrier to this may also relate to time of day or be due to the delayed developmental stage of an individual and the inability to perform age-appropriate tasks at the same time as their peers.

physical.

The physical context includes the "natural and fabricated environments along with the objects within one's context" (Dunn, 2017, p. 212). The physical context for the pediatric population includes school, home, outpatient therapy clinics, outside/ playgrounds, and aquatic therapy pools. A barrier to the physical context may include lack of appropriate equipment needed for an individual such as stairs or a lift for entrance into an aquatic pool. A support to the physical environment may include a therapy pool that already has all modifications and adaptive equipment needed for optimal performance.

social.

The social context includes "family, friends, clubs, churches, governments, and other places where people engage with each other" (Dunn, 2017, p. 212). The pediatric population of the outpatient clinic includes friends, family, church, and the community. A barrier of the social context may include limited exposure to peers for developmental learning. A support may be increased social communication skills when surrounded by peers, family, and the community.

cultural.

The cultural context includes "ethnic, religious, organizational, and other groups that contribute to a person's sense of identity or set of expectations or rules of behaviors" (Dunn, 2017, p. 212). The cultural context for the pediatric population at the outpatient clinic includes the community in which they live and other groups in which they may belong. A barrier of the cultural context may include limited exposure or acceptance to new cultures or experiences. A

support may be that the individual is surrounded by others with similar beliefs and values, forming a sense of community and acceptance.

Performance Range

The performance range refers to the number of tasks or occupations available to a person based on the interaction between that person and their context (Dunn, 2017). Children with I/DD can be challenged with the tasks of play, social participation, education, self-care, and sleep. These tasks take place in a variety of contexts including home, school, healthcare facilities, and the community. By introducing an aquatic program to this population, clients will be exposed to a new context with supportive aquatic properties to increase performance and carry over to everyday activities on land. The aquatic context will encourage sensory integration and motor coordination, enhance social participation, strength, brain development, breathing skills and support community integration in children to reach developmental and therapy goals.

EHP Application to Program Development

The EHP framework was selected to aid in the development of a pediatric aquatic therapy resource in an outpatient therapy clinic. By altering the context from land to water, providers will work with children with I/DD in a context that is supportive to the child. Depending on the task carried out in the aquatic environment, the person's abilities will vary and may require some adaptation or modification to the task. The aquatic environment will support the development of new skills that will transfer over to occupations carried out on land. Lastly, EHP is an interdisciplinary model which will aid in the development of the aquatic resource at an outpatient therapy clinic. Further description of the application of EHP to program development can be seen in Chapter Four.

Conclusion

Children with I/DD will benefit from an aquatic therapy resource with a focus on safety, strength, motor coordination, sensory input, brain development, and breathing skills. The properties of the water provide numerous benefits to address the sensory system, overall strengthening, behavior, and increased performance in daily occupations carried out on land. The lack of accessibility to and education on the benefits of aquatic therapy demonstrates the need for this resource. The resource will support the pediatric population served by an outpatient therapy clinic.

CHAPTER III

Methodology

Introduction

The author of this scholarly project began by choosing a topic that was of interest and meaning to gain a better understanding of occupational therapy and aquatic therapy. The author saw opportunity with an outpatient clinic through online research and set up a time to meet and discuss the area of interest. Following research and acknowledging the benefits of aquatic therapy with various populations, the author's targeted population was narrowed down to children with intellectual and developmental disabilities (I/DD). I/DD encapsulates a broad range of conditions. After further research of specific disabilities such as attention deficit hyperactivity disorder, autism, cerebral palsy, Angelman syndrome, and down syndrome; aquatic benefits were then identified for each with much overlap. The Ecology of Human Performance (EHP; Dunn, Brown, & McGuigan, 1994) framework was chosen to support the scholarly project and outline program development. The purpose, goals, and objectives of the aquatic resource were then established. This helped to develop the informational handout, pre/posttest assessment, consent form, and caregiver questionnaire. Activities were developed to support the goals of the program through evidence-based research and implementation experience through eight aquatic sessions for a small group and one on one during the month of March 2022.

Theoretical Framework

The author chose EHP to theoretically structure the aquatic resource. EHP is an interdisciplinary model and uses the term task rather than occupation (Dunn, 2017). This is a term that is more common in everyday language and the framework is more comprehensible for other disciplines to understand. EHP focuses on the dynamic interaction between the person,

context, task, and this interaction establishes the individual's performance range. EHP follows five intervention approaches including establish/restore, prevent, adapt/modify, create, and alter. These approaches are applied to the person, context, and or task to increase performance range and allow for engagement in meaningful occupations. The person, a child with I/DD, is supported by the context through the use of aquatic properties and skilled services provided by the occupational therapy student. The tasks are observable behaviors that allow an individual to complete a goal (Dunn, 2017). For example, a child who is completing an aquatic session may work on upper extremity strengthening, cognitive development, and fine motor skills through the use of an obstacle course in the water. All of these tasks support education and a goal targeting handwriting. If the child has a hard time with a specific task such as sequencing during the obstacle course, the performance range is not as wide making handwriting and the overall occupation of education much more challenging. The goals and objectives for this resource were not only based on the needs identified in the literature, but also the EHP framework.

Timeline

The timeline of the scholarly project began with idea generation during semester five of the eight semester occupational therapy doctoral program. The pairing of the doctoral experiential placement (DEP) took place at the end of semester seven. The DEP began semester eight where collaboration and idea generation continued between the author and site mentor. Product development began during week three. Product implementation took place week 9-13. Product evaluation was completed throughout week 14.

Procedures

Searches were conducted on aquatic therapy and the benefits of this service with children with I/DD. Articles were gathered through the electronic databases with an inclusion and

exclusion criteria. Evidence was gathered and a literature matrix was created during semester six and seven of the doctoral occupational therapy program. An outline for a literature review was developed following semester seven and supportive evidence was put into the literature review from the matrix. The literature review draft was then submitted to the author's advisor for review and feedback. The author observed the site mentor at the schools for potential candidates to participate in the implementation of the aquatic sessions during week two of the DEP. An educational handout was then created for caregivers as an invitation to take part in the eight-session program. Once the educational handout was complete, the author took it to the school district director for approval. After approval, the director typed up a letter to attach to the handout. The letter included information on supporting graduate students and the aquatic opportunity. The caregiver educational handouts were delivered to the school and the paraprofessional sent them home with the children the author had observed during week two of the DEP. Four emails and a verbal interest from a client at the outpatient clinic was received. A caregiver questionnaire, pre/posttest, and consent form were also created for those that wanted to take part in the program. Documents were sent out and returned prior to the start of the first aquatic session. The author then reviewed the documents to gather an understanding of each child. The author chose to create a small group session with three of the children and a one-on-one session with the fourth child. The aquatic activities were planned the day prior to the sessions. Chapters one through five and the product itself were written and edited throughout the implementation weeks. Caregivers were informed to fill out the post-test following the last aquatic session. The author then used the information from the pre-test and post-test to evaluate performance over the four weeks. This information was then added to the end of the product.

Meetings with the author's advisor and site mentor took place monthly and weekly for check-ins and needed support.

Inclusion and Exclusion

The electronic databases the author used for development of the aquatic program and literature review included CINAHL, Pubmed, and Google Scholar. One government resource was utilized, and this was the Center for Disease Control and Prevention (CDC). Experts in the field included the author's site mentor and a pediatric textbook resource. Professional organizations that were explored included the American Occupational Therapy Association (AOTA) and the scholarly journals, American Journal of Occupational Therapy (AJOT), Official Journal of the American Academy of Pediatrics, Singapore Medical Journal, The Journal of Aquatic Physical Therapy, Journal of Physical Education, Recreation, and Dance, Journal of Autism and Developmental Disorders, Journal of Sport and Kinetic Movement, African Journal of Disability, and the International Journal of Advanced Research in Medicine. Keywords and terms that were searched when completing research include "Aquatic therapy AND Occupational therapy," "Aquatic therapy AND Children," "Hydrotherapy and Autism," "Aquatic therapy AND ASD," "Aquatic therapy AND Autism Spectrum Disorder," "Aquatic therapy AND land therapy," "aquatic physiotherapy," and "aquatic therapy AND skills AND safety," "aquatic therapy AND developmental delays," and "aquatic therapy AND developmental delay AND occupational therapy". The inclusion criteria of the research conducted included articles published in English, and articles related to pediatrics and aquatic therapy. The exclusion criteria included articles that were not related to pediatrics, published prior to 2011 unless deemed valuable and articles written in a language other than English.

Ethical Considerations

The author utilized principles from the American Occupational Therapy Association (AOTA) Code of Ethics throughout the project (AOTA, 2020a). This included nonmaleficence, autonomy, veracity, and justice. Examples of autonomy include caregivers filling out consent forms, information kept confidential through separate emails rather than mass emails to protect the privacy of the children and families, voluntary participation, and the ability to withdraw at any time. Examples of justice throughout the DEP included sending the caregiver handout through a readability scan prior to dissemination to assure content was clear and easy to understand for all reading levels and obtaining approval by key stakeholders prior to the start of caregiver handout dissemination. An example of nonmaleficence included having a tech to help with safety and activities in the water for the group sessions. Lastly, an example of veracity included citing information correctly, paraphrasing, and sharing appropriate knowledge throughout the scholarly project and program development.

CHAPTER IV

Product Overview

The pediatric aquatic therapy resource, titled *Aquatic Therapy: An Interprofessional Resource Focusing on Children with Developmental and Intellectual Disabilities*, has been created for the interprofessional team to reference when working with the pediatric population. It is not a step-by-step guide; however, it is a resource that can be easily referenced to individualize therapy sessions depending on the client's needs and therapy goals.

Purpose

The purpose of the aquatic therapy resource is to provide the interprofessional team with skilled activities that can be carried out in the therapy pool with the pediatric population. The properties of water create an environment that can be very supportive to an individual and their needs (Dumas & Francesoni, 2001). Some of these properties include the hydrostatic pressure, viscosity, warmth, resistance, and buoyancy of water. Aquatic therapy provides a dynamic sensory environment supporting vestibular stimulation, auditory and proprioceptive feedback, in addition to many other benefits for self-regulation and functional independence (Dumas & Francesconi, 2001). The hydrostatic pressure and resistance of the water provides support for the cardiovascular system and for muscular strength and endurance supporting individuals in their everyday activities (Pocius & Riley, 2019). Aquatic therapy has also shown to have lasting effects following a session by demonstrating increased concentration, attention span, and sleep. The goal of the resource is to enhance the performance range of the pediatric population when participating in meaningful occupations.

There are five objectives that have been created for the resource. All activities in the resource have been constructed to support in the development of these objectives.

1. The child will demonstrate increase sleep duration throughout the night by 1 hour by the end of 8 aquatic sessions.
2. The child will utilize breathing technique for 10 seconds by the end of 8 aquatic sessions to increase self-regulation.
3. The child will increase motor coordination demonstrated through 5 consecutive balloon bats by the end of 8 aquatic sessions.
4. The child will demonstrate increased strength by 1 manual muscle test (MMT) grade in 8 sessions for functional independence in daily life.
5. The caregiver will identify 3 benefits to the aquatic therapy service by the end of 8 sessions.

Guiding Theory

The program is outlined using the Ecology of Human Performance (EHP; Dunn, Brown, McGuigan, 1994), a framework that uses common terminology across various disciplines for the purpose of ease and usability. EHP addresses the relationship between the person, context, and task. The dynamic interaction between these three concepts impacts the client's overall performance in everyday activities. A wide performance range depicts optimal performance in meaningful activities. There are five therapeutic approaches consistent with EHP to increase performance range which include establish/restore, alter, adapt/modify, prevent, and create (Dunn, 2017). In the product, EHP is introduced so the reader can better understand the guiding force. Each activity is supported with a list of EHP concepts to support the child and find the best fit in order to be successful and increase performance range in and out of the therapy pool. This resource has been created for the interdisciplinary team as a back pocket tool to address skills needed for children to participate in their meaningful occupations.

Organization

The resource begins with a table of contents followed by an introduction to the program. The introduction explains aquatic therapy, who the targeted population is, and how aquatic therapy can translate to everyday tasks. The benefits of aquatic therapy follow the introduction and include information on the supportive properties of water. The goals and objectives of the resource throughout a four-week implementation are listed next, followed by aquatic therapy contraindications. The contraindications are considerations for all populations, not just the pediatric population. Pool safety is then listed which is to be communicated with the child and for the professional to keep in mind when carrying out a therapy session. The activity section of the resource then includes warm up and cool down activities followed by a more organized outline of activities listed by skills of breath control, strength and coordination, sensory input, visual perceptual, and brain development. Each activity includes instructions, equipment needed, and modifications through the use of EHP concepts. The activities have multiple components embedded within; therefore, each is organized under the main skill the author deemed a primary target. At the end of the resource there is a section including quick references for modifications if the interdisciplinary team has created their own aquatic therapy activity. The references are then listed followed by the appendix which includes the caregiver educational handout, caregiver questionnaire, caregiver pre/posttest, and caregiver consent form. The caregiver handout includes educational information about aquatic therapy that can be used as a handout for those that may be interested in this service. This handout was used during the implementation portion of the doctoral experiential placement to locate caregivers that may be interested in having their child participate in the service. The questionnaire includes questions about the child's medical history, behavior, communication,

experience in the water, and caregiver goals for the child. The pre/posttest includes questions about sleep and sensory processing, modulation, and emotional responses. A section for strength and coordination lies at the end of the pre/posttest for the therapist to fill out. The consent form includes caregiver permission to participate in the aquatic sessions, the ability to use photos taken during session (if applicable), the need to seek medical attention if needed, information on liability, understanding the no cost service, and the ability to withdraw at any time during the eight sessions. The product has been presented and provided to the partnered agency in a binder with waterproof sleeves for usability while in the aquatic context. The author has also provided an electronic version of the resource for the interprofessional team to add or edit content.

Implications

The aquatic resource is important for practice as it provides the interprofessional team with skilled activities for therapy in a motivating, fun, and unique way. It is to be used for children ages 3-10 with the ability to make modifications for a just right challenge. The author implemented 16 aquatic sessions (8 per group) for 45 minutes and tested a majority of the activities to support breath control, strength, coordination, sensory input, visual perceptual skills, and brain development. The activities were then edited in the resource based on the outcomes during implementation. Not all activities in the resource were tested. The resource can be implemented at other agencies with access to an aquatic therapy pool.

Summary

This model driven resource has been created through evidence-based research to create activities that support skills needed to increase the performance range of children on land. The final product can be found in Appendix A.

CHAPTER V

Summary

Purpose

Many children with intellectual and developmental disabilities (I/DD) are challenged with physical development, learning, language, and behavior (CDC, 2021b). These challenges lead to impacts on everyday activities such as play, social participation, education, and self-care. Children with I/DD receive services in occupational therapy, physical therapy, and speech therapy. The purpose of these services is to support the child in development and engagement in everyday life. Most of these services are provided on land, however, they can also be carried out in the water. Aquatic therapy is a tool that many disciplines can use in addition to land-based therapy. The properties of water provide numerous benefits for therapy with support from the viscosity, buoyancy, hydrostatic pressure, warmth, and multi-sensory experience. For individuals with I/DD, research has included that aquatic therapy can improve sleep, social interactions, strength and coordination, hyperactivity, stereotypical movements, the sensory system, emotional behaviors, hypertonia/hypotonia, and spasticity to help support individuals to engage in everyday occupations (Adapt and Learn, 2018).

The purpose of the project was to provide activities for the interprofessional team to reference and carry out with the pediatric population with I/DD through guidance by the Ecology of Human Performance (EHP) (Dunn, 2017; Dunn, Brown, & McGuigan, 1994). The activities have been created to target safety, strength and coordination, brain development, sensory input, and breathing skills. The overall goal of the resource is to enhance the performance range of the pediatric population when participating in meaningful occupations on land with objectives

targeting increased sleep, strength and coordination, self-regulation, and parental awareness on the benefits of aquatic therapy.

Strengths and Limitations

The strengths of the aquatic resource include the organization and easy navigation throughout the product. Each activity lists instructions, equipment, and provided modifications guided through the EHP theoretical framework. The aquatic resource is not a step-by-step guide but provides the interprofessional team with activities to support specific skills, allowing for flexibility and client centered practice. The product is located in a binder with page protectors allowing for use in the aquatic context for the ability to reference at any time during a session.

A limitation identified by the author of this paper was the lack of aquatic occupational therapy resources in the literature. The author's findings from the review of the literature suggests that effects of aquatic therapy can provide positive behaviors for children with I/DD, however, published skilled interventions lacked a presence. This type of service is gaining popularity; however, further research is needed including studies with larger sample sizes and structured resources for occupation based aquatic interventions for children that are found to be successful.

A second limitation to utilization of the aquatic resource includes therapy pool time. There are many clients that come into the clinic for physical therapy or that may have a membership to utilize the pool. This can limit the availability and space to carry out services. Another limitation may include the financial aspects. It is expensive to upkeep a therapy pool with maintaining chemicals and appropriate PH, heating, cleaning and filling the pool. This maintenance and financial demand may cause any closure of the therapy pool for multiple days

or months resulting in a delay to services. Lastly, not all children may like or tolerate this type of therapy, therefore limiting services.

Future Recommendations

Future recommendations may include creating an aquatic occupation-based camp for children of all abilities. This would expand the pediatric population and take place for more than eight sessions to see the effects on children of typical development and those with delays. Another recommendation may include targeting older adults that would benefit from the aquatic context from an occupational therapy standpoint. This would require a change of activities as the current resource is play based, however the foundation of the activities would remain somewhat the same targeting strength and coordination, balance, increased range of motion, and decreased pain. Another recommendation may be to target children strictly with autism and hold one on one sessions rather than group sessions. This would be a great way to identify the different ways aquatic therapy may impact children with the same diagnosis. I would recommend new graduates gaining experience working with children on land prior to integrating aquatic therapy into practice. Lastly, I would recommend the agency to implement the product, measure outcomes, and make changes for continued improvement and sustainability.

Conclusion

The aquatic resource has been created to support children with intellectual and developmental disabilities to enhance performance range in everyday activities carried out in the home, school, and community. There are many benefits that come with aquatic therapy in combination with land-based therapy to support the pediatric population. Through the use of the author's product, caregivers and parents will have the opportunity to better understand the effect of aquatic therapy and how the positive impacts may transfer to their engagement on land.

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APPENDIX A

PRODUCT

Aquatic Therapy: An Interprofessional Resource Focusing on Children with Developmental and Intellectual Disabilities

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University of North Dakota Doctoral Experiential Capstone Project 2022

Table of Contents

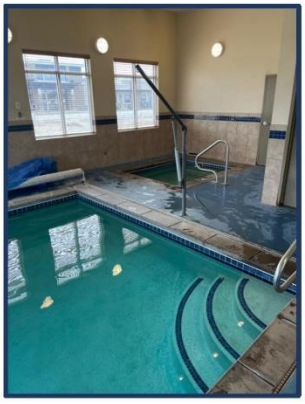
Introduction to the Aquatic Resource

Rexburg Rehabilitation Therapy Pool

Aquatic therapy is a creative and unique approach to therapy services allowing clients to maximize function in a completely new environment. The therapeutic activities are carried out in a therapy pool (~91 degrees F) with a depth of 3-5 ft. Rexburg Rehabilitation has 3 stair steps leading into the pool with a handrail on the left side when entering and a ladder on the opposite end with bilateral hand railings. There are grab bars along the walls of the deep end of the pool to assist in stability and carrying out therapeutic activities. There is also a Hoyer lift in the shallow end for individuals that may have a harder time with mobility in and out of the therapy pool. The therapy pool has resistance jets that allow for resistance and increased muscle strengthening. All photos in this resource have been used with permission or available for free use on a website.

Translation of Skills

Aquatic therapy is a service that can be used with many different conditions across the lifespan. This aquatic resource has been developed for work with the pediatric population focusing on strength, motor coordination, the sensory system, breath control, and brain development. These skills are designed to translate and support everyday occupations carried out on land through a fun and motivating medium. In addition, aquatic therapy aides to improve social skills, self-confidence and decreased social anxiety through performing activities in the pool. The activities have been developed for easy adjustment based on patient need and to provide the just right challenge.



Theoretical Framework

The aquatic resource was constructed using the Ecology of Human Performance (EHP; Dunn, Brown, & McGuigan, 1994), a framework that uses common terminology across various disciplines for the purpose of ease and usability. EHP looks at the relationship between the person, context, and task. The dynamic interaction between these three concepts impacts the client's overall performance in everyday activities. There are five therapeutic approaches consistent with EHP to increase performance range which include establish/restore, alter, adapt/modify, prevent, and create (Dunn, 2017). These approaches are applied to the element of the person, context, or task for the individual to be most successful. If skills and abilities are limited, performance is limited. Having a wide performance range depicts optimal performance in meaningful occupations and is the main goal of the resource. These approaches are evident throughout the activities to create opportunities for the child to be successful.

Benefits of Aquatic Therapy

Aquatic therapy is a great addition to land therapy to help children meet their needs and goals. Occupational therapists, physical therapists and speech therapists utilize this service with their clients to increase performance in everyday activities. Some of the beneficial properties of water that support skill development include:

Buoyancy - the ability to float in water with a zero-gravity effect. This helps to develop muscle strength, endurance, and mobility. The buoyancy is also supportive for individuals that may have increased weight and stress on joints.

Warmth - the temperature and sensation of being warm. This helps improve range of motion, muscle relaxation, circulation, and provides a calming input on the sensory system.

Refraction - the ability to see through one medium to another. This makes it hard to see in or through water and promotes other sensory skills.

Viscosity - the resistance and thickness that water provides with difficulty to push, pull, or work against. It provides multi-sensory feedback, motor development, strengthening, and endurance training as muscles work harder than they would on land.

Auditory feedback - is related to hearing and sound bouncing off the walls and water. Echoes and amplifications are great for speech encouragement. In addition, the water aides in reducing external stimuli when ears are simply submerged into the water. Doing this allows for an individual to better focus on the task at hand.

Uniqueness - Activities carried out in the pool support a child's development and ability to engage in the occupations of play, education, sleep, self-care, and social participation. Playing in water is extremely motivating and fun for children.

(Dwyer, 2017)

4

Aquatic Program Goals for Capstone Project

Goal: To enhance the performance range of the pediatric population when participating in meaningful occupations.

Objective #1: The child will demonstrate increase sleep duration throughout the night by 1 hour by the end of 8 aquatic sessions.

Objective #2: The child will utilize breathing technique for 10 seconds by the end of 8 aquatic sessions to increase self-regulation.

Objective #3: The child will increase motor coordination demonstrated through 5 consecutive balloon bats by the end of 8 aquatic sessions.

Objective #4: The child will demonstrate increased strength by 1 MMT grade by the end of 8 aquatic sessions for functional independence in daily life.

Objective #5: Parent's will identify 3 benefits to the aquatic therapy service by the end of 8 sessions.



5

Contraindications

Aquatic therapy should be avoided with the following conditions.

- Uncontrolled epilepsy
- Uncontrolled incontinence
- Unstable cardiac conditions
- Open wounds or non-healing ulcers
- Skin allergies
- Severe pulmonary conditions
- Extreme behavioral or mental disorders
- Acute illness (Pneumonia, etc.)
- Abnormal blood pressure
- Tracheotomy
- Hydrophobia (fear of water)

(Lucas & Scholljegerdes, 2021; Sony et al., 2021)

6

Pool Safety

Child safety

These safety procedures should be communicated with the child prior to the start of each session.

- Wait to enter the pool until instructed by the therapist or tech
- No diving
- Use the wall, stairs, or ladder to enter/exit
- Try to limit splashing other's faces
- When in the pool area you must walk
- Pool and activity equipment are used appropriately and with respect
- When you're tired, take a break
- Have fun!

Therapist Safety

These safety procedures should be followed by the therapist or tech involved in the aquatic activities.

- Do not allow a floatation device as a form of supervision
- Pool area will remain free of equipment and objects that may be a tripping hazard
- Demonstrate appropriate use of equipment
- Give the child time and opportunity to be successful, especially when fearful
- When waiting to complete activity a child should be seated on the steps, side of the pool or standing/holding onto the wall in the shallow end

Warm Up Activities

Activity: Practice blowing bubbles!

Instructions: The child will practice taking in a big breath through their nose, close their mouth, and releasing that breath through pursed lips underwater to create bubbles. This breathing warm up can be used in preparation for other breathing activities. This activity will also assist with the child putting their face and other body parts in the water for those that may be more fearful.

Equipment: Drinking straw

Modifications:

Adapt/modify: Introduce a drinking straw to blow through if the child does not like to put their face in the water.

Adapt/modify: Encourage the child to put their whole head underwater rather than just their mouth.

Activity: Kicking your legs and splash your arms!

Instructions: The child will be sitting on the edge of the pool or stair step with their legs dangling in. The therapist will be standing in the water in front of the child and encouraging them to kick while you walk back and forth. The child will try to splash the therapist by kicking their feet to create big waves and water turbulence. After legs are warmed up, switch to using arms and hands to splash.

Equipment: No equipment needed

Modifications:

Adapt/modify: The therapist will move further away from the child, encouraging them to kick big and fast.

Adapt/modify: Add weights to the child's legs or arms for increased strengthening.

Activity: Warm up laps

Instructions: The child will start by standing at the wall in the shallow end. They will move through the water by first walking forward and maintaining balance against the water's resistance. Instruct the child to then walk backwards, sideways, gallop, run, and then jump for the following laps. To make this activity more motivating for the child, race against each other, move slow like a slug, or rescue an object or toy from one end of the pool and bring it to safety.

Equipment: Pool noodle, toys to rescue

Modifications:

Adapt/modify: Move the child into the shallowest section of the pool.
Adapt/modify: Move the child into the deeper section of the pool.
Adapt/modify: Instruct the child to hold a pool noodle out in front of them for increased support.

Activity: Bubble popping with hands and feet!

Instructions: The child will be seated on the side of the pool or on a step in the pool with their legs over the water. Encourage the child to pop the bubbles with their toes and fingers. This will encourage big kicks, reaching, and core strength by maintaining a dynamic sitting balance. This may be a great activity for kiddos that have a hard time transitioning into the pool. If bubbles are not going where you want them to, catch them on the wand and hold them down low or up high for them to try and pop.

Equipment: Bubbles

Modifications:

Adapt/modify: Blow bubbles higher and lower for increased range of motion while seated.
Adapt/modify: Instruct the child to stand on the stair step in the pool, blow bubbles high and low to encourage a squat.

Activity: Head, shoulders, knees, and toes!

Instructions: This is a great motivating activity to encourage children to become comfortable with water on their body. The therapist and child will be standing in the shallow end of the pool. The therapist will sing the song and model the movements for the child. Also, a great activity for body awareness and identification.

Equipment: No equipment needed

Modifications:

Adapt/modify: The therapist will only verbalize the song for increased auditory processing without modeling.
Alter: Complete the activity standing on the pool deck.

Activity: Shake your sillies out!

Instructions: While standing in the shallow end of the pool or on a stair step, play the YouTube song and encourage the child to shake, clap, wiggle, jump, stomp, rest, and stretch along with the song. This will allow the child to move freely through the water warming up their UE and LE.

Equipment: YouTube Song "Shake Your Sillies Out"

Modifications:

Adapt/modify: Move the child into deeper water.
Adapt/modify: Move the child into more shallow water.

Activity: Dynamic stretching.

Instructions: Encourage the child to complete big and little arm circles forward and then backward, shoulder shrug up and down, punches, neck rolls, raise the roofs, and trunk twists. To make this activity more motivating, assign the child to be the leader. Great for memory if completing this warmup in multiple sessions!

Equipment: No equipment needed

Modifications:

Adapt/modify: Model the stretches for the child.
Adapt/modify: Instruct the child to lead the therapist through the stretches.
Alter: Instruct the child to complete dynamic stretching on the pool deck prior to entering the pool.

Cool Down Activities

Activity: Ring around the rosy!

Instructions: While standing in the shallow end of the pool or chest deep, hold the child's hands and turn/spin in a clockwise rotation. Sing the song together "*Ring around the rosy a pocket full of posey Water! Water! We all fall down"*. At the end of the song, submerge under water. Now reverse the direction and turn/spin counterclockwise. Reversing the direction will stop the fluid in the inner ear from swooshing around too quickly. This provides proprioceptive and vestibular input, assisting in calming the sensory system.
Caution: Pay close attention to how much spinning is being provided, the brain may react with dizziness and nausea and every child's sensory needs are different.

Equipment: No equipment needed

Modifications:

Adapt/modify: Use ankle weights for children that are more buoyant.
Prevent: Complete the activity near the stairs for an easy transition to end the session.

Activity: Motorboat!

Instructions: While moving in a circle in the shallow end, instruct the child to move their arms around the body while twisting their torso singing "*motorboat motorboat go so slow* "(moves arms slowly and sing slow), "*motorboat motorboat goes so fast"* (move arms fast and sing fast), "*motorboat motorboat step on the gas*" (sing fast and move arms fast). Complete this song several times and reverse the direction each time. Reversing the direction each time will stop the fluid in the inner ear from swooshing around too quickly resulting in dizziness.
Caution: Pay close attention to how much spinning is being provided, the brain may react with dizziness and nausea and every child's sensory needs are different.

Equipment: No equipment needed

Modifications:

Adapt/modify: Instruct the child to move into deeper water.
Prevent: Complete the activity near the stairs for an easy transition to end the session.

Activity: Five little ducks!

Instructions: This is a great closing song for a group therapy session. The child will be seated on the stairs or standing in the shallow end of the pool. The therapist will sing *"Three* (the number of children in the session) *little ducks went swimming one day, over the hill and far away. Mother duck said Quack, Quack, Quack! And only two little ducks came back!* "The children will sing the "quacks" depending on the number of ducks (children)in the pool. The child will splash their arms as pretend wings when quacking and one child will exit the pool at a time.

Equipment: No equipment needed

Modifications:

Adapt/modify: The child will splash arms underwater rather than above water.

Prevent: Complete the activity near or on the stairs for a smooth transition to end the session**.**

Activity: Hokey pokey!

Instructions: The child will stand in the shallow end of the pool. This is also a great closing activity for a group therapy session. The therapist and child will sing *"you put your hands in, you put your hands out, you put your hand in and you paddle them all about, you do the hokey pokey, and you turn yourself around, that what it's all about. You put your right arm in, you put your right arm out, you put your right arm in and you splash it all about, you do the hokey pokey and you turn yourself around, that's what it's all about. You put your left arm in you put your left arm out, you put your left arm in, and you splash it all about, you do the hokey pokey and you turn yourself around, that's what it's all about. You put your lips in, you take your lips out, you put your lips in and you blow bubbles all about, you do the hokey pokey and you turn yourself around that what it's all about. You put your whole self in, you take your whole self out, you put your whole self in and you splash all about, you do the hokey pokey and you turn yourself around, that's what it's all about.*" Great for body awareness, identification, and proprioceptive input.

Equipment: No equipment needed

Modifications:

Adapt/modify: Instruct the child to complete the activity standing on a stair step if they are unable to stand in the shallow end.

Activity: If you're happy and you know it!

Instructions: While standing in the shallow end the therapist and child will sing *"If you're happy and you know it, splash your hands (splash, splash)! If you're happy and you know it, splash your hands* (splash, splash)! *If you're happy and you know it, and you really want to show it, if you're happy and you know it, splash your hands* (splash, splash). Following lyrics:

If you're happy and you know it kick your feet (kick, kick)
If you're happy and you know it blow your bubbles (blow, blow)
If you're happy and you know it do all three (splash, splash, kick, kick, blow, blow)

This activity is great for sequencing, memory, and proprioceptive input.

Equipment: No equipment needed

Modifications:

Adapt/modify: Instruct the child to sit or stand on the stair step.

Activity: Row, Row, Row your boat!

Instructions: The child will be standing in the shallow end at chest deep. The therapist will sing Row, Row, Row your boat and model the paddling movements. Encourage the child to cup their hands and paddle on the sides of the body while singing the song alongside the therapist.

Equipment: No equipment needed

Modifications:

Adapt/modify: Instruct the child to sit on the stair step.
Adapt/modify: Use a pool noodle to maintain balance during activity.
Adapt/modify: Provide hand over hand assistance to coordinate arm movements.

Breathing Activities

Activity: Popcorn!

Instructions: The child will be standing in the shallow end of the pool. Demonstrate bouncing up and down off the bottom of the pool (like microwave popcorn). Now have the child try. Encourage the child to breathe in while bouncing up and exhaling while submerging back into the water at shoulder level. When the child submerges back into the water, the resistance will assist in breath exhalation. If the child is comfortable with submerging their head in the water, move to deeper water to completely submerge head during the activity.

Equipment: No equipment needed

Modifications:

Adapt/modify: Move to the deeper end of pool where the child can submerge their head more easily, and weight is reduced.

Adapt/modify: The child will stand in the shallow end and submerge their head completely during breaths. Remaining in the shallow end will reduce the buoyancy and require more leg strength and weight bearing while bouncing.

Activity: Blow bubbles from a bubble wand!

Instructions: Have the child blow from a bubble wand and pop the bubbles using their fingers or clapping hands together. This can be completed in the shallow end while standing or seated on the pool step.

Equipment: Bubbles

Modifications:

Adapt/modify: Instruct the child to sit on a pool noodle like a swing or horse to incorporate core and sitting balance.

Activity: Blow bubbles with your mouth!

Instructions: Instruct the child to inhale through the nose and slowly blow out through their mouth using pursed lips. Have them practice while above water. Now have the child breathe in and blow out while their face or mouth is submerged in the water to create bubbles. Instruct the child to blow bubbles fast and slow by demonstrating examples. If the child is not motivated to participate, show them how to create big bubbles using a bowl or pitcher.

Equipment: Drinking straw

Modifications:

Adapt/modify: Use a straw if the child is hesitant to put their mouth in the water.
Adapt/modify: Instruct the child to just touch the water with their lips.

Activity: Egg flip!

Instructions: Scatter the eggs in the shallow end of the pool shoulder deep. Instruct the child to blow on the egg at water level to flip over the egg revealing a new color. This is a great breathing activity for lung power and facial motor. As the child is shoulder level, the hydrostatic pressure of the water squeezes the lungs making them work harder compared to when breathing outside of the water.

Equipment: Egg flip

Modifications:

Adapt/modify: Incorporate sitting on a noodle to maintain balance.

Activity: Elephant or volcano!

Instructions: This activity can be carried out seated on the pool step or standing in the shallow end. Encourage the child to push the noodle down into the water to fill up one end. Instruct the child to hold one end up in the air and put their mouth to the other end. Take a deep breath in through the nose and blow through the noodle allowing the water to spray out the other end like an elephant or volcano erupting. Great activity for breath control, UE strengthening, and bilateral coordination.

Equipment: Pool noodle

Modifications:

Adapt/modify: Instruct the child to sit on the noodle like a horse to incorporate balance.

Activity: Balloon race!

Instructions: This activity can be carried out in the shallow end while the child is standing. Let the balloon float on top of the water and have the child take a deep breath in through the nose and slowly release out their mouth to move the balloon across the water. Set up a target for the child to blow the balloon into or have a race to see who can move the balloon the quickest to the other side.

Equipment: Balloon

Modifications:

Adapt/modify: Provide the child with a pool noodle if the child is having a harder time blowing the balloon. This will elevate their chest out of the water and provide less pressure.

Activity: Ping pong race!

Instructions: This activity can be carried out in the shallow end while the child is standing. Let the ping pong ball float on top of the water and have the child take a deep breath in through the nose and slowly release out their mouth to move the ping pong ball across the water. Set up a target for the child to blow the ping pong ball into or have a race to see who can move the ping pong ball the quickest to the other side.

Equipment: Ping pong balls, hula hoop

Modifications:

Adapt/modify: The child will lay prone with a pool noodle supporting under the arm pits and under the hips.
Adapt/modify: Set up a target for the child to blow the ping pong ball into.
Adapt/modify: Scatter all ping pong balls around the pool and have the child retrieve them by blowing them into a floating hula hoop.
Prevent: If carrying out a group session, have one child complete the activity at a time to prevent unexpected behaviors.

Activity: Back float!

Instructions: With the therapist's support, assist the child in a transition from standing in the shallow end to a supine position floating on their back. The therapist may need to provide support under the neck and back. Instruct the child to breathe in through their nose and release through their mouth. Verbalize "smell the flowers, blow out the candles" until they have the pattern down. See how long the child can maintain a supine floating position.

Equipment: Pool noodle

Modifications:

Adapt/modify: If the child has trouble with the transition from vertical to supine, bring them over to the wall and have them practice leaning backward while holding onto the wall for increased grounding of where they are in space.
Adapt/modify and prevent: Add support under the child's arm pits, hips, and knees, while laying supine.

Activity: Ring dive!

Instructions: Distribute colored rings or sinking toys in the shallow or deep end depending on the child's ability. Instruct the child to retrieve the toys by taking a big breath in through their nose and submerge under water to retrieve toy. When the child returns to the surface instruct them to exhale through their mouth.

Equipment: Diving rings or sinking pool toys

Modifications:

Adapt/modify: Instruct the child to retrieve a specific color sequence.
Adapt/modify: Pick up 2 rings at a time to increase breath control.

Strength and Motor Coordination Activities

Activity: Flutter kick!

Instructions: Instruct the child to grab onto the side of the pool with both hands. Assist the child to lift into a prone position from their hips and encourage the child to kick.

Equipment: Kickboard or pool noodle

Modifications:

Adapt/modify: Flutter kick while resting with hands on top of the pool step.
Adapt/modify: Instruct the child to hold onto a kick board or pool noodle out in front of them and encourage them to motor around the pool.

Activity: Grow little flower!

Instructions: The child will fill up a pitcher of water and carry it up the stair steps onto the pool deck. Once the child is standing on the pool deck, they will lift the pitcher up and pour it out into the pool or onto the therapist's head as if they are watering a flower. This activity is great for UE and LE strength.

Equipment: Water pitcher

Modifications:

Adapt/modify: Instruct the child to lift the full pitcher onto the side of the pool deck before climbing out using the stairs.

Activity: Tidal wave!

Instructions: The child will be standing in the shallow end of the pool holding onto a kickboard with both hands. Instruct the child to submerge the kickboard halfway into the water. The resistance of the water will push the kickboard straight up which will require a strong grip to hang on and control the board. Demonstrate a back-and-forth movement with the kick board to create waves in the water. Next, have the child try. Competitions are always motivating! See who can push the sailboat across the length of the pool first by making waves!

Equipment: Kickboard, floating boat, or object to push across the pool.

Modifications:

Adapt/modify: Instruct the child to push the kickboard only ¼ of the way in.
Adapt/modify: Use hand over hand if the child is having a hard time with motor movements.



Activity: Frog Jump!

Instructions: The child will stand in the shallow end of the pool. The therapist will demonstrate jumping up off the bottom of the pool and bringing their feet together. The child will then land back on both feet.

Equipment: Ankle weights

Modifications:

Adapt/modify: Add weight to the child's ankles for increased strength.

Activity: High 5 balance challenge!

Instructions: The child will be sitting on a noodle like a horse maintaining their balance. The therapist will reach out to the left side of the child for a high 5, then the right side. The child can also cross midline to bring opposite hand to high 5 while maintaining balance on the noodle.

Equipment: Pool noodle

Modifications:

Adapt/modify: Remain in the shallow end for those that need extra support by putting feet on the ground to correct or right themself.

Activity: Save the ducks!

Instructions: The child will be prone with support from a pool noodle under the arm pits and hips. Ducks will be scattered throughout the pool. Instruct the child to save each duck by reaching out to collect the duck and hold onto it while they push the duck underwater and back to their hips to hand it to the therapist. Great for grip strength against the resistance of water and increased ROM.

Equipment: Rubber ducks

Modifications:

Adapt/modify: Provide hand over hand for motor movements.

Activity: Sponge squeeze!

Instructions: The child will stand in the shallow end of the pool. There will be a bucket placed on the pool deck that the child will fill up by squeezing from various sized sponges. Once the bucket is full, instruct the child to use both hands to pour the water out. This is a great activity for hand and finger strength!

Equipment: Sponges, bucket

Modifications:

Adapt/modify: Add weight to the child's wrist for increased UE strengthening.
Adapt/modify: Increase or decrease the size of bucket to fill up.

Activity: Rocketship off wall!

Instructions: The child will hold onto the side of the pool with both hands and feet placed on the wall in a crouched position. Count down from 3 and the child will transition from a vertical to supine position blasting off the wall using their legs. Great for vestibular, proprioceptive input, grip, and LE strength!

Equipment: No equipment needed

Modifications:

Adapt/modify: The child can lay supine with only their feet touching the wall. Instruct the child to bend their knees up to their chin and push off as hard as they can. This will eliminate a coordination component of UE and LE together. The therapist will need to provide support.

Activity: Rocketship off therapist!

Instructions: The child will be laying supine in a starfish position. The therapist will hold the child's feet pulling them close and allowing the child to push back off with their feet. Great for proprioceptive input and strength.

Equipment: Pool noodle

Modifications:

Adapt/modify: Add support under the armpits, hips or knees as needed.

Activity: Flamingo stance!

Instructions: The child will stand on 1 leg while maintaining balance. Count how long they can maintain a flamingo position.

Equipment: No equipment needed

Modifications:

Adapt/modify: Instruct the child to hold onto the side of the pool for added support.

Adapt/modify: Instruct the child to hold onto a pool noodle.

Activity: Hide and seek!

Instructions: The therapist will hide suction cup toys (Squigz) around the pool on the railings and sides of the pool, high and low. Instruct the child to pull them off with their hands.

Equipment: Suction cup toys

Modifications:

Adapt/modify: Instruct the child to spider crawl along the wall to find the toys.

Activity: Spider walks!

Instructions: The child will start in the shallow end of the pool grasping onto to the edge of the wall with both hands. Assist the child to bring both feet to the wall. The child will then spider walk all the way around the parameter of the pool using alternating movements with arms and legs. Take a break, and then spider crawl in the reverse direction.

Equipment: No equipment needed

Modifications:

Adapt/modify: Provide hand over hand for motor coordination.
Adapt/Modify: Add wrist weights for increased strengthening.

Activity: Tight rope pull!

Instructions: Tie a rope from one end of the pool to the other end. The rope can be attached to a hand railing or ladder. While lying supine, instruct the child to alternate their hands to pull themselves from one end of the pool to the other.

Equipment: Rope, pool noodle

Modifications:

Adapt/modify: Complete the activity in prone.
Adapt/modify: Provide additional support with a pool noodle under the arm pits, hips, or knees.

Activity: Cup race!

Instructions: Cut a small hole in the bottom of a plastic cup and guide a string through the hole. Tie each end of the string onto a pole or hand railing in a straight line so the cup is hovering over the pool. The child will then use a spray bottle and aim at the center of the cup to move it along the string from one end to the other.

Equipment: Spray bottle, plastic cup, string, pool noodle

Modifications:

Adapt/modify: Use a pool noodle for support under the arm pits when entering deep water.
Adapt/modify: Decrease or increase the amount of water in the spray bottle for UE strength.

Activity: Horse race!

Instructions: In the shallow end assist the child with sitting on a pool noodle like riding a horse. The child will bounce and propel themselves off the bottom of the pool while maintaining balance.

Equipment: Pool noodle

Modifications:

Adapt/modify: The therapist will provide support by holding each end of the noodle for stabilization.

Activity: Bicycle!

Instructions: The child will be in the shallow end of the pool. Assist the child to sit on a pool noodle like a horse. Encourage the child to maintain balance while they move their legs in a circular pattern, like riding a bike. The child will cup their hands like ice cream scoops and move them back and forth in the water to help maintain balance.

Equipment: Pool noodle

Modifications:

Adapt/modify: The child will use the side of the pool to hold on for stabilization while completing the circular pattern.

Activity: Wake boarding!

Instructions: Assist the child to sit on a kickboard with legs dangling off into the water. The therapist will hold onto the kickboard with both hands to move about the water. The turbulence and directional changes will assist in core stability, righting, and balance.

Equipment: Kickboard

Modifications:

Adapt/modify: Instruct the child to bring legs up onto the kickboard in a kneeling position.

Activity: Noodle snake!

Instructions: Scatter cut up noodle rings around the pool. Have the child retrieve the pieces and string them onto a rope making a long snake. The child can motor over to each piece using a kickboard or crab walk along the wall. This a great activity for bilateral hand coordination!

Equipment: Cut up noodle rings, rope, kickboard

Modifications:

Adapt/modify: Crab walk along the wall for increase grip and UE strength.

Activity: Fishing!

Instructions: The child will hold a fishing pole with both hands while standing in the shallow end of the pool. The child will sit on a floatation device or stand in the shallow end while holding a fishing pole. The therapist will scatter fish throughout the pool and instruct the child to retrieve the fish using their fishing pole.

Equipment: Fishing pole, toy fish

Modifications:

Adapt/modify: Instruct the child to retrieve the fish in a particular order for memory and sequencing.

Activity: Hungry Hungry Hippo!

Instructions: Have the child lay prone on a kickboard or floatation device. Scatter the balls around the pool. The therapist will hold onto the other child's legs and steer the child towards the floating balls. The child laying on the raft will hold a round plastic laundry basket with two hands trying to collect as many balls in the basket as possible. Great for core strength, UE strength and range of motion!

Equipment: Plastic laundry basket, plastic balls, kickboard, or floatation device

Modifications:

Adapt/modify: Instruct the child to stand in the shallow end holding onto the plastic laundry basket using both hands to collect balls. The child will walk against the resistance of the water rather than lying prone.

Activity: Baseball!

Instructions: The child will be standing in the shallow end of the pool. Have the child grasp onto a baseball bat with both hands. Lightly toss a ball for them to hit using the bat. This is a great eye hand coordination, bilateral coordination, and strength activity.

Equipment: Baseball bat or cut noodle, ball, balloon

Modifications:

Adapt/modify: Use a balloon for increased reaction time.

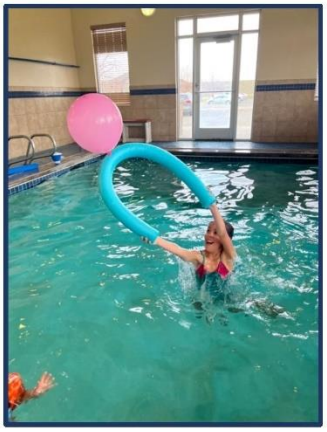
Activity: Volleyball!

Instructions: Can use a pool noodle or kickboard and hold either end with two hands and bat the balloon back and forth. Can also play don't let the balloon touch the water.

Equipment: Beach ball or balloon, pool noodle or kickboard

Modifications:

Adapt/modify: Use a beach ball for quicker movements and less reaction time.


Activity: Red light, green light!

Instructions: The child will stand at one end of the pool while holding a kick board with both hands. The therapist will call out red, green, or yellow and the child will kick at the speed according to the color.

Equipment: Kickboard, traffic light visuals

Modifications:

Adapt/modify: Remove the kick board and have the child walk, run, jump, or gallop during the activity.
Adapt/modify: Provide a visual aid.

Activity: Scavenger hunt!

Instructions: The child will be in the shallow end of the pool where they can touch the bottom. Scatter sinking rings or various toys around the bottom of the pool. The child will then use their feet to locate and retrieve the items. Once they have the object, they will transfer it from their foot to their hand. This encourages balance on one foot and core strengthening!

Equipment: Sinking rings

Modifications:

Adapt/modify: Use smaller objects that are more challenging to grasp and encourage the child to stand on 1 foot for a longer duration.
Adapt/modify: Instruct the child to hold onto the wall to complete the activity.
Adapt/modify: Complete the activity on the pool step for those that are unable to stand on the bottom of the pool.

Activity: Catch the ducks!

Instructions: The child will be using a butterfly net to retrieve the ducks scattered around the pool. The child will be lying in a prone position over a kickboard or therapy ball. The therapist will need to provide some support to stabilize the floatation steady and to propel the child through the water as they reach with their net.

Equipment: Butterfly net, rubber ducks, kickboard, or small therapy ball

Modifications:

Adapt/modify: Instruct the child to lay prone on the side of the pool and reach into the pool to collect the ducks using the net.

Activity: Scoop and toss!

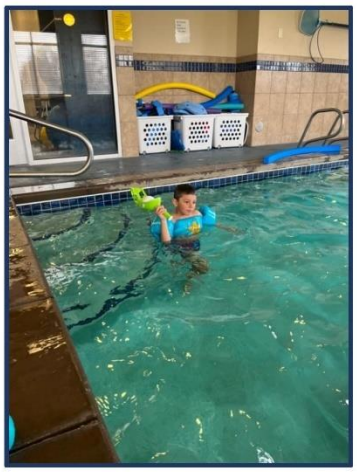
Instructions: The child will be standing in the shallow end of the pool holding a scooper with their dominant hand. The therapist will toss a ball for the child to catch with their scoop. Once the child catches the ball, the therapist will instruct the child to pass it back using the scoop or with a one-handed toss.

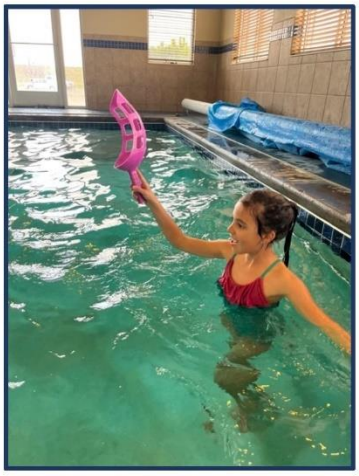
Equipment: Plastic scoop, plastic or light ball

Modifications:

Adapt/modify: Decreased the size of the ball for increased difficulty.

Adapt/modify: Provide hand over hand assistance if there is a tech for support.





29

Activity: Weight ball pass!

Instructions: Instruct the child to pass a weighted ball back and forth with the therapist. The child will be standing in the shallow end where they can touch the bottom.

Equipment: Weighted ball

Modifications:

Adapt/modify: Increase/decrease the weight of the ball.
Adapt/modify: Increase/decrease the size of ball.
Adapt/modify: If the child is unable to stand in the shallow end, move them to a stair step.

Activity: Catch and jump**!**

Instructions: The child will be stand on the edge of the pool deck in the deep end. The therapist will be in the pool holding a playground ball. The therapist will toss the playground ball for the child to catch. Following a catch without dropping, the child will toss it back to the therapist and then jump into the pool. The therapist will be in the deep end to catch the child and bring them back to the wall to climb out.

Equipment: Playground ball

Modifications:

Adapt/modify: Have the child jump and catch the ball at the same time.
Adapt/modify: Instruct the child to sit on the edge of the pool and push themselves into the water if they are fearful about jumping in while standing.

30

Activity: Water blaster!

Instructions: Instruct the child to use both hands to fill up a water blaster. Set up colored cones or targets for the child to hit on the side of the pool deck. The child will be standing in the shallow end of the pool.

Equipment: Water blaster, cones or targets

Modifications:

Adapt/modify: Provide hand over hand to help fill up the water blaster.
Adapt/modify: Increase the target size for the child.
Adapt/modify: Instruct the child to hit the targets in a sequencing pattern.
Adapt/modify: Apply weights to the child's wrists for increased strength.

Activity: Balloon pass!

Instructions: The child will be standing in the shallow end of the pool. The therapist will pass the balloon to the child requiring them to reach and bat the balloon back to them. To make the activity more fun, pretend the water is hot lava and the balloon will pop if it touches the hot lava. See how many bats you can do back and forth.

Equipment: Balloon

Modifications:

Adapt/modify: Instruct the child to move into deeper water.

31

Activity: Inner tubing / water skiing!

Instructions: The child will be holding onto the noodle with both hands. The therapist will be holding onto the other end of the noodle. The therapist will pull the noodle through the water requiring the child to maintain grip strength to hold on. Pull fast and then slow to provide different sensations and stimulations. Pull from different angles. The child can also try a prone, supine, or side lying position. Great for proprioceptive input and UE strength!

Equipment: Pool noodle x2

Modifications:

Adapt/modify: Switch out the pool noodle for a wet towel to hold onto. This will help with individuals that have a harder time holding onto a pool noodle.
Adapt/modify: If the child needs additional support, provide the child with a pool noodle across their chest and under their armpits.

Activity: Jump rope!

Instructions: The child will be holding onto a pool noodle using both hands while standing in the shallow end. The therapist will instruct the child to push the noodle under the water, bring their legs up and over the noodle, and back around their head to mimic a jump rope motion. The child will have to maintain grasp against the resistance of the water.

Equipment: Pool noodle

Modifications:

Adapt/modify: Switch out the pool noodle for a hula hoop or item that is less buoyant.
Adapt/modify: Use a different type of pool noodle with a smaller or larger circumference for grip strength.

32

Activity: Dressing obstacle course!

Instructions: Instruct the child to donn/doff an article of clothing over their swimsuit while standing in the shallow end of the pool. This can be incorporated in with spider crawls around the parameter of the pool.

Equipment: Button up shirt, long sleeve t-shirt, socks, shorts

Modifications:

Adapt/modify: Instruct the child to sit on the step while donning/doffing clothing items.
Alter: Instruct the child to donn/doff clothing over their swimsuit on the pool deck and then enter the pool to complete spider walks along the parameter of the pool. Once the child returns to the shallow end, instruct them to doff the clothing.

Activity: Knock down the tower!

Instructions: Stack cups on the side of the pool to form a tall pyramid. Instruct the child to use a water sprayer to spray the cups down.

Equipment: Plastic cups, squirt bottle, pool noodle

Modifications:

Adapt/modify: Provide hand over hand assistance to squeeze the squirt bottle.
Adapt/modify: Move the child further away of closer to the tower.
Adapt/modify: Instruct the child to sit on a pool noodle and maintain balance while knocking the tower down.
Adapt/modify: Instruct the child to squeeze the spray bottle under water or at legs, arms, feet to get used to squeezing.
Alter: Instruct the child to complete the activity outside of the pool.

Sensory Input Activities

Activity: Added clothing!

Instructions: Have the child put on a piece of clothing such as a tighter fitted cotton t-shirt or long sleeve shirt, shoes/socks, water shirt or a swim vest for added deep pressure. This may be helpful for individuals who may be more sensory seeking/ under responsive. This can also help to ground the child if they are too buoyant during activities.

Equipment: Short sleeve shirt, long sleeve shirt, swim vest, socks

Modifications:

Prevent: Adding clothing to any activity may prevent behaviors.

Activity: Spinning!

Instructions: The child will be supported under the armpits with their back to the therapist. The therapist will provide rotary input spinning in one direction and then reverse in the other direction.
Caution: Pay close attention to how much spinning is being provided, the brain may react with dizziness and nausea and every child's sensory needs are different.

Equipment: No equipment needed

Modifications:

Adapt/modify: Spin in different positions while prone, supine, or side lying.
Adapt/modify: Spin fast or slow for a variety of input.

Activity: Textured equipment!

Instructions: Introduce different textured equipment for different tactile experiences. For example, bumpy pool noodles vs. scratchy pool noodles vs. smooth pool noodles.

Equipment: Pool noodles, kick boards, toys

Modifications:

Establish: Applying different textures to the child's arms and legs will help to establish textural tolerance, especially with different clothing pieces.

Activity: Stationary popcorn!

Instructions: Instruct the child to jump up and down off the bottom of the pool for proprioceptive input. The child will bend their knees and jump off the bottom of the pool in a vertical direction.

Equipment: No equipment needed

Modifications:

Adapt/modify: Add ankle weights for added input and strength.

Activity: Jump for joy!

Instructions: Instruct the child to jump off the edge of the pool feet first into the deep end for proprioceptive input.

Equipment: No equipment needed

Modifications:

Adapt/modify: Jump towards a target for increased motor planning and visual perceptual skills.

Adapt/modify: Scooch into the water from a seated position on the side of the pool. The therapist will be standing in front of the child for assistance or to catch them.

Activity: Music to my ears!

Instructions: Add music for additional auditory input while completing relaxing activities such as floating on back and deep breathing.

Equipment: Phone or speaker

Modifications:

Adapt/modify: Add music during tasks requiring attention and concentration.
Adapt/modify: Increase or decrease the volume of the music.

Activity: Marco polo!

Instructions: The child will close their eyes while standing in the shallow end of the pool. Have them call out "Marco" while the other child, therapist, or tech calls out "Polo". The child calling out Marco will then have to try to locate the individual calling out Polo by only listening. The child can repeat Marco as often as they would like. Once the child tags that individual calling out Polo, roles reverse. This activity is great for the auditory system as vision has been taken away. Be cautious of children who have less experience in deeper water.

Equipment: No equipment needed

Modifications:

Adapt/modify: Make the boundaries smaller or larger.
Adapt/modify: Use a pool noodle to reach out and tag someone.

Activity: Whirlpool!

Instructions: Make a whirlpool in the shallow end rotating in one direction and then change directions against the pull of the water. Start standing in a circle. Have everyone move in the same clockwise direction. Once the whirlpool starts to pick up switch directions. This may be harder to move through the water as individuals will be going against the viscosity and force of the water.

Equipment: No equipment needed

Modifications:

Adapt/modify: Move into deeper water for more resistance.
Adapt/modify: Move into shallow water for less resistance.

Activity: Sensory bin!

Instructions: Create a sensory bin with water, ice, and other figurines. Have the child remove items from the sensory bin using different tweezers and scoops for increased fine motor skills. This can be carried out while standing in the shallow end or seated on the pool step while the bin sits on the side of the pool deck.

Equipment: Plastic bin, ice, water, figurines, tweezers, scoops

Modifications:

Adapt/modify: Add a balance component by instructing the child to stand on a pool noodle while utilizing the sensory bin.
Establish/restore: Add textured objects to establish a tolerance for different tactile input.

Activity: Sensory ice block!

Instructions: The therapist will freeze a container of water with figurines and other objects such as plastic letters. To disperse figurines throughout the block, freeze in layers and keep adding water to the container once the bottom layer has frozen over. The child will be standing in the shallow end of the pool. The child will use a toy hammer and other tools to chip away at the ice and retrieve the items from the block. The therapist can also provide the child with a squirt bottle filled with warm water to help melt the ice away. Great activity for temperature contrast!

Equipment: Tools, figurines, bucket, bowl

Modifications:

Adapt/modify: Provide hand over hand assistance to break the ice block apart.
Adapt/modify: Use hands to pick out figurine pieces.
Adapt/modify: Use tweezers and fine motor tools to retrieve the objects

Activity: Weights!

Instructions: Add ankle weights or wrist weights for added stability, proprioceptive input, and strength. This can be beneficial for individuals that may be more buoyant.

Equipment: Ankle weights, wrist weights

Modifications:

Adapt/modify, Establish/restore: Adjust the weight based on the individuals' abilities.

Visual Perceptual Activities

Activity: Ring toss!

Instructions: The child will be instructed to scan for items on the bottom of the pool. The child will identify the object and retrieve the ring. Once the child collects all the rings, they will stand 5ft from the edge of the pool. There will be plastic water bottles lined up with colored dye to match the rings. The child must toss the ring to the water bottle that matches.

Equipment: Colored water bottles with food dye, diving rings

Modifications:

Adapt/modify: Allow the child to place the rings on the correct water bottle rather than tossing the ring.

Activity: iSpy!

Instructions: The therapist will hide sinkable colored objects at the bottom of the pool. The child will be instructed to stand on the side of the pool deck and identify objects at the bottom. Take turns being the guesser.

Equipment: Sinkable colored toys

Modifications:

Adapt/modify: Use colored items that are bright and easier to see through the water.
Alter: Instruct the child to stay in the water for the activity.

Activity: Pop the bubbles!

Instructions: The child will pop bubbles for visual tracking. The therapist will blow the bubbles and the child will track them and use their pointer finger or clap with their hands to pop the bubbles while maintaining balance on a pool noodle.

Equipment: Bubbles, pool noodle

Modifications:

Adapt/modify: Instruct the child to sit on the pool step rather than maintaining balance on a pool noodle.

Activity: Kenneth Lane!

Instructions: Have the child complete Kenneth Lane visual perceptual activities while balance on a noodle in the water.

Equipment: Kenneth Lane exercises, pool noodle

Modifications:

Adapt/modify: Move the visual activity closer to or further away from the child.

Activity: Scuba diver!

Instructions: Remove the labeling on a plastic water bottle and fill it with water so it will sink to the bottom of the pool. Instruct the child to search for the clear bottle while standing on the side of the pool deck.

Equipment: Plastic water bottle

Modifications:

Adapt/modify: Add slight coloring to the water bottle if identifying the clear bottle is too challenging.

Alter: Instruct the child to stay in the water to complete the activity.

Cognitive Activities

Most of the aquatic activities have a cognitive component embedded into them. Many require listening, attention, memory, following multistep instructions, impulse control, problem solving, and sequencing.

Activity: Tic tac toe!

Instructions: The therapist will blow up a floating tik tac toe game board or use pool noodles to create the board. The child will be instructed to put each floating piece on the game board to try to obtain 3 in a row.

Equipment: Noodles, floating objects for the "X and O"

Modifications:

Adapt/modify: Complete the activity in the shallow end where the child can walk around the game board

Adapt/modify: Complete the activity while seated on a noodle and instruct the child to toss their object onto the boardgame. The child must call out what square they are aiming at.

Activity: Puzzles!

Instructions: The child will be seated on the stair step and instructed to reach and find the floating or sinking pieces scatters on the steps. The child will then put together the puzzle pieces on the side of the pool deck.

Equipment: laminated or plastic puzzle pieces

Modifications:

Adapt/modify: Increase or decrease the size of puzzle pieces.

Adapt/modify: Increase or decrease the number of puzzle pieces.

Activity: Simon says!

Instructions: The therapist will play Simon says with the child. The therapist will give the child a command and the child must obey the command that starts with "Simon says". For example, *"Simon says stand on one leg, Simon says bounce up and down, touch your ear. Simon didn't say!"* This is a great activity for following directions, visual perceptual skills, gross motor, and body awareness.

Equipment: No equipment needed

Modifications:

Adapt/modify: Have the leader model and verbalize the command.
Adapt/modify: Have the leader use only words to make the commands.
Prevent: Eliminate distractions by removing floating pool noodles and other objects on the pool deck.

Additional EHP Approaches for Quick Reference

Adapt/modify

- Sitting on a noodle like a horse or swing to add balance factor.
- Standing on a noodle with 1 or 2 feet to add a balance factor.
- Sit on a kick board to add core and balance factor.
- Add weight if the activity is too easy.
- Remove weight if the activity is too challenging.
- Add/ remove directional steps in activities.
- Move to the deep end or to the shallow end for increased/decreased weight bearing.
- Turn on jets for increased resistance.

Prevent

- Use goggles to prevent distractions and create a tunnel vision effect.
- Carry out activities near the stair steps and away from others utilizing the therapy pool to minimize distractions or impulsive behaviors.
- Keep the equipment and toys used in the therapy session out of sight to prevent distractions.
- Keep needed equipment close to the stair steps or where the child feels most comfortable.
- Understand prior to working with a child what their behaviors may look like.

Alter

- Alter the environment by instructing the child to complete the activity outside of the pool.

Implementation Experience & Recommendations

The occupational therapy student (OTS) who created this resource implemented a total of 8 sessions for 45-minute 2x a week. 4 children participated in the implementation of the resource. The children were grouped based on abilities and day availability with an age range of 3-6 years. One small group consisted of 3 children and the other group was carried out as a one-on-one session. Conditions included apraxia, attention challenges, and autism. The child with autism participated in the one-on-one session.

OTS Observation

The OTS noticed an increase in confidence demonstrated through independence with activities and willingness to explore through submerging their face in the water, positioning the head and body differently in space (prone, supine, side lying) and jumping from the side of the pool. The OTS also noticed increased eye contact, verbalization, and calming of the sensory system, especially for the child with autism. Attention was harder to maintain with the small group. This may be due to having a set of twins and a larger age gap between the children in the group, adding a more challenging factor. Strength and coordination were observed to be the same from the initial session. Transitions into each session were smooth for all 4 children, however, transitions at the end of each session were challenging with the need to jump back in or submerge underwater not wanting to get out of the pool.

Parent Observation

After completing a pre and post-test, the caregiver from the one-on-one session noted an increase in calming and much less irritability. Sleep surprisingly decreased each night following an aquatic session. Caregiver noted that sessions would have been very beneficial in the morning or if the child had more intellectual stimulation after calming the body. Time to fall asleep decreased, need for movement decreased, and tires less decreased compared to the pretest. The caregiver also noted throughout session an increase in eye contact and vocalization when in the water.

The caregivers in the small group session noted an increase in happiness and willingness to go to lay down and go to bed without arguments. The caregiver noted that the child seems much more confident and stronger, especially with swimming and other physical activities. One of the caregivers would like to see her child be more independent, while another caregiver verbalized during the last session that her child has been wanting to complete tasks on their own with an increase in independence. Lastly, the caregiver would have liked to see the child listen when asked to do something the first time, rather than being asked multiple times.

Recommendations

From implementation experience, the OTS recommends that even prior to incorporating aquatic therapy as a service, new therapists should first gather experience and an understanding of the child through land therapy. Once gathering an understanding of the child, it may be best to carry out aquatic services as a one-on-one session. Group sessions have many benefits including encouragement of social skills and boundaries, opportunities for modeling peers, and a positive fun learning environment, however, this may not be suitable for all clients. If carrying out a group session, providing a tech may be beneficial so activities can be carried out simultaneously. The OTS recommends for future implementation adding a tabletop activity to the aquatic pre/

post-test to measure the effects the service has on attention and concentration. This would include completing a coloring or puzzle activity prior to an aquatic session and then following an aquatic session completing a similar activity. Future recommendations also include carrying out the aquatic activities with one population to dive deeper and understand the benefits from a larger sample. The timing and frequency of the implemented service seemed to be adequate, however, frequency of service could be increased to 3x a week depending on the child's needs.

Appendices

Appendix A

Pediatric Aquatic Therapy Opportunity

Hello! My name is Mackenzie, and I am a 3rd year doctoral occupational therapy student at the University of North Dakota completing my experiential capstone project with Rexburg Rehabilitation. I will be creating an aquatic therapy program for children with developmental needs. I have a background in aquatics as I started swimming at the age of 2.5 and was a college level athlete. I am very excited to bring my background in aquatics and occupational therapy education together to create a program that many children may benefit from!

I am reaching out to see if your child would like to participate in the development of the aquatic therapy program taking place in March. Your child would participate in 8 aquatic therapy small group sessions at Rexburg Rehabilitation. Each session will be 45 minutes and focus on safety, strength, sensory input, breathing skills, brain development, and motor coordination.

What is aquatic therapy?

Aquatic therapy is a great addition or alternative to land therapy to help children meet their needs and goals. Therapy is carried out in a warm pool (~91 F) and provides many therapeutic benefits. Occupational therapists, physical therapists and speech therapists utilize this service with their clients to increase performance in everyday activities. Some of the beneficial properties of water include:

Buoyancy is the ability to float in water. This helps to develop muscle strength, endurance, and mobility.

Viscosity is the difficulty to move through water by pushing, pulling, or working against. It provides sensory feedback, strengthening, motor development, breathing skills and endurance training.

Warmth is the sensation of being warm. This helps improve range of motion, muscle relaxation, circulation, and provides a calming input on the sensory system.

Refraction is the ability to see through one medium to another. This makes it hard to see in water and promotes other sensory skills.

Auditory feedback is related to hearing and sound bouncing off the walls. Echoes and amplifications are great for speech encouragement.

Uniqueness
Activities carried out in the pool support a child's development and ability to engage in the occupations of play, education, sleep, self-care, and social participation

If you are interested, please email **mackenzie.brokaw@und.edu** by **2/4/22** for additional information. This is a no cost service as it is a capstone project for the University of North Dakota OTD program.

Appendix B

Caregiver Questionnaire

REXBURG REHABILITATION
Physical & Occupational Therapy & Sports Medicine

Child's name: _____
Date of birth: _____
Parent/Guardian: _____
Phone: _____
Emergency Contact/Number: _____

Medical information

Diagnosis: _____
Allergies: _____
Fully toilet trained (daytime): Yes ☐ No ☐
Is your child receiving any of the following services?
Occupational therapy ☐ Physical therapy ☐ Speech therapy ☐ Psychology ☐ None ☐
Comments: _____

Behavior Information

Can be in a small group setting? Yes ☐ No ☐
Aggressive behavior? Yes ☐ No ☐
Common triggers leading to negative behavior: _____

Communication Information

Verbal ☐ Non-verbal ☐ Sign language ☐ Communication device ☐
Follows simple directions Yes ☐ No ☐
Uses a visual schedule Yes ☐ No ☐
Other: _____

Experience in Water

Comfortable with face in water Yes ☐ No ☐
Needs floatation device Yes ☐ No ☐
Floats on back Yes ☐ No ☐
Floats on front independently Yes ☐ No ☐
Fearful of water Yes ☐ No ☐
Independent in deep water Yes ☐ No ☐
Other comments about aquatic abilities: _____

What do you hope your child will gain from this experience? _____

Comments: _____

47

Appendix C

Caregiver Pre-Post Test

Sleep	
# of hours your child sleeps a night?	
# of times your child wakes up throughout the night?	
Average time required for child to fall asleep?	
In what ways does your child's sleep currently impact the next day (Please highlight all that apply)	Prefers to lay down, even if it means missing out on activities Falling asleep or seems drowsy at school or at home Lacks interest and motivation for everyday tasks Increased forgetfulness Difficulty learning new information Increased moodiness and irritability Increased impulsivity Other:
Answer following 8 aquatic sessions- In what ways has sleep changed following the aquatic program?	

Sensory Processing, Modulation, and Emotional Response	**Always**	**Frequently**	**Occasionally**	**Seldom**	**Never**
Auditory					
Holds hands over ears to block out sound					
Difficulty staying on task when there is background noise					
Appears to not hear what you say					
Visual					
Difficulty completing a puzzle					
Difficulty finding objects in a busy background					
Bothered by lighting					

Vestibular					
Holds head up when bending over or leaning					
Dislikes activities when head is upside down					
Seeks all types of movement (spinning, moving toys, playground equipment etc.)					
Seeks movement that interferes with daily routines (ex-can't sit still)					
Rocks or spins frequently					
Touch					
Withdraws from splashing water					
Difficulty standing in line or close to others					
Displays need to touch toys, textures, items.					
Avoids certain textures					
Decreased awareness of pain and temperature.					
Does not notice when someone touches back or arm					
Multisensory					
Difficulty paying attention					
Modulation					
Tires easily – when standing or hold body position					
Seems to have weak muscles					
Weak grasp					
Can't lift heavy objects (compared to other children the same age)					
Poor endurance/ tires easily					
Appears lethargic (no energy)					
Behavior and Emotional Responses					
Seems anxious					
Has temper tantrums					
Poor frustration tolerance					
Cries easily					
Does not express emotions					
Difficulty tolerating changes in plans and expectations					
Difficulty tolerating changes in routines.					

After program satisfaction questions	
Rate you satisfaction with this program using the 5-point scale provided.	(Please highlight) 1= not at all satisfied 2=slightly satisfied 3=neutral 4=very satisfied 5=extremely satisfied
If your child participated again in this service, what changes would you like to see?	
What benefits (if any) did you notice from your child's participation in this service?	

49

Would you recommend aquatic therapy to other parents of children receiving OT/PT/ST?	

Quick Motor Coordination and Strength- Administered by the OT student during first and last class	
Quick UE MMT	
Coordination	

Appendix D

Caregiver Consent Form

I, _____, give permission for my child, _____ to take part in the development of an occupational therapy capstone project at Rexburg Rehabilitation.

Please initial boxes:

☐ **I give permission** for my child to take part in the aquatic activities provided by a doctoral occupational therapy student for the purpose of program development for the University of North Dakota and Rexburg Rehabilitation.

☐ **I give permission** for the doctoral occupational therapy student to use photos taken to provide illustrations for an activity, for use by teaching professionals and staff involved.

☐ **I give permission** for medical attention and my emergency contact to be notified in case of an emergency.

☐ **I understand** that Rexburg Rehabilitation, the doctoral occupational therapy student, and additional assistants are not liable for any damages, injuries or medical emergencies that may be sustained during activities carried out with my child.

☐ **I understand** that this is an 8 session no cost service provided by a doctoral occupational therapy student taking place in the month of March 2022.

☐ **I understand** that I can withdraw consent at any time during the aquatic program.

Print name:_____

Signature:_____

Date: _____

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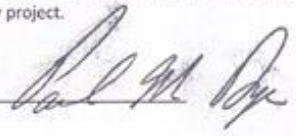
APPENDIX B

PERMISSION FORMS

I give permission for use of the Rexburg Rehabilitation logo in the UND occupational therapy student's DEP and scholarly project.

Signature: 

Parental Consent Form

I, [redacted], give permission for my child, [redacted] to take part in the development of an occupational therapy capstone project at Rexburg Rehabilitation.

Please initial boxes:

☐ **I give permission** for my child to take part in the aquatic activities provided by a doctoral occupational therapy student for the purpose of program development for the University of North Dakota and Rexburg Rehabilitation.

SN **I give permission** for the doctoral occupational therapy student to use photos taken to provide illustrations for an activity, for use by teaching professionals and staff involved.

☐ **I give permission** for medical attention and my emergency contact to be notified in case of an emergency.

☐ **I understand** that Rexburg Rehabilitation, the doctoral occupational therapy student, and additional assistants are not liable for any damages, injuries or medical emergencies that may be sustained during activities carried out with my child.

☐ **I understand** that this is an 8 session no cost service provided by a doctoral occupational therapy student taking place in the month of March 2022.

☐ **I understand** that I can withdraw consent at any time during the aquatic program.

Print name: [redacted]

Signature: [redacted]

Date: April 1, 2022

Salem School District #322

STUDENT & TEACHER SERVICES DEPARTMENT

105 WEST CENTER • P. O. BOX 150 • SUGAR CITY, ID 83448 • PHONE (208) 356-8802 • FAX (208) 356-7237

Dear Parents,

As part of our beliefs in our department, we have a desire to help preservice students improve their skills as they move towards their various degrees and/or licensures. At times we have some university students who are seeking to do various projects and need some help.

Attached is a flyer for a free opportunity for your student to receive some additional therapy through aquatics. We have not released you or your student's contact information to this person. So if you are interested in your child participating, you need to use the contact information on the flyer and follow up with that individual.

Thanks for all you do to help your child grow.

Sincerely,

Bryon Kennedy, Director