

AQUATIC PASSIVE RANGE OF MOTION THERAPY
AS AN OCCUPATIONAL THERAPY MODALITY

A Thesis submitted to the faculty at Stanbridge University in partial fulfillment of the
requirements for the degree of Master of Science in Occupational Therapy

by

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Certification of Approval

I certify that I have read Aquatic Passive Range of Motion Therapy as an Occupational Therapy Modality by Brenda Avila, Martin Hechanova, Stephanie Lee, and Alyssa Nguyen, and in my opinion, this work meets the criteria for approving a thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Occupational Therapy at Stanbridge University.

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Abstract

Aquatic therapy is a modality that utilizes the advantages of water to enhance the therapeutic environment for increased effectiveness. Aquatic therapy consists of active range of motion (AROM) exercises and passive range of motion (PROM) exercises to address components including range of motion, pain, strength, and mobility. These components influence an individual's functional capacity to engage in their meaningful occupations. Early evidence using PROM modalities such as WATSU® presented positive benefits such as decreased risk of falling, increased muscular strength, and greater autonomy (Ribeiro et al., 2019; Schitter et al., 2015; Segura-Jiménez et al., 2012). However, further investigation needs to be completed in order to justify the effectiveness of aquatic PROM modalities such as WATSU® in occupational therapy. In order to assess its efficacy, an online survey was distributed to various aquatic therapy practitioners around the world to gather information regarding the experience of the practitioners, the method of their aquatic therapy practice and its impact for the clients. Of the 57 participants, 94% of practitioners reported improved mood in their clients, 96% of practitioners reported decrease in pain for their clients, and 85% of practitioners reported improved quality of life for their clients. The results of the survey presented responses from various practitioners using PROM techniques such as WATSU® across the globe. Further research needs to be conducted in randomized controlled trials to determine its efficacy.

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Aquatic Passive Range of Motion Therapy as an Occupational Therapy Modality

Individuals with neurological disorders, musculoskeletal disorders, rheumatic diseases, and cardiovascular disease experience impaired mobility, pain, and poor functional capacity that negatively impact optimal levels of functional independence (Marinho-Buzelli, Bonnyman, & Verrier, 2015; Shi et al., 2018; Meredith-Jones, Waters, Legge & Jones, 2011). The World Health Organization International Classification of Functioning, Disability, and Health (ICF) has developed a framework to define the effects of an individual's health condition and their ability to function in their environment (Lowry, Vallejo, & Studenski, 2012). The ICF discusses the limitations of mobility and performance of activities of daily living (ADLs) and instrumental activities of daily living (IADLs) and its adverse effects on independence. Additionally, pain and limited independence reduce participation in personal and social activities (Lowry et al., 2012). The impact of health conditions and functional independence calls for a means of therapy to emphasize engagement in ADLs and IADLs.

Land-based therapies are typical methods of treatment; however, land-based therapies have shown deficits in post-treatment pain and static and dynamic balance in comparison to aquatic therapy (Pérez de la Cruz, 2017). Aquatic therapy is a modality that is utilized by health care professionals among various disciplines. Buoyancy, viscosity, and thermodynamics are unique properties of water that further enhance the therapeutic environment for treatment of a wide array of client populations and diagnoses. Aquatic therapy can provide an environment that decreases an individual's fear of falling, improve their mobility, improve their ability to move through a greater range of motion (ROM), and improve their balance (Schitter, Nedeljkovic, Baur,

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Fleckenstein & Raio, 2015; Segura-Jiménez et al., 2012). Limited research regarding the utilization of aquatic therapy and functional mobility indicates a need to increase awareness for the effectiveness and methods of performing aquatic therapy for disciplines such as occupational therapy ([OT]; Marinho-Buzelli et al., 2015).

The Occupational Therapy Practice Framework (OTPF) defines the purpose of occupational therapy to enhance or enable engagement in life activities, or occupations including ADLs and IADLs (American Occupational Therapy Association [AOTA], 2014). OT treatment goals incorporate personal, social, and environmental adaptations in order to promote overall health for individuals who have or are at risk of a health condition. The use of aquatic therapy can be a component of OT treatment in order increase occupational performance in occupations including ADLs and IADLs such as dressing, grooming, functional mobility, and meal preparation (AOTA, 2014). Some client factors that occupational therapists (OTs) can address in aquatic therapy can include body, mental, and neuromuscular functions. Furthermore, performance skills such as such coordination, alignment, stability, and manipulation can be addressed in a client by improving their muscle tone and endurance during a treatment session (AOTA, 2014). Aquatic therapy can impact occupational performance by helping ease daily task completion and prioritizing the safety of our clients when performing occupations such as ADLs, IADLs, work, and leisure in various contexts and settings.

The purpose of this research was to gather primary information from aquatic therapy practitioners to address the gap in literature regarding the use of aquatic passive range of motion (PROM) therapy and the impact on the client's engagement in meaningful occupations. Currently, aquatic therapy is a modality that is more commonly

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seen in disciplines such as physical therapy and massage therapy. OTs are constantly utilizing a wide array of therapies to meet the individual needs of each client, but the use of aquatic therapy in OT is limited. Aquatic therapy can be a beneficial modality to help clients maximize functional independence, complete daily tasks, and engage in meaningful activities. We designed an online, mixed methods survey to gather information regarding current practice of aquatic PROM therapy. We hoped to discover the aquatic therapy methods used by OTs, and the effectiveness and utilization of aquatic PROM therapy as a component of treatment in OT.

Literature Review

Aquatic therapy consists of exercises and activities performed in a pool or aquatic environment. It takes advantage of the properties of water to help improve the client's function (Shi et al., 2018). The positive effects of aquatic therapy have been shown in individuals with musculoskeletal conditions, arthritis and fibromyalgia, cardio and pulmonary pathologies, and more (Becker, 2009). Using the components of water, aquatic therapy practitioners use different types of water treatments in their practice to help their clients improve function and engage in their daily tasks.

Fundamentals of Aquatic Therapy

Aquatic therapy differs from land-based therapy as water has three properties that land-based therapies do not: buoyancy, viscosity, and the thermodynamic aspects of water exercise (Frohman et al., 2015). Buoyancy is defined as a "reduction in weight of the body within the buoyant medium of water" (Frohman et al., 2015, p. 864). The buoyancy of water enhances the environment for "the possibility of performing a greater variety of movements with greater ease and low impact" (Pérez de la Cruz, 2017, p. 831).

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This way, the water can “either facilitate or challenge horizontal movements and balance” (Chan et al., 2017, p. 233), increasing the effects of aquatic therapy for balance. By decreasing the load on the body, the individual can progress at a rate that may not have been possible in land-based therapies (Brady et al., 2008).

Viscosity is a dragging force that is generated when moving within water (Frohman et al., 2015). This type of force is useful for therapy as it “decelerates movements and retards falls, which prolongs the time available for regaining posture when the body gets out of balance” (Aveiro et al., 2017, p. 7). Reducing the fear of falling in the therapy pool can increase confidence so that individuals can challenge themselves beyond perceived limitations (Aveiro et al., 2017). The viscosity of the water in aquatic therapy can be beneficial as it improves the environment for balance, posture, and strength.

The thermodynamic aspect is the water’s ability to transfer heat at a significantly faster rate than air, thus sustaining heat temperatures between the water and body (Frohman et al., 2015). Typically, the temperature of the water for therapy can range from 30-34.5 °C. The warmth of the water “can have a therapeutic effect on rigidity [for individuals with Parkinson’s disease]” (Pérez de la Cruz, 2017, p. 831). A heated therapy pool can decrease pain levels and improve an individual’s functional abilities. For individuals with neurological or musculoskeletal alterations, the warmth can block pain receptors in the body, strengthen blood flow, and encourage muscle relaxation (Castro-Sánchez et al., 2012).

Land-based therapy is widely practiced throughout multiple disciplines and requires the individual to maintain balance control in opposition to the downward forces

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of gravity (Chan et al., 2017). However, if the individual has impairments influencing their ability to withstand the forces of gravity, there may be difficulties with practicing reactions to falls, training balance, and fearing a possible fall (Chan et al., 2017). While land-based therapies are used among various professionals and practice settings, research supports significant benefits for aquatic therapies compared to land-based therapy or in conjunction with land-based therapy (Aveiro et al., 2017; Chan et al., 2017). The strengthening of balance and posture in the pool can supplement the land therapy to maximize benefits for the individual. OT can address the engagement of meaningful occupations through the conjunction of aquatic and land-based therapy.

AROM and PROM

Aquatic therapy can be performed using active range of motion (AROM) or PROM techniques. Currently, most aquatic therapy rehabilitation incorporates AROM modalities. AROM can be defined as voluntary muscle contraction for joint movement and ROM (Lippert, 2017). In aquatic AROM exercises, the individual engages in exercises in water. This can include aerobic exercises, stretching and strengthening, and working on ROM (Shi et al., 2018). Ai Chi, for example, is an AROM exercise where an individual performs resistance training exercises and a series of yoga poses while in water (National Center on Health, Physical Activity and Disability, 2013). Performing AROM exercises in warm water has shown to be highly effective across a variety of diagnoses. Studies exhibit decreases in pain for clients with fibromyalgia and patients with lower back pain, improvements in balance for clients with Parkinson's disease, and those who have experienced a stroke (Segura-Jiménez et al., 2012; Shi et al., 2018; Pérez

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de la Cruz, 2017; Chan et al., 2017). These studies illustrate and justify the positive benefits of AROM aquatic therapy.

On the other hand, PROM can be defined as passive joint movement of the individual facilitated by a practitioner (Lippert, 2017). The individual is fully or partially submerged in water and maneuvered through various sequences with the support of a practitioner (Chon et al., 2009). The practitioner performs the entirety of the exercise while the individual can feel weightless and find relaxation throughout the session (Chon et al., 2009). For example, Water Shiatsu (WATSU®) is an example of an aquatic PROM therapy that incorporates an arrangement of passive stretching and mobilization of the trunk, extremities and joints, deep breathing and unique pressure and rocking techniques specifically practiced for WATSU® (Tufekcioglu, Erzeybek, Kaya, & Ozan, 2018). Another example of PROM therapy is AquaStrech™. This is a technique where a practitioner assists a client in various exercises and stretches in a gravity reduced aquatic environment (Alejo et al., 2018). While there is evidence for AROM, research is limited regarding aquatic PROM exercises as an effective intervention in OT.

Implications of PROM in Occupational Therapy

At present, the growing research of aquatic therapy PROM modalities, such as WATSU®, can reduce pain for clients with fibromyalgia, and increase control of spasticity and ambulation for clients with hemiparesis who have experienced a stroke (Faull, 2005; Chon et al., 2009). According to Ribeiro et al. (2019), individuals with Parkinson's disease were able to engage in IADLs with greater ease and autonomy. In a study on the effects of WATSU® and women in their third trimester, results showed a decrease in perceived stress and improvements in mental health and quality of life (QoL).

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Additionally, participants of this study stated that they felt relaxed, reported a decrease in pain, and improved trunk mobilization (Schitter et al., 2015). Furthermore, a study illustrated significant improvements in ROM for individuals with a total knee arthroplasty after performing an AquaStrech™ intervention during a therapy session (Kochar, 2011). Another study illustrated how AquaStrech™ may be an effective form of therapy to improve lower extremity function in injured athletes (Alejo, Shilhanek, Mcgrath, & Heick, 2018).

Evidence suggests that PROM modalities such as WATSU® and AquaStretch™ would be beneficial to the field of OT. Incorporating interventions from multiple practices will create an avenue for OTs to consider WATSU® or other modalities in practice. Aquatic therapy has the potential to be a client centered approach to helping individuals across all populations holistically, increasing their overall well-being across all dimensions of their life.

Statement of Purpose

OT strives to help individuals reach their fullest potential and help them engage in their meaningful daily activities (AOTA, 2014). As the profession advances, new components of therapy arise that may enhance the improvement of functional independence. The purpose of this study was to gain more knowledge from multidisciplinary professionals such as physical therapists, massage therapists, and physiotherapists regarding their experiences with aquatic therapy. Participants completed an online survey to gather more information to address the gap in literature regarding the use of aquatic PROM therapy and the impact on the client's physical and psychological well-being. Aquatic therapy as a modality is utilized across multiple disciplines, however

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our research was limited to discover its implications in OT. Therefore, the survey was open to all practicing aquatic therapists in order to assess its effectiveness in the scope of practice. The collection and analysis of the online survey data has increased awareness of the effectiveness of aquatic PROM therapy in OT.

Theoretical Framework

The biomechanical framework is a bottom-up approach that focuses on the relationship between body functions and the task demands of occupations. Some examples of body functions include ROM, strength, endurance, and pain. The goals of the biomechanical framework are to prevent deterioration, maintain existing movements, restore movements, and compensate or adapt to loss of movements in relation to occupational performance (Cole & Tufano, 2008). OTs consider using the biomechanical framework for individuals with musculoskeletal conditions, trauma, or neurological disorders to address how deficits in ROM, strength, and endurance affect engagement in various activities such as bathing and dressing (Cole & Tufano, 2008). Similarly, PROM modalities such as aquatic therapy focus on movements and sequences of the body in water to improve the same body functions.

Range of Motion

ROM and kinematics focus on the angles and directions of human movement, and the amount of speed and acceleration of those movements. Human movement includes flexion, extension, abduction—moving away from the body—and adduction, meaning moving towards the body (Cole & Tufano, 2008). OTs focus on these ROM and kinematics to address and analyze human movement, and the forces that cause motion and stability. ROM and kinematics are two factors that OTs address and analyze in the

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activities of daily living. Limited ROM affects an individual's ability to engage in tasks and interact with their environment. Addressing these underlying factors is a role that an OT plays when creating, implementing, and grading interventions.

Strength

Strength refers to the stability and motion caused by muscle tension (Cole & Tufano, 2008). Strength is initiated when a group of muscles move or stabilize the body to perform simple to complex tasks. For example, strength is required to stand and walk. Sufficient strength in certain muscles is also needed for more complex activities such as driving. Stability is achieved when muscles co-contract. Stability is needed for more skilled movement to occur.

Endurance

Endurance is the ability to sustain muscles activity for extended periods of time. It involves the musculoskeletal system and cardiopulmonary system, making it more complex than ROM and strength. A person's health can impact endurance. For example, the presence of infection or disease can decrease endurance. Evaluating an individual's endurance is important in grading the time spent on treatment intervention and when to integrate rest periods within a treatment session (Cole & Tufano, 2008).

Pain

Pain is a concern for OTs because of its impact on biomechanical capacities such as ROM and strength that affect occupational performance. Pain evaluation is complex due to the subjectivity of individual pain tolerance and perception. Reducing pain can help increase tolerance and participation in AROM and PROM exercises leading to

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improved ROM, strength, and improved participation in occupations (Cole & Tufano, 2008).

OT Intervention

The biomechanical framework serves as a lens in assessment, intervention, and evaluation of people with occupational performance problems caused primarily by disease, injury, or an event that affects ROM, strength, and endurance. This refers to addressing how body structure and function affect an individual occupational performance. Some of the ways that people can change their biomechanical abilities involve changes in positioning, exercises, or engaging in tasks that involve stretching, lifting, and moving (Cole & Tufano, 2008). Passive stretching, for example, can create tension on the muscles and tendons but does not injure them through therapeutic handling with a practitioner such as an occupational therapist. Clients with musculoskeletal disorders, neurological disorders, and pain may benefit from a biomechanical framework lens to guide treatment plans. This framework focuses on reducing symptoms including spasticity, low muscle tone and poor postural control that can limit ROM, strength, and endurance.

Aquatic PROM therapy aims to improve physiological influences on the client with the water properties of the pool and the diversity in therapeutic techniques to address various body structures and functions that affect occupational performance in areas such as self-care, work, leisure, and social participation. OTs assess disengagement in meaningful occupations and provide clients with opportunities for re-engagement to improve their functional independence.

Methodology

Agency Description

We were responsible for the distribution and collection of the survey on behalf of Stanbridge University. Stanbridge University supported students and provided a platform to execute responsibilities. The agency allowed the students to administer the survey and receive responses within a specific time period.

Survey Design

The survey was developed in a mixed-methods design to gain insight from professionals in the field who perform aquatic therapy, specifically aquatic PROM. Participants completed a five to ten-minute, 17 question online survey regarding aquatic therapy through SurveyPlanet™. Survey questions were divided into five sections: demographics, therapy sessions, client information, client outcomes, and other/contact information. The survey gathered quantitative data regarding demographic questions that acquired data about the region of world they practice in, the scope of practice, the type of aquatic therapy practiced, and how many years of aquatic therapy training the participant has. The therapy session set of questions acquired data such as: the average percentage of the client's therapy session is in the water, how long an aquatic therapy session lasts, how often do clients attend sessions, and how are therapy sessions billed. The client information set of questions asked about which populations or diagnoses the participants have worked with and which demographics, defined by gender and age, do they work with the most. The client outcomes set of questions gathered qualitative data inquired what physical and psychological effects clients report after attending a session and what

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aquatic therapy techniques are shown to be helpful and unhelpful. The last section allowed the participants to comment on other topics that were not previously discussed in the survey and choose to disclose contact information to be contacted in the future for an interview.

Target population

The aim of this research study was to determine if aquatic therapy is a beneficial modality that can be applied to OT. In order to gather a broader understanding of aquatic therapy practice, the survey was distributed to a wide array of professionals who perform aquatic therapy. Professionals in the field include the following: OTs, physical therapists, massage therapists, athletic trainers, physiotherapists, WATSU® certified practitioners, and AquaStretch™ certified practitioners.

Recruitment Procedures

Participants were recruited through convenience sampling. The survey was advertised using flyers disseminated by email and posts on online platforms that linked the professionals to an online survey. The flyer and survey link were posted to online forums including: Aquatherapist Hub, the AOTA CommunOT forum, and the World Federation of Occupational Therapy online forum. The survey link was also given to personal recommendations of professionals by Dr. Hatala, such as the coordinator for the Worldwide Aquatic Bodywork Association (WABA) and the Aquatic Therapy Rehab Institute. The WABA coordinator individually emailed the survey to members of WABA. Lastly, we emailed the online flyer and survey link to 20 therapy clinics located in Orange County that practice aquatic therapy. Furthermore, one participant asked permission to share our survey via Facebook.

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Data Collection

The survey flyer was created on Canva, an online graphic design platform. The survey was created and posted on SurveyPlanet™. Participants clicked a unique link that directed them to our survey. Aquatic therapy professionals accessed the survey through a hyperlink in the flyer. The survey was completed by aquatic therapy professionals with internet access on a mobile device or computer. Survey responses were securely stored and accessed on SurveyPlanet™. Participants were informed of and agreed to the California Bill of Rights before proceeding with the survey.

Survey Implementation

The survey was dispersed on June 1, 2020 and collection ended on June 30, 2020. The collection dates were stated on the flyer provided. The flyer for the survey was uploaded online on the survey's start date.

Survey Evaluation

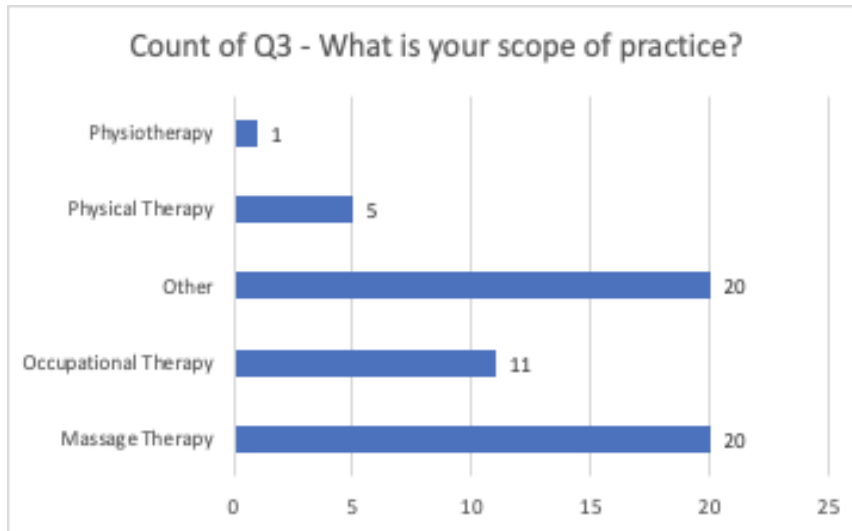
The quantitative questions were analyzed for frequency, mode, and percentage of the participants that participated. The qualitative responses were analyzed through descriptive analysis. We chose to manually analyze the qualitative responses to analyze the answers for recurrent themes. We divided the participants' responses amongst each of us to analyze. We discussed the common themes and most popular responses that emerged from the study. The last question of the survey provided the participants the option to be contacted in the future. The survey responses are helpful for future researchers to contact aquatic practitioners and to build on our findings.

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Results

A total of 57 participants responded to the survey. For the demographics section of the survey, 73.7% of the participants are from North America, 14% from Europe, 8.8% from Asia, and 3.5% from South America. Figure 1 displays the participant's scope of practice. The scope of practice of the participants showed 35.1% massage therapy, 35.1% other (including aquatic therapy, biodynamic cranio-sacral therapy, and WATSU®), 19.3% OT, and 8.8% physical therapy. For types of aquatic therapy, the majority of participants practice WATSU® therapy, aquatic AROM therapy, and others (including healing dance and water dance, cranio-sacral therapy, and ai chi). 50% of participants have 10+ years of aquatic therapy training, 28.6% have 1-5 years and 17.9% have 6-10 years.

Figure 1



62.5% of participants stated that on average, 75-100% of the client's therapy session is in the water. The next majority of 17.9% of participants stated that on average, 0-24% of the client's therapy session is in the water. Regarding the average length of an aquatic therapy session, 53.6% of participants reported one hour or more while 44.6% reported

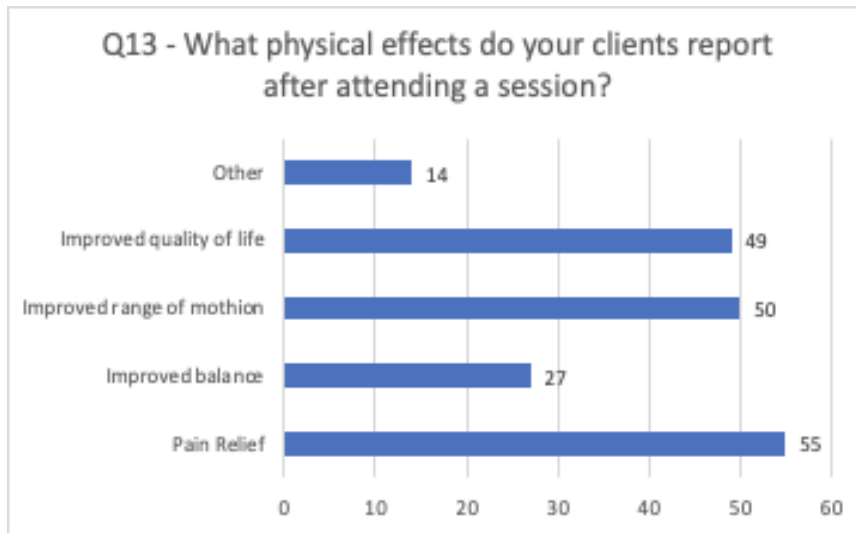
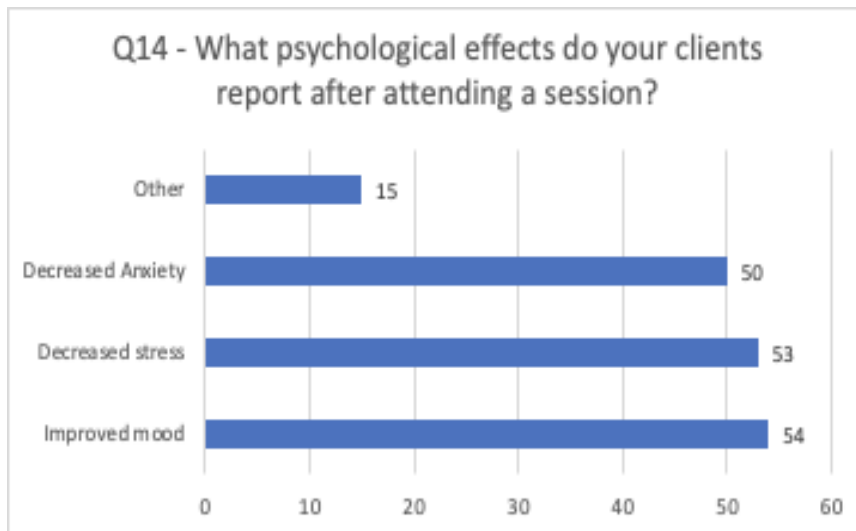
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30 minutes to one hour. The majority of clients, 38.2%, attended an aquatic therapy session weekly. 60% of therapy sessions are billed cash-based, and 14.7% are billed private insurance-based or government insurance-based.

The three most common diagnoses that participants have worked with are clients with musculoskeletal pain, psychological conditions (such as depression, PTSD, or anxiety), and physical disability/orthopedic rehabilitation. 51.7% of participants work with an equal number of males and females and 43.1% of participants work with females the most. The majority of participants, 55.7%, work with the adult population. Following the adult population are the adolescent and pediatric populations at 12.5% and 11.4%, respectively.

Figure 2 displays the physical effects that clients reported after attending a session. Participants reported that the three most common physical effects that their clients experienced after attending a session were pain relief, improved range of motion, and improved quality of life. Other physical effects include improved sleep, strength, and relaxation. Figure 3 displays the psychological effects that the clients reported after attending a session. Participants reported that the three most common psychological effects that their clients experienced after attending a session are improved mood, decreased stress and decreased anxiety. Other psychological effects include renewed hope, social-emotional effects, and decreased trauma symptoms. Participants self-reported various techniques that are shown helpful and unhelpful.

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Figure 2*Figure 3*

We analyzed the self-reported questions to discover themes in the responses. Techniques that were shown to be helpful include range of motion exercises, breath work, a therapeutic presence, and techniques such as neurodevelopment treatment, shiatsu, underwater handling, Pilates, yoga. For example, Participant 21 stated, “Any kind of nurturing noninvasive stretches and moves. Allowing the body to unfold

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effortlessly in freedom.” Techniques that were shown to be unhelpful include a dysfunctional client-therapist relationship, not being mindful of the body’s response, an unskilled therapist, fear of water, and environmental factors such as the impact of a shared pool on balance and stability. For example, Participant 35 stated,

Techniques will be successful or not according to the skillset of the therapist. The sensitivity, awareness, empathy, experience, presence and skill of the practitioner are infinitely more important than the technique. Techniques that emphasize these qualities are more successful than other techniques that do not emphasize the qualities mentioned.

Themes revealed from the participants’ comments regarding other topics that were not discussed in the survey bring attention to the importance of water temperature, emphasizing a holistic approach, and the capabilities of deep psychological and emotional healing. Forty-two participants presented their personal information to be contacted in the future for an interview.

Discussion

Currently, there is extensive research supporting the use of aquatic AROM therapy in various multidisciplinary fields to address pain, balance, and functional mobility. On the other hand, research is limited for support of aquatic PROM therapy in addressing pain, ambulation, and ROM. The results from our survey provided insight on the perspectives of aquatic practitioners around the world regarding aquatic PROM therapy and its effectiveness. We were able to learn more about aquatic practitioners’ scope of practice and levels of experience. The descriptive responses supported the need for further research regarding this topic. It also supported how OTs can benefit from

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learning aquatic PROM therapy techniques such as WATSU®. It revealed other techniques that can be beneficial to OT practice such as Water Dance, cranio-sacral therapy, and strategies for using aquatic therapy to treat PTSD. The survey has opened further opportunities to contact and engage with aquatic practitioners and ask more questions as to how clients benefit from receiving aquatic PROM therapy.

The American Occupational Therapy Foundation (AOTF) focuses on eight research priorities. The results from our survey align with two of AOTF's research priorities: emotional and physiological influences, and also safety and injury prevention in home, clinical, and community settings (AOTF, 2015). Participants of our study reported that their clients received benefits that have helped their mental health such as increased mood, reduced anxiety, and decreased stress. Aquatic PROM modalities such as WATSU® enhance the health and well-being for many conditions and populations. Furthermore, addressing biomechanical factors such as strength, ROM, and postural control can have positive effects on the safety and health of clients in the home and community. Results from our study affirm that OT interventions that focus on restoring body functions and modifying the environment addresses what limits an individual in participating in everyday activities (AOTF, 2015).

Our study aligns with the AOTA's research areas of intervention, translational, and health services research. One major goal of intervention research is to develop interventions that evaluate the efficacy of OT interventions. Translational research examines how new ideas and theories may be integrated into theory and practice. Lastly, health services research aims to examine evidence-based modalities and OT practice (AOTA, 2018). Our study recognizes that research aquatic PROM modalities such as

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WATSU® and AquaStretch™ in OT is still in its early stages. Our survey results contain preliminary information that can be used to further expand the knowledge base on the role of PROM aquatic therapy as a feasible modality for OT practice.

Limitations

Our survey focused on gaining information from aquatic therapy practitioners as there is an unknown number of OTs that practice aquatic therapy. To gain as much knowledge and information on aquatic therapy, we sent out our flyer to a wide audience. Consequently, sending out a flyer on an international forum provided data from regions of the world that may or may not be applicable to aquatic therapy in the United States. Moreover, there is a lack of research in the field of aquatic therapy, especially as it pertains to occupational therapy. Our survey was also limited to individuals who can read and write in English and have access and the ability to operate a computer.

There are several concerns regarding the recruitment process. The survey was posted in public forums. Depending on how many aquatic therapists are actively engaged in public forums, the amount of participation will vary. The IRB application initially stated that the survey would be posted on online forums such as Reddit. However, the community guidelines restricted the ability to post survey links on the website. Due to the unprecedented COVID-19 pandemic, we were also unable to share physical flyers. This may have limited our survey recruitment process. Additionally, many participants omitted answers to questions they do not feel comfortable answering. However, when questions were left blank, the participant was able to move on to the next question. Participants provided subjective answers based on their personal experiences as practitioners in aquatic therapy.

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Lastly, the sample size of our survey was 57 respondents. This sample size may not be generalizable to all aquatic therapists and OTs who practice PROM modalities. Thirteen respondents practiced in Europe, Asia, or South America. Aquatic therapy practices across the globe may not be generalizable to United States standards and expectations.

Ethical and Legal Considerations

Principles and standards of conduct that we observed during our research to our participants include autonomy, beneficence, justice, and role fidelity. Through upholding these principles, we ensured that our participants were free from harm during the study, the information obtained will be kept confidential, and data was analyzed objectively (AOTA, 2015).

All results were collected in a manner that ensured anonymity, and participants were not required to disclose their identity. However, at the end of the survey, some participants chose to disclose their contact information such as first and last name, phone number, and email address to be contacted for future research. Some demographic questions were included in the survey (such as geographic location or scope of practice). All responses from the participants were secured through a password protected account on SurveyPlanet™. Individuals who have access to the account include our team and thesis advisor. After completion of research, the password will be changed, and we will no longer have access to survey results. There are minimal risks due to the cybersecurity of sending the survey via the internet. Additionally, their confidentiality will be protected by presenting only the results and responses of the survey. There will be no identifiable information displayed regarding the survey results for individuals who do not opt to be

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contacted for future research. Costs of the participants will include time and effort. There were no monetary costs to the participants.

Conclusion

AOTA's Centennial Vision seeks to "increase and accelerate the adoption and application of science-driven, evidence-based OT practices that lead to better client outcomes" (AOTA, 2015). The development of the online survey was designed to gain more knowledge and insight from aquatic therapy practitioners on the benefits and outcomes that result from aquatic therapy. Future researchers can use these findings to further investigate the effects of aquatic modalities such as WATSU® in conjunction with OT treatments. By introducing aquatic therapy into the field of OT, practitioners can provide client-centered care utilizing evidence-based practice. Future research such as randomized control trials need to be conducted to investigate the efficacy and effectiveness of WATSU® practices.

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Appendix

Institutional Review Board Approval

IRB Application Number	MSOT009-011
Date	03/30/2020
Level of Review	Exempt Category 2 (i) Research involving the use of educational tests, survey procedures, interview procedures or observation of public behavior and information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained.
Application Approved	X
Conditional Approval	
Disapproved	
Comments	Minor changes have been submitted and conditions have been approved. This application is complete.
Signature of IRB Chair	