Retrospection: An Innovative Strategy to Assess the Benefits of an Aquatic Exercise Program on Well-Being during the Pandemic

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Abstract

The pandemic prevented participant research in all aspects of the physical and occupational therapy professions, and aquatic exercise research was significantly impacted. Despite the challenges, insightful research was conducted. This paper provides an example of one of those research studies.

Background and Purpose: Students in a doctoral occupational therapy program were required to perform research, but the pandemic did not allow for in-person participant research in an aquatic setting, so a retrospective study was conducted. Aquatic exercise has been shown to improve endurance and physical fitness, but the impact of aquatic exercise on overall well-being has not been widely studied. The goal of this retrospective survey study was to look at the effects of aquatic exercise on feelings of well-being in an older adult population, and on the students who helped conduct the program.

Methods: Occupational and physical therapy graduate students, who led an aquatic exercise program for older adults while under the supervision of a faculty member, completed the 42-item Ryff Psychological Scales of Well-Being (Ryff), and the 14-item Scales of General Well Being (SGWB). The older adults served also completed these standardized assessments. For each question, participants answered how they felt before participating in the program (pre-test), and again after completing the program (post-test). They also answered one qualitative question about how the program impacted their feelings of well-being. Non-parametric data analysis was used for between and within group effects.

Results: The Ryff revealed a statistically significant increase in all dimension scores when both groups were studied together (autonomy, $p < .001$; environmental mastery, $p < .001$; personal growth, $p < .005$; positive relations with others, $p < .005$; purpose in life, $p < .01$; and self-acceptance, $p < .005$). When the groups were analyzed separately, the students' Ryff results demonstrated a more significant change than the older adults. All 14 items on the SGWB showed a statistically significant difference when both groups were studied together, with the total SGWB demonstrating the most significant increase ($p < .000$). When analyzed separately, there was little difference between the two groups. Four themes emerged from the qualitative data: feelings of physical improvement, mental well-being, social connectedness, and no change of feelings.

Discussion and Conclusions: In this retrospective study, both the students and older adults seemed to have benefitted from participating in the aquatic program by receiving physical benefits, increased well-being and social connectedness. Although this study did not utilize a real-time approach and focused on the participants' memory of events, it still supports the contention that aquatic exercise can be used to promote well-being, not only for the participants but also the student aquatic leaders. Caution when interpreting this information is recommended, as this was a retrospective study where the data was collected during the pandemic relying on the participants' memory related to well-being from years-past. Future participant research in an actual aquatic setting is recommended to further explore the effects of aquatic exercise on well-being.

Introduction

The pandemic prevented participant face-to-face intervention and research in all aspects of the physical therapy and occupational therapy professions (Palacios- Ceña, et al., 2021; Palacios- Ceña, et al., 2021a, Wittmeier et al., 2022), especially research related to aquatic exercise. Despite the challenges, insightful research was conducted. This paper provides an example of one of those research studies.

Physical exercise has been found to improve not only strength and endurance, but also feelings of well-being (Cordes et al., 2021; Klaperski et al., 2019; Mandolesi et al., 2018). According to the National Institutes of Health, exercise has been linked to many positive effects on an individual's physical and mental health, including reducing anxiety, stress, and depression while improving overall mood and well-being (NIH, 2022). Conversely, a lack of exercise can lead to more doctor visits, hospitalizations, and increased medicinal intake (Cordes et al., 2021). Aquatic exercise is a way to exercise in a low-impact environment, as the buoyancy of the water reduces pressure on bones and joints in the back and extremities resulting in decreased stress, improved heart health, and endurance (Mayo Clinic, 2022). Aquatic exercise may be appropriate for individuals who need lower impact exercises because they have difficulty performing land-based physical exercises that involve high impact movements. Aquatic exercise has been shown to improve a person's endurance and physical fitness (Görner & Rieneke, 2020; Neiva et al. 2018), but the impact of aquatic exercise on overall well-being has not been widely studied.

The purpose of this research was to gain a better understanding of the effects of aquatic exercise on well-being, not only for the older adult participants, but for the graduate students who worked with them. Because this research study took place during the pandemic, and face-to-face interaction in the aquatic setting was not possible, a retrospective study was utilized.

Well-being, social participation, and exercise

Well-being is defined as the totality of human life domains, which include mental, physical, and social aspects, or feeling content with one's health, sense of others, and self-esteem, with value placed on how an individual feels about the roles they occupy, and the meaning and sense of belonging attached to their roles (WHO, 2022; Hammell, 2009).

Social participation and physical activity can have a positive effect on a person's well-being. Regular physical activity and social interactions have been shown to improve an older adult's subjective well-being (Cronly et al., 2019; Ottoni, 2016; Won et al., 2019). Also, participation in leisure activities, which may include exercise, can help lessen psychological distress and promote well-being in post-secondary students (Zhang & Zheng, 2017. Furthermore, the literature demonstrates a link between exercise and quality of life, suggesting that quality of life improves with physical activity (Baena-Beato et al., 2017; Kargarfard et al. 2012; Silva et al., 2011).

Well-being and aquatic exercise

There is extensive literature available that describes the relationship between well-being and exercise in general (Gaitan-Sierra & Hyland, 2011; Won et al., 2019); however, the specific impact of aquatic exercise on well-being has not been widely studied. Neville et al., 2014, found that participants experienced behavioral and psychological changes leading to improved well-being after participating in aquatic exercise, but overall, the available literature is very limited. Therefore, there is a clear gap in the literature describing the effects of aquatic exercise on well-being in adults. This study sought to identify the relationship between well-being and participation in an aquatic exercise program for both the older adults who participated in the aquatic exercise program, and the graduate students who helped lead the aquatic exercise program.

Methods

This study utilized a convergent mixed methods design that asked older adults and students to reflect on their well-being both before and after participating in an aquatic exercise program. Approval for this study was obtained from the Belmont University Institutional Review Board.

The Aquatic Exercise Program

The Aquifit program is a community-based aquatic exercise program, which was developed by Dr. Natalie Michaels, a PT who is ATRI certified and holds an Aquatic Clinical Competency Certificate through the Aquatic Section of the American Physical Therapy Association. The program typically includes one-hour aquatic exercise sessions, offered twice a week for four to six weeks. Each session consists of water aerobic exercises in waist to chest deep water, with accompanying music. Aquifit program goals include increasing participant endurance, balance, social participation, and weight loss. Physical and occupational therapy students led participants in the exercises for one to two songs; however, when not leading, the students participated by either performing the exercises on the edge of the pool or in the pool alongside the older adults.

Table 1. Aquatic exercise program description (Adopted in part from Michaels et al., 2021)

Minutes	Exercises
Warm Up (5 minutes)	Slow movement to the music, breathing exercises, and gentle stretches.
Balance Exercises (20 minutes)	Opposite hand to foot, jogging with arm push, standing balance on noodle, side bends, back bends, long-arm slow trunk rotations, short-arm fast trunk rotations, beach ball toss. Some of the exercises

	in this section were done with participants holding barbell shaped water weights.
Cardio Exercises (15 minutes)	Faster movement to the music. Light jumping, leg kicks in the water, marching, high knee steps, leg swings in all planes of motion, side shuffle, squats with back kicks, pool walking with current resistance, hamstring curls, jumping jacks, jogging, heel hops.
Coordination Exercises (15 minutes)	Opposite hand to foot, coordinated clapping, leg and arm exercises crossing midline, jogging with arm push, standing balance on noodle, beach ball toss.
Cool Down (5 minutes)	Light breathing exercises, gentle stretches, trunk bends, trunk rotation.

Participants

Potential participants, which included older adults and former/current graduate physical and occupational therapy students who had participated in the Aquifit program over a ten-year span, were recruited via an initial email sent by the primary investigator. A follow-up email was sent to ensure all who wanted to participate had the opportunity. Study participants included 25 graduate students and ten older adults between the ages of 22 and 77 (See Table 2 for additional demographics).

Table 2. Participants

Category	Students	Older Adults
N	25	10
Gender	2 male 23 female	2 male 8 female
Year Participated	11 attended in 2019 4 attended in 2018 2 attended in 2017 3 attended in 2016 2 attended in 2014 1 attended in 2013 1 attended in 2012 1 attended in 2010	2 attended in 2019 1 attended in 2018 2 attended in 2017 1 attended in 2016 3 attended in 2015 1 attended in 2013
Number of Times Participated	16 attended once 1 attended twice 1 attended 3 times 5 attended 7 times	3 attended once 2 attended 3 times 5 attended 4 times

Instrumentation

The 42-item Ryff Psychological Scales of Well-Being (Ryff) assesses positive functioning and several dimensions of well-being including autonomy, positive relations with others, environmental mastery, purpose in life, personal growth, and self-acceptance (Ryff, 1989). This assessment has been widely used in the literature and demonstrates strong psychometric properties (Ryff, 2014). The 14-item

Scales of General Well Being (SGWB) short form assesses overall well-being with high validity and reliability (Longo, Coyne, & Joseph, 2018). Qualitative data was collected from all participants via one open-ended question, "In your opinion, has participating in Aquatic Exercise changed your feelings of well-being in any way? If you answered yes, please elaborate."

Procedure

The recruitment emails contained a link to a Qualtrics survey which included a demographics questionnaire, the two standardized assessments, and the qualitative question. Participants provided implicit consent by initiating the survey. To assess each individual's well-being before and after participation in the Aquifit program, participants were asked to complete the standardized assessments twice, once reporting how they felt before participating in the program, and once reporting how they felt after participating in the program.

Data analysis

Quantitative Analysis

Quantitative data was analyzed using SPSS Statistics Software, Version 25 (IBM, 2022). A Wilcoxon Signed Rank Test was used to compare the difference in results of the SGWB and the Ryff pre and post-tests for the students and older adults who participated in the Aquifit program (within groups comparison). A Mann Whitney U Test was used to determine if there were significant differences between the older adults when compared to younger adult participants for the two scales (between groups comparison).

Qualitative Analysis

Researchers analyzed the qualitative data line-by-line resulting in open codes, followed by the creation of focused codes based on similarity of open codes (Charmaz, 2014; Corbin & Strauss, 2015). Then, the focused codes were further grouped into larger overarching themes. In-vivo codes were used when a response was well-written, and the researchers wanted to incorporate the participant's exact thoughts and feelings. The in-vivo codes were copied word for word into the manuscript (Charmaz, 2014). Rigor was preserved through a detailed audit trail, memos recording decisions made, and triangulation as six researchers collectively participated in the coding process and thematic development.

Results

Researchers analyzed the results of the survey to determine if any relationship existed between participation in Aquifit and well-being. Non-parametric analysis was conducted for both within-group effects and between-group effects based on age, gender, living situation, and timing of the classes, and correlations were used to compare relationships between gains and the number of times the Aquifit sessions were attended.

Quantitative Results

The SGWB – Within Group Differences

A Wilcoxon Signed Rank Test analyzed the within group differences between the pre-test and post-test of all 35 participants (N = 10 older adults; N = 25 students) taken together for the SGWB. All 14 items showed a statistically significant difference when comparing the pre-test to the post-test, with the most significant increase being the final SGWB score (p =.000, d = .897, very large effect size). When the two groups were separated, the 25 young adults showed increased scores for all 14 items on the SGWB, and on the total SGWB (students p =.000, d = .965, very large effect size). The 10 older adults also showed a significant increase in the total SGWB score (p =.018 , d = .727, large effect size,). See Figure 1.

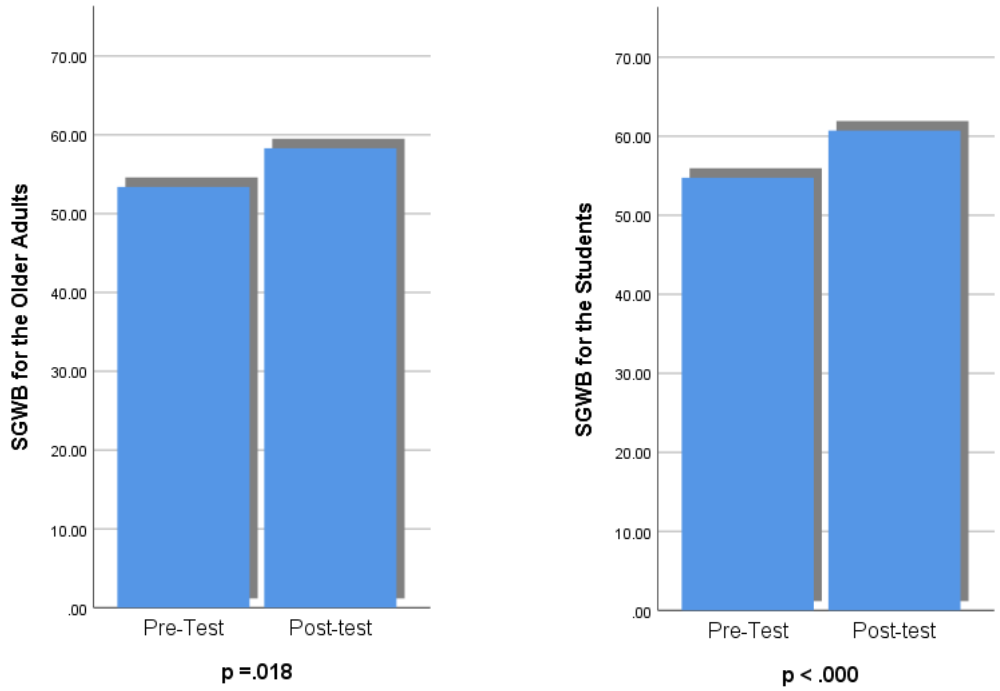

Figure 1. The SGWB Pre-Test and Post-Test for Older Adults and OT/PT Students

The SGWB – Between Group Differences

Both groups showed an increase in Total SGWB scores. Although the increase demonstrated by the students was greater than that of the older adults, a Mann Whitney U Test revealed no significant differences between the two groups (p <.529).

The Ryff – Within Group Differences

Only 32 participants answered the questions on the Ryff (N = 8 older adults; N = 24 students). A Wilcoxon Signed Rank Test found statistically differences between the pre-test and post-test (with an increase in score from pre to post) for within group differences when all participants were tested together for all the Ryff score dimensions: autonomy (p =.001; d = 0.234), environmental mastery (p =.001; d = 0.326) , personal growth (p =.002; d = 0.272), positive relations with others (p =.002; d = 0.185), purpose in life (p =.007; d = 0.197), and self-acceptance (p =.002; d = 0.256). Although all were statistically significant, the effects sizes were not large.

When looking at the two groups separately, two of the dimensional items for the older adults increased (autonomy and self-acceptance), but none were statistically significant. All the Ryff dimension scores demonstrated a statistically significant increase for the students: autonomy (p =.002, d = .351), environmental mastery (p =.001, d = .459), personal growth (p =.001, d = .472), positive relations with others (p =.005, d = .412), purpose in life (p =.002, d = .358), and self-acceptance (p =.002, d = .362).

The Ryff – Between Group Differences

Because group sizes differed, a Levine's independent samples t-test was used to test for homogeneity of variance. Results showed there is not enough evidence to claim that variances are comparable; therefore, the calculations utilized were based on the assumption that equal variances could not be assumed. The Mann Whitney U test to compare the Ryff scores between the 24 students and the eight older adults showed a statistically significant difference in scores from pre to post aquatic program participation for the students when compared to the older adults for environmental mastery (p = .001; d = 1.404), personal growth (p = .030; d = .946), purpose in life (p = .038; d = .961), and self-acceptance (p =

.007; *d* = .905) (See Figure 2).

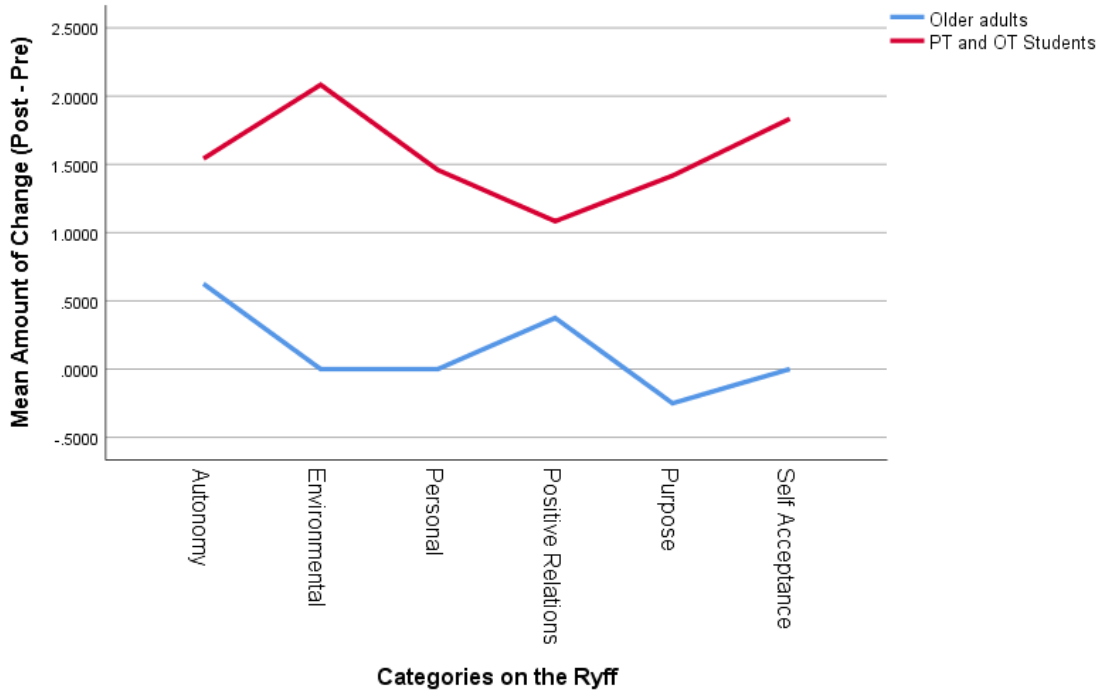

Figure 2. The Ryff Post-Test minus Pre-Test for Each Dimension

Qualitative Results

Qualitative data was collected to further understand the effects of the Aquifit program on the well-being of adults. The participants responded to the following question: "In your opinion, has participating in Aquatic Exercise changed your feelings of well-being in any way? If yes, please elaborate." Based on the participant responses, the following four themes emerged from the data: feelings of physical improvement, feelings of mental well-being, feelings of social connectedness, and no change in feelings.

Theme 1: Feelings of physical improvement.

In their response, the participants expressed feelings of physical improvement after participating in the Aquifit program. The theme of feelings of physical improvement was based on three focused codes: physical benefits, importance of physical well-being, and new and appropriate exercise. The older adults reported feelings of physical benefits as increased energy, increased strength, feelings of being pleasantly tired, healthy, and weight loss. One older adult participant stated, "the (Aquifit) sessions left me feeling upbeat and pleasantly tired." The older adult participants found Aquifit to be an appropriate, safe, and new way to exercise. One older adult described how Aquifit contributed to their overall well-being:

> (Aquifit) has the added benefit of the properties of warm water that give you additional resistance when moving without hurting. So many of us don't move because of pain. So, we get stiff and weak as a result. And move even less. Then withdrawal from social activities. Get depressed.

> Withdrawal further. More stiffness, more weakness, more pain... (Aquifit) was more than just exercise. It was a form of exercise that nearly anyone could do and adapt to fit their activity level in a way that did not hurt so much.

The student participants also reported the importance of physical well-being both pertaining to well-being as a whole and physical activity in general.

Theme 2: Feelings of mental well-being.

Both the older adult and student participants mentioned feelings of mental well-being being positively affected after participating in Aquifit. The theme of feelings of mental well-being was based on the following focused codes: promotes mental well-being, feelings of self-positivity, and enjoyable activity. Participants, older adults and students, reported feeling improved optimism, stress relief, feeling good, improved self-confidence, and feelings of accomplishment and empowerment. The older adults and students also noted that they felt present, uplifted, a sense of calm, a sense of enjoyment, and that Aquifit was a fun activity. One older adult participant exclaimed, "After each session, I couldn't stop smiling." One student participant stated:

> While I have always been a confident, extroverted person, "dance" and coordination have never been part of my expertise. I remember feeling embarrassed when I got up in front of everyone to "teach" a song, but I had tons of supporters in the pool. Some of my new friends (older attendees who are used to water aerobics) encouraged me to teach the song and told me to watch them when I got nervous. When I stayed on an exercise for too long, they would switch it up (from the water!) and I would follow suit.

Another student participant specifically wrote, "This experience was out of my comfort zone but definitely improved my confidence!"

Theme 3: Feelings of social connectedness.

Older adult and student participants expressed feelings of social connectedness in their response to the qualitative question. The theme of feelings of social connectedness was based on the following focused codes: sense of social connection, impacting others, and importance of social participation. The researchers made distinctions between these three focus codes by individually defining each code. Participants described social connection as receiving interactions with other people and the benefits that come from those interactions. For example, one student participant said "I had a ton of fun and would always hang out with the class attendees in the hot tub after. I will always remember enjoying the stories they told me!" Participants reported feelings of social connection, a sense of belonging, a judgement-free experience, and a decrease in isolation. One older adult participant explained, "It got people off their couches and chairs, out of isolation." For participants from both groups, they felt they had an impact on others by supporting the community, making a positive impact on others in general, and making a

positive impact on others' fitness and health goals. Finally, the importance of social participation is the acknowledgement that participating in social activities is important.

Theme 4: No change in feelings.

While most participants described a change in their well-being from participating in Aquifit, some participants, both older adults and students, expressed feeling no change in their well-being. The theme of no change in feelings was based on the following focused code: no change. The participants who reported no change in feelings regarding well-being when comparing how they felt before and after Aquifit indicated this in the initial yes or no question.

Discussion

This retrospective study, conducted during the COVID-19 pandemic, examined the effects of aquatic exercise on the recollected feelings of well-being in both an older adult population and from the students who helped lead the aquatic exercise program. Unfortunately, due to the pandemic restrictions, this study could not follow a more rigorous research design with participation in the aquatic setting. However, using a retrospective approach provided an insightful way to collect data when individuals were limited by pandemic required quarantines. This analysis utilized a survey to look at an individual's recollection of their feelings of well-being both before and after their participation in the aquatic exercise program years before. Although accuracy might have been a concern, the very idea that an individual remembered this activity as a positive experience lends credence to the powerful effects of aquatic exercise.

Quantitative Discussion

For the Ryff scores, the students yielded more statistically significant results showing greater improvement overall when compared to the older adults. For certain test items that were written in a more negative light, the answers seemed more positive after participation for the students and more negative for the older adults. For negatively worded questions on the Ryff, students improved, but older adults did not. The reason for this is unclear, however, may have been due to confusion from wording within the question, since wording is opposite to that of the other questions on the Ryff. Further research may be needed in this area. Some questions showed a decline after the aquatic exercise program which may have highlighted areas of concern that the older adults were previously unaware of having. For example, question 16 stated, "*I often feel lonely because I have few close friends with whom to share my concerns."* The older adults might have been unaware that they were lonely until after they felt a sense of belonging from their engagement in the Aquifit program. In addition, question 17, *"my daily activities often seem trivial and unimportant to me"* also had negative wording and yielded similar results. This could have been due to the older adult feeling satisfied during their daily activities prior to participation, but after coming to highly value and enjoy the Aquifit program, may have found their normal activities to seem

less exciting. Lastly, question 27 states, "*I do not enjoy being in new situations that require me to change my old familiar ways of doing things,"* which could indicate a desire to stay within the comfort zone, which would be difficult to drastically change from a short-term exercise program.

Both groups demonstrated statistically significant gains on the SGWB. Since the SGWB measures general well-being as opposed to the psychological well-being measured by the Ryff, it could be concluded that aquatic exercises work better to improve general well-being rather than psychological well-being specifically. The students, however, showed greater gains on the SGWB when compared to the older adults. A reason for these results could be that there is often a greater reward and impact when serving others than when being served, which directly correlates with the qualitative data. While the aquatic exercise was not provided as part of a clinical setting or therapeutic intervention for this study, these results can support the contention that if aquatic exercises were incorporated into therapy sessions, there is the potential that when looking at quality of life, there could be benefit for both the clients and therapists (Harvard, 2022).

Qualitative Discussion

Based on the qualitative data, aquatic exercise can have more than just physical benefits, as evidenced by two of the four themes. Participants reported various physical benefits from participation in the aquatic exercise. For some, this meant that the importance of physical well-being was emphasized, while for others this included discovering a new way to exercise that was appropriate and safe. Some participants noted the physiological changes and benefits that came from their Aquifit experience as a means for improving their well-being. As discussed in the reviewed literature, exercise yields several physical benefits[7] and has been linked to many positive effects on the physical aspects of well-being.[29] The results of this study suggest that engagement in aquatic exercise can improve physical well-being.

Furthermore, this study found that aquatic exercise can positively affect the mental well-being of adults, both young and old. Although the participants experienced aspects of mental health in a variety of ways, such as self-positivity or enjoyment of the activity, it is evident in the results that aquatic exercise changed the participants' feelings of well-being. The available literature highlights the connection between aquatic exercise and behavioral and psychological changes, suggesting that aquatic exercise may impact mental aspects of an individual's overall sense of well-being.[21] The results of this study are consistent with the evidence regarding mental well-being and support the use of aquatic exercise to improve the overall well-being of older adults.

Finally, the qualitative data showed that participating in aquatic exercise provided the participants with feelings of increased social connectedness as they made a positive impact on others within a judgment-free context. These findings are consistent with the literature that suggests that regular social interactions and activities positively impact social well-being.[13,14,15,29] Based on this connection, aquatic

exercise opportunities may provide a social component for people which can improve their overall well-being. Some individuals noted that their feelings of well-being did not change. No form of activity is universally beneficial and enjoyable for everyone, so it is possible that some people did not feel that aquatic exercise influenced their well-being.

The Relationship between Quantitative and Qualitative

As previously stated, there was a significant improvement in the Ryff scores for all participants taken together across all dimensional scores. This was further supported by the responses of the participants to the qualitative question. Within the qualitative data, participants reported improvements in their physical well-being, mental well-being, and social connectedness, which paralleled improvements in specific dimensions within the Ryff (e.g. social connectedness and positive relations with others; mental well-being, and purpose in life).

Greater quantitative improvements for the students may be due to a variety of factors, such as having an opportunity to lead and help others. Being able to instruct others in a way that is healthy and beneficial and will positively impact someone else's life makes participation even more meaningful. Many students noted feelings of empowerment and feeling like what they did was worthwhile, explaining why they scored higher on the SGWB. Although the students indicated greater improvements in well-being, older adults still experienced improvements. While the older adults did not receive potential benefits of leading the aquatic exercise program, there were still plenty of benefits associated with participation, as is evidenced by the numerous positive comments falling within the three main themes of the qualitative data.

Limitations

While this study yields promising results suggesting statistically significant effects of aquatic exercise on well-being in adults, there are limitations to consider. The sample size of 35 participants was relatively small, with only ten older adults and 25 students. Also, the student participants were all former students of the primary investigator and the older adults had previously received services at their residence by the primary investigator. It is possible that participants could have wanted to please the researchers, and more specifically the primary investigator, and therefore answered survey questions more positively, demonstrating the Hawthorne Effect (Cherry, 2021). This study also asked participants to rate a past experience. This was the only way to gain insight regarding outcomes during the COVID-19 pandemic, but because ratings were based on memory, this could be a limitation. This study also only surveyed participants from one specific aquatic exercise program, Aquifit at the Del Webb at Lake Providence residence in Tennessee. Further research is recommended to examine the effects on well-being when using different aquatic exercise programs. Furthermore, participants did not take the pre-test, followed by

participation in the program and then the post-test within a specific time frame. Instead, participants reflected on their aquatic exercise experience, which could have affected the reporting accuracy of their well-being before and after the program. Additionally, the Ryff is mixed with positively and negatively worded questions. While the researchers reverse coded the negative questions when analyzing the data, this could have caused confusion for participants when taking the survey and led to misinterpretation of questions.

Suggestions for Future Research

Future research would be beneficial to build on the findings of this study. Since this study was conducted retrospectively during the COVID-19 pandemic, replicating the research in real-time with pre-tests given prior to participation and post-tests given following participation is recommended. Also the study focused on two specific age groups (students and older adults), therefore, further research could be conducted to assess the consistency of the results with varying populations. This study also opens opportunities to research the ways in which aquatic therapy can impact the well-being of therapists in addition to clients in a clinical setting. Furthermore, future research could explore the individual themes of well-being (e.g., mental, physical, and social) and analyze their separate relationships with aquatic exercise. This would allow for further understanding of the impact of aquatic exercise on specific well-being domains. Lastly, future studies should utilize different aquatic exercise programs that vary in duration, frequency, and intensity to determine the impact that each component of aquatic exercise has on well-being.

Conclusion

This research supports the contention that aquatic exercise can promote overall well-being not only for those that participate, but also for those who lead the program. The results from the Ryff yielded improvements in well-being for both populations after participating in the aquatic exercise program; however, the students demonstrated greater improvement with the SGWB. The results of the qualitative data, including themes of physical and mental benefits and social connectedness, supported the quantitative data indicating that aquatic exercise has an overall positive impact on well-being in a variety of different ways. This research study also provides one example of how retrospective research can be conducted when in-person research is not possible.

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References

Baena-Beato, P.Á., Artero, E.G., Arroyo-Morales, M., Robles-Fuentes, A., Gatto-Cardia, M.C., Delgado-Fernández, M. (2014). Aquatic therapy improves pain, disability, quality of life, body composition and fitness in sedentary adults with chronic low back pain. A controlled clinical trial. *Clinical Rehabilitation*, *28*(4) 350–360. https://doi.org/10.1177/0269215513504943

Charmaz, K. (2014). *Conducting Grounded Theory (2nd ed.)*. Washington, DC: Sage Publications, Inc.

Cherry, K. (2021). How does the Hawthorne effect influence productivity? *Very Well Mind.* Retrieved March 04, 2021, from https://www.verywellmind.com/what-is-the-hawthorne-effect-2795234\

Corbin, J., Strauss, A. (2015). *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory (4th ed.)*. Washington, DC: Sage Publications, Inc.

Cordes, T., Zwingmann, K., Rudisch, J., Voelcker-Rehage, C., Wollesen, B. (2021). Multicomponent exercise to improve motor functions, cognition and well-being for nursing home residents who are unable to walk – A randomized controlled trial. *Experimental Gerontology*, *153* (2021): 111484. https://doi.org/10.1016/j.exger.2021.111484

Cronly, J., Duff, A., Riekert, K., Horgan, A., Lehane, E., Perry, I., Fitzgerald, A., Howe, B., Chroinin, M. N., Savage, E. (2019). Positive mental health and wellbeing in adults with cystic fibrosis: A cross sectional study. *Journal of Psychosomatic Research*, *116*, 125–130. https://doi.org/10.1016/j.jpsychores.2018.11.016

Gaitan-Sierra, C., Hyland, M.E. (2011). Nonspecific mechanisms that enhance well-being in health-promoting behaviors. *Health Psychology*, *30*(6), 793–796. https://doi.org/10.1037/a0025582

Görner, K., Rieneke, A. (2020). The influence of endurance and strength training on body composition and physical fitness in female students. *Journal of Physical Education and Sport, 20* (Supplement issue 3): 2013 – 2020. https://doi.org/10.7752/jpes.2020.s3272

Hammell, K.W. (2009). Self-care, productivity, and leisure, or dimensions of occupational experience? Rethinking occupational "categories." *Canadian Journal of Occupational Therapy*, *76*, 107–114. https://doi.org/10.1177/000841740907600208

Harvard Health. (2022). *5 ways exercise improves your quality of life. Harvard Health.* Retrieved February 11, 2022, from https://www.health.harvard.edu/healthbeat/exercise-advice-for-people-with-heart-problems

IBM. (2022). *IBM SPSS Statistics* (Version 25). [Software]. Retrieved February 11, 2022 from http://www.ibm.com/analytics/spss-statistics-software

Kargarfard, M., Etemadifar, M., Baker, P., Mehrabi, M., Hayatbakhsh, R. (2012). Effect of aquatic exercise training on fatigue and health-related quality of life in patients with multiple sclerosis. *Archives of Physical Medicine and Rehabilitation*, *93*(10), 1701-1708. https://doi.org/10.1016/j.apmr.2012.05.006

Klaperski, S., Koch, E., Hewel, D., Schempp, A., Müller, J. (2019). Optimizing mental health benefits of exercise: The influence of the exercise environment on acute stress levels and wellbeing. *Mental Health and Prevention*, *15*(2019): 200173. https://doi.org/10.1016/j.mhp.2019.200173

Longo, Y., Coyne, I., Joseph, S. (2018). Development of the short version of the scales of general well-being: The 14-item SGWB. *Personality and Individual Differences, 124,* 31-34. https://doi.org/10.1016/j.paid.2017.11.042

Mandolesi, L., Polverino, A., Montouri, S., Foti, F., Ferraioli, G., Sorrentino, P., Sorrentino, G. (2018). Effects of physical exercise on cognitive functioning and wellbeing: Biological and psychological benefits. *Frontiers in Psychology*, *9*: 509. https://doi.org/10.3389/fpsyg.2018.00509

Mayo Clinic. (2020). Aquatic exercises. *Mayo Clinic*. Retrieved February 11, 2022 from https://www.mayoclinic.org/healthy-lifestyle/fitness/multimedia/aquatic-exercise/sls-20076730?s=1

Michaels, N.N., Espiritu, E.W., Broecker, M., Gonyea, S., Hendricks, T., McClintock, K., Sanders, K., Stelbasky, D. (2021). Aquatic exercise and its effect on participation, quality of life, and falls self-efficacy in older adults: A pilot study. *Journal of Aquatic Physical Therapy, 29(3): 78-84.* https://doi.org/10.1097/PXT.0000000000000004

Neiva, H.P., Fail, L.B., Izquierdo, M., Marques, M.C.. Marinho, D.A. (2018). The effect of 12 weeks of water-aerobics on health status and physical fitness: An ecological approach. *PLOS ONE*, 2018; *13*(5): e0198319. https://doi.org/10.1371/journal.pone.0198319

Neville, C., Henwood, T., Beattie, E., Fielding, E. (2014). Exploring the effect of aquatic exercise on behaviour and psychological well-being in people with moderate to severe dementia: A pilot study of the Watermemories Swimming Club. *Australasian Journal on Ageing*, *33*(2): 124-127. https://doi.org/10.1111/ajag.12076

NIH (2022). Real-Life benefits of exercise and physical activity. *National Institutes of Health*. Retrieved February 11, 2022 from Real-Life Benefits of Exercise and Physical Activity | National Institute on Aging (nih.gov)

Ottoni, C.A., Sims-Gould, J., Winters, M., Heijnen, M., McKay, H.A. (1016). "Benches become like porches": Built and social environment influences on older adults' experiences of mobility and well-being. *Social Science & Medicine*, *1982*(169): 33–41. https://doi.org/10.1016/j.socscimed.2016.08.044

Palacios-Ceña, D., Fernández-de-las-Peñas, C., Florencio, L.L., Palacios-Ceña, M., de-la-Llave-Rincón, A.I. (2021). Future challenges for physical therapy during and after the COVID-19 pandemic: A qualitative study on the experience of physical therapists in Spain. *International Journal of Environment Research*, *18*:8368. https://doi.org/10.3390/ijerph18168368

Palacios-Ceña, D., Fernández-de-las-Peñas, C., Florencio, L.L., de-la-Llave-Rincón, A.I.,

Palacios-Ceña, M. (2021a). Emotional experience and feelings during first COVID-19

outbreak perceived by physical therapists: A qualitative study in Madrid, Spain. *International Journal of Environmental and Public Healt*h, *18*(1), 127. https://doi.org/10.3390%2Fijerph18010127

Ryff, C.D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology, 57*(6): 1069-1080. https://doi.org/10.1037/0022-3514.57.6.1069

Ryff, C.D. (2014). Psychological well-being revisited: Advances in the science and practice of eudaimonia. *Psychother Psychosom., 83*(1):10-28. https://doi.org/10.1159/000353263

Silva, R., Rizzo, J.G., Filho, P.J.B.G., Ramos, V., Deans, S. (2011). Physical activity and quality of life of amputees in southern Brazil. *Prosthetics and Orthotics International, 35*(4), 432-438. https://doi.org/10.1177/0309364611425093

WHO. (2022). Constitution of the World Health Organization. *World Health Organization.* Retrieved February 11, 2022 from https://www.who.int/about/governance/constitution

Wittmeier, K.D.M., Hammone, E., Tymko, K., Burnham, K., Janssen, T., Pablo, A.J., Russell, K., Pierce, S., Contello, C., Protudjer, J.L.P. (2022). "Another Tool in Your Toolkit": Pediatric occupational and physical therapists' perspectives of initiating telehealth during the COVID-19 pandemic, *Physical & Occupational Therapy In Pediatrics*, *42*(5): 465-481. https://doi.org/10.1080/01942638.2022.2065898

Won, D., Bae, J.S., Byun, H., Seo, K.B. (2019). Enhancing subjective well-being through physical activity for the elderly in Korea: A meta-analysis approach. *International Journal of Environmental Research and Public Health*, *17*(1). https://doi.org/10.3390/ijerph17010262

Zhang, J., Zheng, Y. (2017). How do academic stress and leisure activities influence college students' emotional well-being? A daily diary investigation. *Journal of Adolescence (London, England.)*, *60*, 114–118. https://doi.org/10.1016/j.adolescence.2017.08.003