

Zhang G and Liu X. (2024) THE IMPACT OF SWIMMING TRAINING ON PHYSIOLOGICAL AND PSYCHOLOGICAL INDICATORS IN INDIVIDUALS OF DIFFERENT AGE GROUPS: A CROSS-SECTIONAL STUDY. Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte vol. 24 (94) pp. 164-181.

DOI: <https://doi.org/10.15366/rimcafd2024.94.012>

ORIGINAL

THE IMPACT OF SWIMMING TRAINING ON PHYSIOLOGICAL AND PSYCHOLOGICAL INDICATORS IN INDIVIDUALS OF DIFFERENT AGE GROUPS: A CROSS-SECTIONAL STUDY

Guobao Zhang¹, Xurui Liu^{2,*}

¹ School of Police Law Enforcement Abilities Training, People's Public Security University of China. 100038. China.

² China College of Swimming, Beijing Sport University, 100084, China.

E-mail: titaikangfu@vip.163.com

Recibido 16 de Abril de 2023 **Received** April 16 2023

Aceptado 22 de Diciembre de 2023 **Accepted** December 22, 2023

ABSTRACT

Swimming training is a kind of aquatic exercise that has been shown to be beneficial to physical fitness at any age. This study aimed to determine how mental and physical aspects of swimming affect aerobic and anaerobic capacity describes the physiological and psychological effects of swimming training at different ages. This study examines how swimming impacts youthful and elderly cardio-respiratory fitness, muscular strength, flexibility, and body composition. A correlation and stepwise regression analysis was performed on the information gathered from a RESTQ-76 sport questionnaire, a Heart Rate Variability (HRV) test, and the efforts of swimmers to improve their aerobic and anaerobic swimming performance. We also investigate the benefits that swimming has on lowering stress, boosting self-esteem, and improving mental health for people of varying ages. We use SPSS version 17.0 was used for the statistical analysis. An examination of the relevant research reveals that swimmers of all ages enjoy significant advantages as a result of their training, including enhancements to their physical and mental health. In that case, they can be able to tailor swimming programs to match the changing physiological and psychological needs of their swimmers. Findings from this study add to a growing body of evidence that open-water swimming is perceived to have positive effects on participants' mental and physical health regardless of age and can be used to inform co-created policy formation to advance outdoor recreation possibilities that are safer, healthier, and more sustainable about this

expanding outside activity.

KEYWORDS: Swimming Training, RESTQ-76 Sport, Physiological and Psychological, Open Water Swimming

1. INTRODUCTION

Swimming is the only form of exercise suggested for more than 80% of medical disorders. It is enjoyed by individuals of all ages and physical abilities, and it is appropriate for people of all ages, even older people. Swimming helps individuals avoid hostility and aggravation while alleviating mental tensions and anxiety by competition and daily stress (Bozano et al., 2020). Swimming is beneficial from a psychological viewpoint for this reason. Swimming is another delightful sport that is great for decompressing after a hard day at the office. After making contact with water, one could experience a sense of relaxation and calmness on the physical and mental levels (Stenner, Buckley, & Mosewich, 2020). The constant rhythm of the stroke, complete submersion, and focused technique result in a rapid improvement, giving the impression of a relaxing meditation in the water. Swimming can be beneficial to health in many ways. Swimming is an excellent cardiovascular and circulatory workout because it employs your entire body (Poole et al., 2020), which puts more demand on heart than it would normally put on arms and legs. As a result, swimming is one of the best exercises can do for your kindness and circulation. Swimming over longer lengths requires taking deeper, more regular breaths, which is good for your lungs. Swimming is another activity that's great for making friends (Hutchison, 2022).

Even while the incidence of mental illnesses such as depression is the increase, in general, people's health and mental well-being are becoming better, and the harmful activities they engage in getting better (Godinić & Obrenovic, 2020). Both the emerging adulthood and the early adulthood period are marked by exceptional development of physical and sensory abilities. However, aspects of one's lifestyle, such as nutrition, weight, exercise, sleep habits, use of alcohol and tobacco, and addiction to drugs, might have an impact on one's chances of surviving and general health. Adults in the middle years have despair, anxiety, agitation, and other significant mental illnesses. People in later stages of life have an increased chance of getting these conditions of worthlessness and despair (Maj et al., 2020). This is in comparison to persons who are either younger or older. It is a wonderful way to relax while conversing about a wide range of topics while trading swimming tips and ideas with other people in the water. In addition, have the opportunity to engage in conversation with people of all ages when going to the pool, which happens less in our society (Greenwood & Fletcher, 2021).

This is a key stage in their lives that is distinguished by mentally

exhausting challenges that may produce depressive symptoms. Children between the ages of 10 and 12 are in a phase of transition from childhood to adolescence (ATALAYIN, Hürmüz, & YURDAKUL, 2021). This is a time when they are transitioning from childhood to adolescence. A child's stress at school may impact other students' conduct and academic performance, which may alter the school's mood. In late adolescence, when students are beginning college, they experience the challenges of moving from home to school and transferring their dependence from family to themselves and their friends (Camacho-Morles et al., 2021). Therefore, regular physical activity benefits one's physical and emotional well-being (Herbert, Meixner, Wiebking, & Gilg, 2020). In similar vein, the hypothesis that regular physical exercise improves mental health is supported by a growing body of research on well-being. Many empirical studies and several plausible theoretical explanations back it up.

1.1. Contributions of the study

- This study wanted that how the mental and physical aspects of swimming are important for the development of aerobic and anaerobic capacity in swimmers.
- This study gives a brief account of the physiological and psychological symptoms connected with swimming training for persons of varied ages.
- The study adds to the expanding body of data that open-water swimming is beneficial to mental and physical health, and it may help shape co-designed policy initiatives to increase the accessibility, safety, and sustainability of this popular form of outdoor leisure.

The literature analysis of the objective of this paper is shown in section The materials and methods contain the data collection of different age groups of swimmers, and their Physiological and Psychological Indicators in Individuals are shown in Section 3. The other age group of the swimmer and their physical activity in the analysis of the output graph are shown in section 4. The discussion and the end of the paper are shown in sections 5 and 6.

2. Related Works

The study (Griban et al., 2019) suggested findings on the dynamics of students' psycho-emotional states and unique psychological traits during physical education are presented in this article. There were sixty students included in the study. The technique was followed to determine the type of temperament, emotional stability, and amount of extraversion. The article (Silva et al., 2020) set out to confirm whether or not children with attention deficit hyperactivity disorder benefit from a swimming-learning program in terms of mental health markers, cognitive ability, and motor control. The study (Haddad, Abbes, Mujika, & Chamari, 2021) examined the global populations that have

been limited as a consequence of the COVID-19 outbreak, which has affected many areas of life. Major swimming competitions have been postponed or canceled due to several critical decisions made by (FINA) Federation Internationale de Natation (Praks & Brkić, 2020).

The research (Ntoumanis et al., 2021) examined that employed an experimental design, evaluated an intervention grounded on self-determination theory (SDT), assessed a minimum of one motivational construct derived from SDT, and included at least one indicator of behavioral health, physical health, or psychological health qualified for inclusion. The article (Kekäläinen, Freund, Sipilä, & Kokko, 2020) demonstrated that engaging in physical exercise during leisure time is correlated with greater internal health and happiness. However, there hasn't been much research done on the relationships between various forms of physical leisure activities and other aspects of mental health. The study (Haible et al., 2020) suggested to verify a self-report measure to evaluate adolescent control skills in the areas of psychology and physiology. Second, links were analyzed among control competence, sports participation, and physical fitness, as well as control competence's foundational components, motivation, and knowledge. The study (Feijen, Tate, Kuppens, Claes, & Struyf, 2020) investigated the relationship between swimming and developing shoulder pain throughout a professional swimming career. Competing swimmers put their bodies through a lot of swim training, which can strain the soft tissue structures and aggravate shoulder discomfort. It is important to identify the specific aspects of exercise connected to the injury before making any suggestions for practice (Sivakumaran, Khashram, & Haggart, 2018).

The article (Mamurov et al., 2020) analyzed how students' healthy lifestyles are developing, providing a definition of a healthy lifestyle from a pedagogical perspective, as well as a description of the prerequisites for using an ecological strategy for healthy lifestyle development among students with the context of reform to higher education system. The research (Park et al., 2020) investigated how a forest treatment program affected the physiological changes of 53 middle-aged city dwellers (who were split into two groups). One group of program participants spent three days in the city, followed by three days in the wilderness; the other group did similar activities. The article (Karasiévych et al., 2021) demonstrated the necessity of developing an efficient athlete training program, which is the cornerstone for guaranteeing greater success in sports and contributes to an increase in the body of scholarly and scientific studies on youth education, physical education, and sports pedagogy.

The study (Etxebarria, Mujika, & Pyne, 2019) examined the variety of triathlon competitions, including sprints, Olympic distances, long distances, and the Ironman, all characterized by the sequential completion of swimming, cycling, and running. Triathletes run the danger of injury, sickness, or exhaustion due to the massive amount of time and effort put into training to

shown improvements in fitness and performance. In the article (Andrieieva et al., 2019) comparing participants' biological ages to their chronological ages and measuring their pace of aging, hoped to get insight into exercise influences the aging process in older people. The study provides the data that came from two different sets of participants. The study (Leguizamo et al., 2021) examined perfectionism and aimed to investigate how high-performance athletes' trait anxiety relates to their mood, depression, state anxiety, and stress to study how athletes deal with the stress of confined because of the COVID-19 epidemic and assess whether or not they were effective at mitigating their negative emotional states. The study (De Sousa et al., 2021) examined the second coronavirus responsible for the current outbreak. For thousands, quarantined during a coronavirus disease 19 (COVID-19) epidemic might reduce their daily caloric expenditure and movement, resulting in sedentary behavior and a rise in the frequency of health conditions. Many chronic illnesses are treated with exercise as a non-pharmacological alternative. The article (Britton, Kindermann, Domegan, & Carlin, 2020) examined to explore blue space's effects on targeted initiatives. More and more people are learning about the positive impact of near water, or blue room, on their health. Nature-based therapies are exceeding expectations, and the health or well-being benefits of blue space treatments, for which there is rising scientific data, have to be subjected to comprehensive assessment. The research (Keiner et al., 2021) suggested that sprint swimming performance was correlated with upper- and lower-body maximal strength and vertical jump height. Swimming workouts should include lower and upper body strength and power exercises for this reason, and strength testing should measure maximal strength in the squat and bench press.

The study (Xie et al., 2019) suggested the inflammatory neurodegenerative illness of a disease, multiple sclerosis (MS), targets the brain and spinal cord. Multiple sclerosis animal models, including experimental autoimmune encephalomyelitis (EAE), suggest that exercise may improve certain disease symptoms. However, the degree of training in these first experiments on mice could have been higher. The study (Barbosa et al., 2023) indicated that Analysts in the swimming world provide coaches and swimmers with data-backed advice. This narrative evaluation aimed to provide the most effective strategies used by swimming analysts who work with elite swimmers. The document aspires to provide information that will help swimming analysts put theory into practice. The article (Guo et al., 2020) suggested that treatments employed in mouse studies linked to certain illnesses or physiological states are summarized. Developing a standard for exercise treatments that can be utilized in future exercise-related research is crucial for learning more about the therapeutic and preventative benefits of exercise. The study (Charmas & Gromisz, 2019) examined how regular exercise may permanently avoid health problems. This is crucial for women, who prioritize leanness and fitness. This exercise is usually done and doesn't reduce body fat. The effects of 12 weeks of swimming instruction on women's body composition were compared to those

of inactive controls.

3. Materials and Methods

3.1. Data collection

Thirty-two healthy persons of various ages participated in the study (Abou-Dest, Albinet, Boucard, & Audiffren, 2012): 16 inactive adults, 16 swimmers in the study. Participants aged 50 and above were solicited via newspaper ads and fliers distributed to senior centers, civic clubs, and swimming facilities. The health of the old volunteers was verified by their doctors, who all blessed them to participate in cardio-respiratory fitness testing by signing a medical certificate. Volunteers aged 18 to 25 were sought from the student body of the University of Poitiers. Participants were required to be 65 or older, have a minimum of 25 on the Mini-Mental State Examination (MMSE), be sedentary as measured by the Dijon Score of Physical Activity (DSPA), and excellent mental health. There were 18-30-year-olds who were considered young adults. The following groups of people were not allowed to take part in the study: (a) Taking drugs that may affect cardiovascular health or cognitive functioning; (b) Suffering from cardiorespiratory or neurological sickness; or (c) Having major surgery in the last year.

3.2. Study design

Participants were asked to consume at least 2 liters of fluids (ideally water) and eat a high carbohydrate meal the day before assessments. In this group, swimmers did very little training (about 30-40 minutes of aerobic swimming) on the two days leading up to the assessment day. Between 9:00 PM and 12:00 AM, ran experimental examination.

3.3. Procedure

There was a link between the two participants who needed to have at least four years of training and competitive experience in swimming, to have participated in a national trial, and to practice more than five days per week. Participant recruitment was difficult; attention was taken to selecting the sampling procedure. On the same day, participants were tested for anaerobic capacity with a 50-meter maximum swimming test, cardiovascular fitness with a HRV, and psychological preparedness with the RESTQ-76 Sport questionnaire. In an aerobic incremental ultimate test, the next day, they swam farther and harder than before.

3.4. Methods Based on Physiology

Human resonant frequency analysis was utilized to evaluate the autonomic nervous system of the swimmers. Consistent with other studies, the

HRV test lasted 10 minutes while the subject lay supine on a stretcher in a temperature-controlled environment. HRV estimated from ECG showed excellent agreement with Respiratory rate (distance between two R waves in an ECG recording) interval Polar S810 heart rate monitor readings. The RR series was evaluated using a custom-built version of Kubios HRV version 2.0. The software has been demonstrated to be very valid since it detrends the smoothness before technique-filtered RR data, therefore taking into consideration non-linear trends that are prevalent in synchronized musical recordings. The program suggested a 4 Hz interpolation rate used.

3.5. Methods of Psychology

Some psychometric tools that might be utilized for this purpose are the RESTQ-76 Sport. Previous reports indicated that the reliability of RESTQ-76 the reliability of sports tests is 0.7. The current research made use of a verified Portuguese translation of the RESTQ-76. Physical, psychological, behavioral, and social indicators of stress and resilience can be measured via self-report questionnaires. The swimmer must provide a precise response to four objects inside each scale. The athlete rates each item on a Likert scale from 0 (never) to 6 (always) to show how frequently they have engaged in each activity for 72 hours. The 77-item questionnaire was divided into 19 primary measures (10 stresses and 9 recoveries) and 4 secondary dimensions.

This evaluation method is valid and helpful, notwithstanding its omission from the RESTQ-76 Sport Manual, it may be used to evaluate broad shifts in athletes' stress recovery balance. It looked at the following factors: There are four types of stress: mental, emotional, social, and violent. To be tired, insufficient vitality, Disrupted breaks, bodily concerns, mental and emotional weariness, fitness–injury, achievement, social healing, physical recovery, overall health, restful sleep, physical fitness, a notable individual achievement, in terms of self-efficacy, Self-Control recovery that isn't sport-specific, stress that isn't sport-specific, recovery from stress that is sport-specific, the sum of all strains, the sum of all rescues, and the ratio of these two quantities.

3.6. Performance Measures

Exercises in swimming for aerobic and anaerobic purposes were carried out with a 25-meter length. The oceanic temperature was 27.5 degrees Celsius, the air temperature was 29 degrees Celsius, and the humidity was 47%. Each participant in this research was allowed to practice with the tests and equipment that were utilized. The anaerobic test was a 50-meter swim at full speed. The aerobic effort was done the day following the 50-meter maximum swim tests, and each participant swam 5 sets of 200 meters while resting for 30 seconds between each set. The researchers and coaches based the speed of the last stage of the procedure on the swimmers' current 400-meter front crawl best

time (with an in-water start and open turns). The average desired velocity for each step was calculated by subtracting 0.05 m/s from the swimmer's final rate at each of the previous four steps. The swimmers' speeds were monitored by a chronofrequenmeter, which sent out audible signals at intervals of 25 meters. A telemetric portable gas analyzer was used to assess the swimmer's oxygen consumption using a snorkel and valve system. The K4b2 mobile device received HR data from a heart rate monitor at regular intervals of 5 seconds. Traditional physiological criteria for the achievement of maximal oxygen uptake (VO₂max) were as follows: a visible and case-by-case regulated plateau despite an increase in swimming speed, a high blood lactate concentration (9mmol/l), an increased respiratory exchange ratio (r 1.0), an increased heart rate (90% of [220-age]), and a very high subjective effort. Every swimmer's MAS, or the fastest pace at which VO₂ max is reached, was calculated and elicited and is regarded as a significant predictor of aerobic performance. The following metrics of performance were analyzed: The four variables assessed are the participant's time in the 50-meter swimming test, their average rate of perceived effort on the Borg 6-20 scale throughout the swim, their maximum aerobic speed (MAS), and their rate of perceived exertion at MAS (RPE-MAS).

3.7. Statistical Analysis

SPSS version 17.0 was used for the statistical analysis. The Shapiro-Wilk test was used to ensure that all variables were normally distributed. Then, Pearson's correlation was used for a bivariate examination of the psychological and physiological factors influencing performance. The physiological and psychological data were utilized as predictors in a stepwise regression model, with the T50 m RPE-50, MAS, and RPE-MAS assessments as the dependent variables. This model enabled researchers to discover which psychological and physiological features most accurately predicted aerobic and anaerobic performance. All statistical tests were performed at a $p > 0.05$.

4. Results

Swimming is physical training that aims to refine one's swimming technique and develop one's endurance while swimming. The terms younger, middle, and older generations are used to denote distinct age groups. A multitude of physiological indicators, including heart rate, stroke efficiency, lung capacity, and muscle strength, are monitored by swimmers watching their progress and performance. The mental qualities of a swimmer, including determination, focus, and self-assurance, are essential to the development and success of the swimmer. Age was significantly and strongly linked ($P < 0.001$) with the participant's greatest personal advantage of swimming in open water, with options including social connections, physical health advantages, and mental wellness. Benefits to mental health were rated as most essential by participants of all ages, except those over 65, who ranked benefits to physical

health as more important, as shown in Table 1 and Figure 1. Similarly, a high correlation ($P < 0.001$) was found between the most important advantage open water swimmers reported and their normal swim style.

Table 1: Age Difference

PERCENTAGE RESPONSE BY AGE GROUP (%)			
PARTICIPANT AGE	SOCIAL INTERACTION	PHYSICAL HEALTH	MENTAL WELLBEING
18-24	8	8	84
25-34	6	12	82
35-44	8	20	74
45-54	6	22	72
55-64	12	26	64
65+	0	62	34

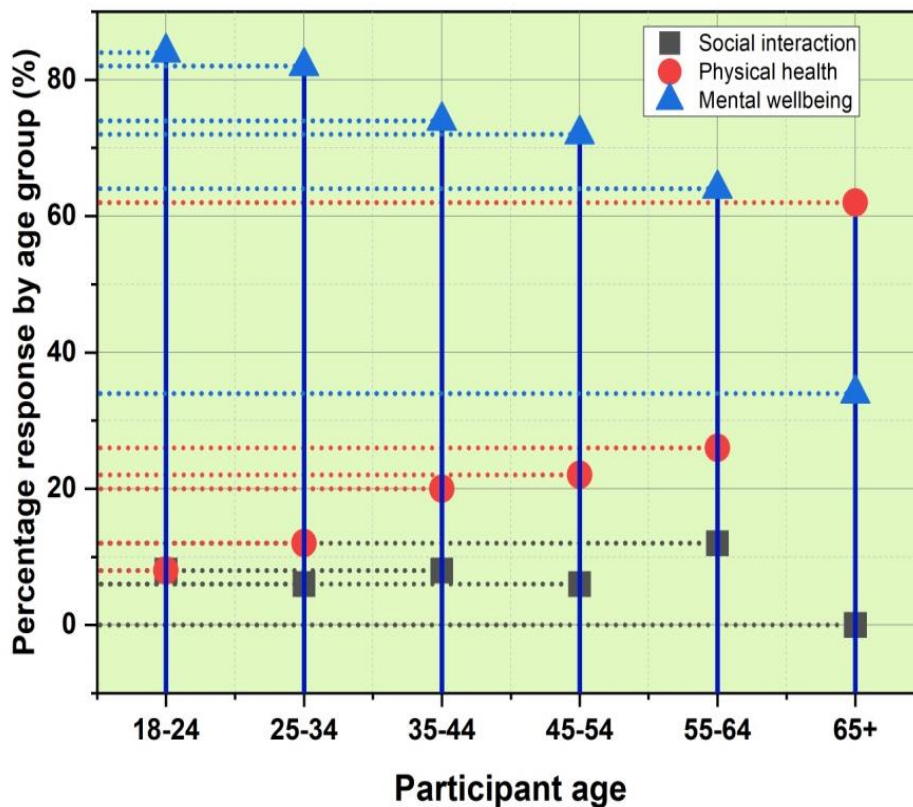


Figure 1: Swimming over several different age groups

The benefits to one's mental health ranked highest across all categories of swimming are shown in Table 2 and Figure 2. Still, the percentage of swimmers who rated mental health participants in goal-focused swims reported improved health as the primary benefit (55% vs. > 72% for all other swim classes). Compared to different types of swimming, goal-oriented swimming has a greater percentage of participants (42%) who identify physical

advantages as the most important result. The respondent's most significant perceived advantage did not correlate with a number, whether one is a swimmer, traveling is necessary for them to participate in open water swimming, how long they typically stay in the water, or how they swim, or any combination of these factors ($P > 0.05$).

Table 2: Typical Swimmer

PERCENTAGE RESPONSE BY SWIM TYPE (%)			
TYPE OF SWIM	SOCIAL INTERACTION	PHYSICAL HEALTH	MENTAL WELLBEING
Goal focused	4	42	52
Quick dip	2	20	80
Relaxing float	3	18	80
Social swim	10	20	72
None of these	-	24	78

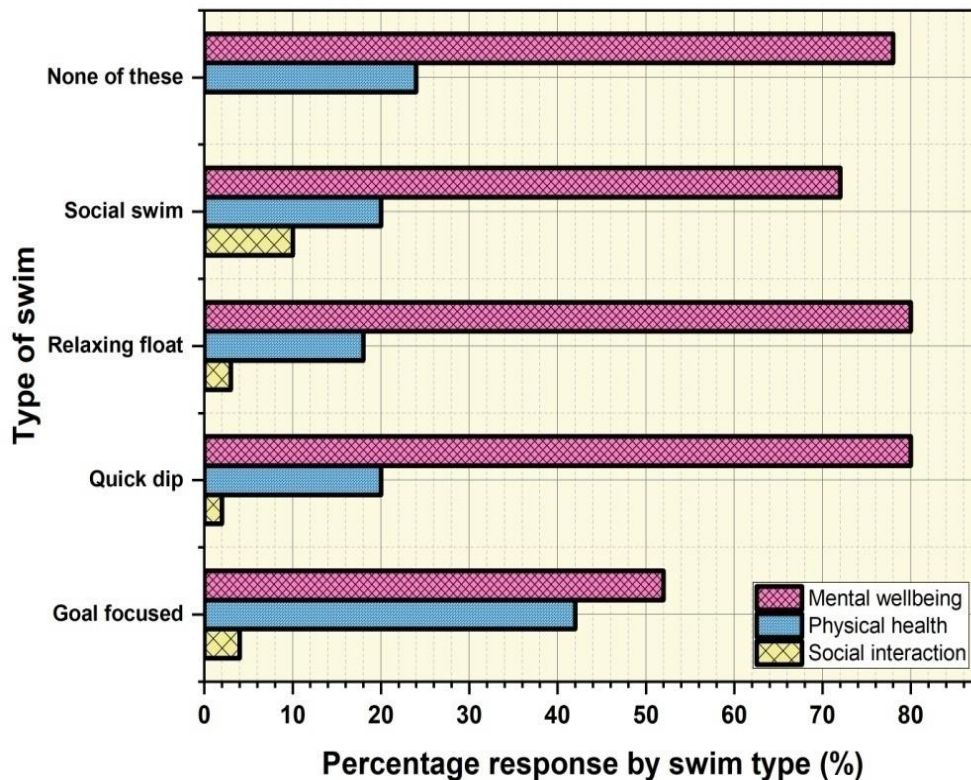


Figure 2: Swimming in the manner of a typical swimmer

The vast majority of swimmers (90%) agreed that swim quality is affected by water quality. There was a small majority of swimmers who were able to complete their open water swim without cutting it short or canceling it due to poor water conditions, but the majority was still small. It was shown that participants who were concerned about water quality were more likely to cancel their swim plans ($P < 0.001$) than those who were not concerned about water

quality. No specific water environment was found to be associated with an increased propensity. Younger swimmers, especially those between 18 and 24, were likelier to have cut short or canceled a swim due to water quality concerns. However, there was no significant association between age and this probability and the chance of doing so ($P > 0.05$). Water quality concerns are shown in Table 3 and Figure 3 ($P < 0.01$).

Table 3: Water quality by age group

PERCENTAGE RESPONSE BY AGE GROUP (%)						
PARTICIPANT AGE	AGREE	DISAGREE	STRONGLY AGREE	STRONGLY DISAGREE	SLIGHTLY AGREE	SLIGHTLY DISAGREE
18-24	40	32	59	26	40	26
25-34	58	42	26	20	40	30
35-44	42	68	8	8	44	32
45-54	38	70	12	28	40	24
55-64	42	78	12	24	22	30
65+	42	82	10	20	30	10

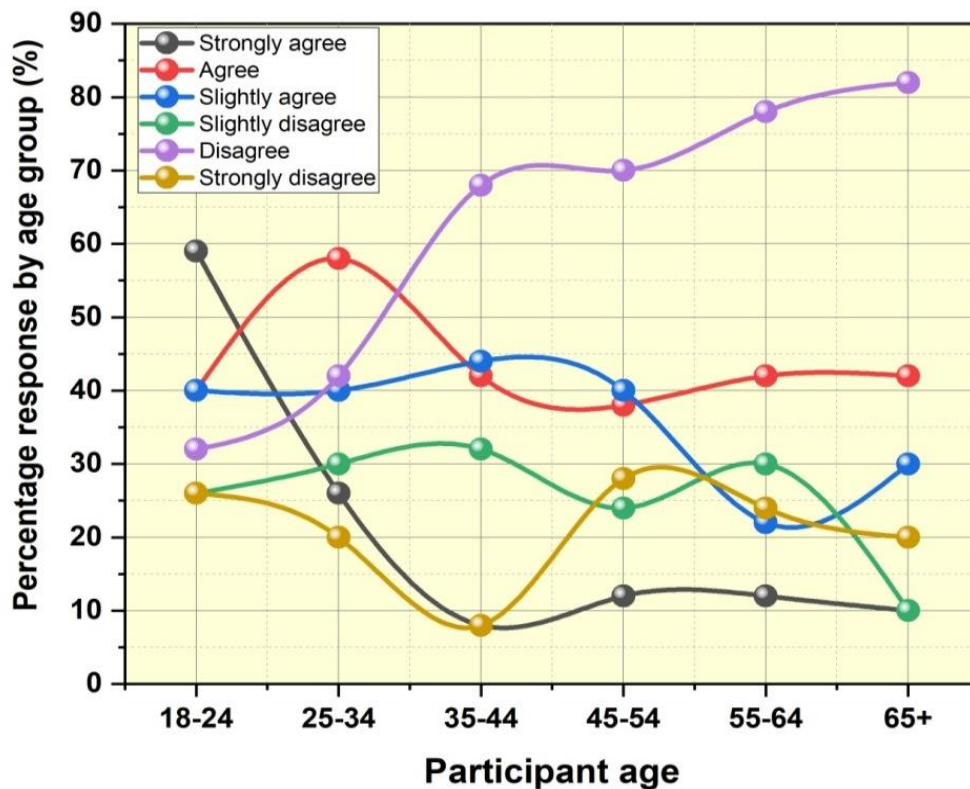


Figure 3: Differences in the propensity to Reduce or cancel swims due to poor water quality per age group

There was a strong correlation between participants' preferred aquatic habitat and their degree of worry about potential environmental harm due to

more people diving into the open-water swimming world, as shown in Table 4 and Figure 4. People who swam in lakes were more anxious than those who swam in rivers or the ocean ($P < 0.001$). However, 73% of participants thought open-water swimming posed only minor environmental dangers, and there was no correlation between age and this opinion ($P > 0.05$).

Table 4: Statement to water environment for swimming

Percentage response by water environment (%)						
PREFERRED WATER ENVIRONMENT	AGREE	DISAGREE	STRONGLY AGREE	STRONGLY DISAGREE	SLIGHTLY AGREE	SLIGHTLY DISAGREE
Sea	16	24	5	5	34	14
Lakes & lochs	25	16	10	2	35	12
Rivers	32	25	9	4	14	13

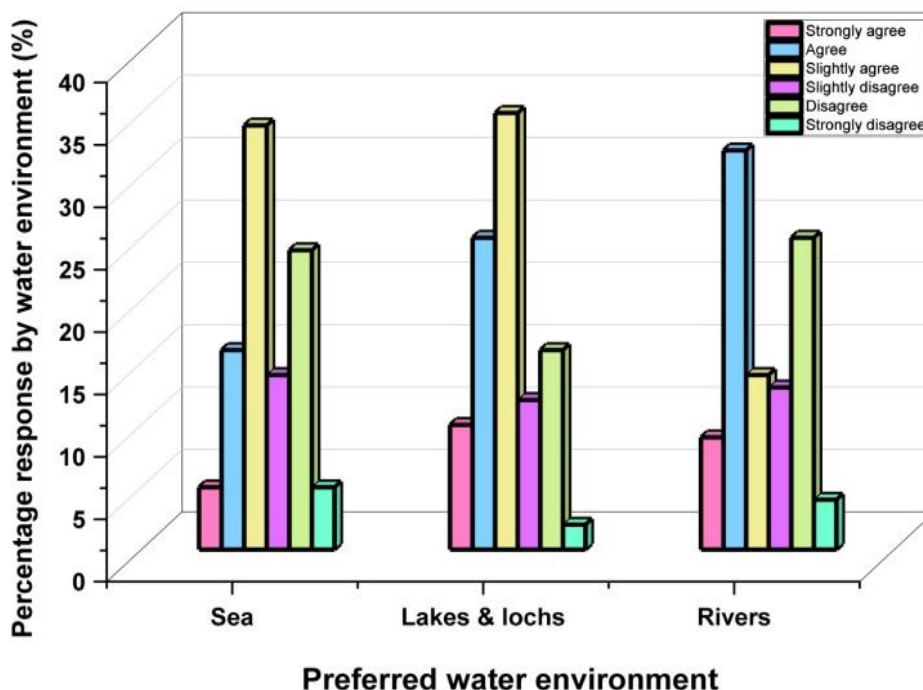


Figure 4: Strongly agree or somewhat agree with the statement about the water environment for swimming

There was a link that was statistically significant between the swimmer's preferred aquatic environment and the average distance swum in open water ($P < 0.001$) in Table 5 and Figure 5. This correlation was shown to exist between the two variables. When they asked the place they preferred for swimming, most open water swimmers whose average swim was goal-focused replied a lake, while 31% stated the ocean was preferred place to swim in open water. There was a four percentage point difference between those who liked

swimming in lakes or the sea and those who considered themselves social swimmers. The only group that showed any interest in swimming in rivers was the quick dip category, which showed a general lack of passion for swimming in rivers.

Table 5: Typical swimming techniques

PERCENTAGE RESPONSE BY SWIM TYPE (%)			
TYPE OF SWIM	Sea	Lakes & lochs	Rivers
GOAL FOCUSED	30	66	4
QUICK DIP	50	38	10
RELAXING FLOAT	50	45	2
SOCIAL SWIM	46	48	8
NONE OF THESE	36	54	10

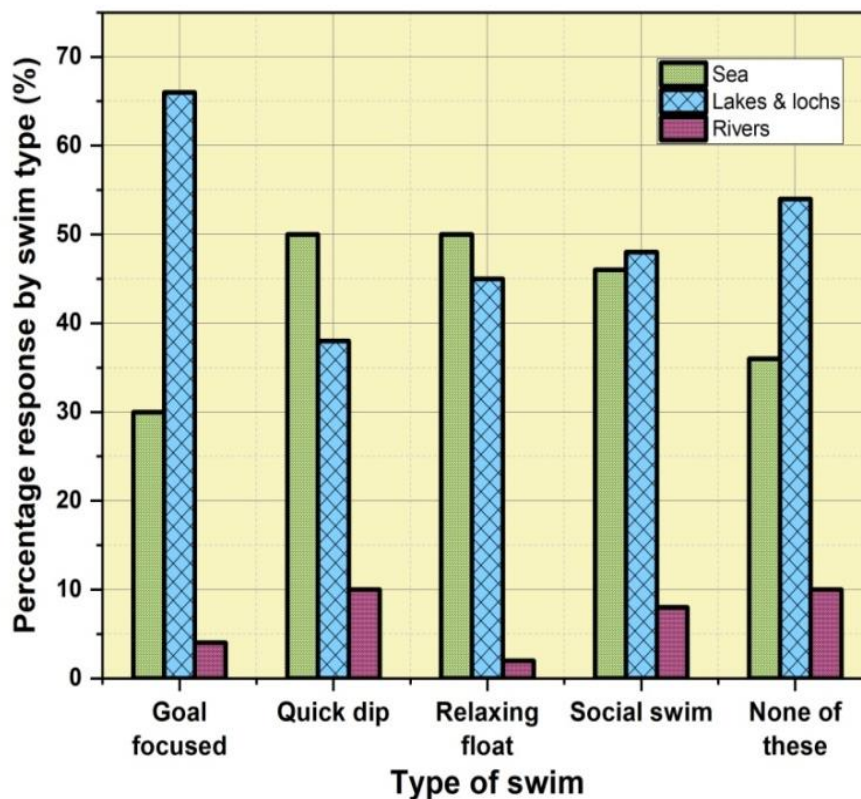


Figure 5: Typical swimming techniques and their corresponding preferred water conditions

A social swim was identified as the sort of swim that was selected by respondents the majority of the time (54%). The percentage of responses for various swimming styles was lower and evenly distributed: Relaxing float, focused on goals, and fast plunge all received 12%, while no option received 10%. It was shown that the participant's age had a significant relationship with the kind of swim ($P < 0.01$). Table 6 and Figure 6 reveal that most swimmers in all age categories consider their activity to be social, with the 18-34-year-olds

preferring shorter swims and more leisurely floats and the 35-54-year-olds choosing longer, more purposeful swims.

Table 6: Function of age distribution

PERCENTAGE RESPONSE BY GROUP (%)						
PARTICIPANT AGE	RELAXING FLOAT	SOCIAL SWIM	GOAL FOCUSED	QUICK DIP	NONE OF THESE	OF
18-34	18	49	5	20	10	
35-54	11	55	19	10	11	
55+	11	53	11	12	12	

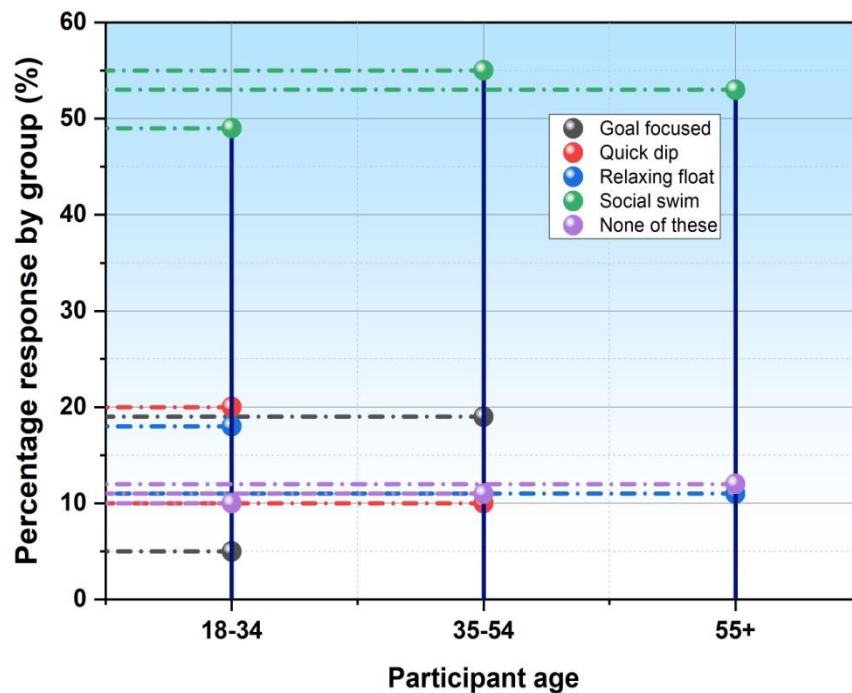


Figure 6: Normal swimming techniques as a function of age distribution

5. Discussion

The purpose of this research was to learn how the mental and physical components of the sport shape swimmers' aerobic and anaerobic capacities. The results demonstrated that swimmers' aerobic and anaerobic abilities were unrelated to their psychological or physical make-up. The first idea was developed due to the discovery of a link between enhanced aerobic and anaerobic performance and unique psycho-physiological profiles. The research showed strong correlations between the characteristics of open-water swimmers, the swimming habits they participate in, and their views on the advantages and disadvantages of this growing outdoor pastime. Treatments for public health that are based on evidence and policies that promote health can be improved by gaining greater knowledge about the potential rewards and

dangers of spending time in the great outdoors. In summary, learning to swim can be modified to accommodate various age groups by considering the particular physiological and psychological indications. Swimming provides multiple benefits that adapt to the different requirements and objectives of people throughout their lives. These benefits include fostering water confidence in young children, refining swimming strokes in teens, and offering a lifetime fitness activity for adults.

6. Conclusion

In conclusion, swimming is an excellent and adaptable exercise that people of all ages may benefit from. It has many positive effects on health, physically and mentally. The psychological and physiological aspects of swimmers' performances varied with the nature of the investigation. Aerobic performance was linked to physiological characteristics, high parasympathetic modulation, and swimming anaerobic performance was related to less stress and more awareness of exhaustion. Coaches may use this data to better prepare their swimmers for competition in either anaerobic or aerobic probes, gives an important perspective on the potential threats to public health and the environment posed by this pastime, and supports the growing body of data suggesting that swimming in open water, it may have unique benefits for mental and physical health and early people who start swimming at an early age mature into adults with high levels of cardiovascular fitness, muscular strength, and endurance. In the long run, this may help set the stage for a life free of obesity and its linked health problems by encouraging physical development and lowering the risk of obesity. Consistent swimming exercise has clear physiological results for people of all ages, including lung capacity, muscular tone, and metabolic rate. Swimming has positive psychological effects, including increased pride in one's abilities, calmness, and relaxation. Swimming's calming effects on the mind and body come from hypnotic rhythms and contemplative qualities. In conclusion, swimming is a sport that can be trained throughout a person's life and provides several health and emotional advantages.

Reference

- Abou-Dest, A., Albinet, C. T., Boucard, G., & Audiffren, M. (2012). Swimming as a positive moderator of cognitive aging: A cross-sectional study with a multitask approach. *Journal of Aging Research*, 2012.
- Andrieieva, O., Hakman, A., Kashuba, V., Vasylenko, M., Patsaliuk, K., Koshura, A., & Istyniuk, I. (2019). Effects of physical activity on aging processes in elderly persons.
- ATALAYIN, S., Hürmüz, K., & YURDAKUL, H. Ö. (2021). The Effect Of Different Training Methods On The Biomotoric and Respiratory Parameters Of Adolescent Swimmers. *Turkish Journal of Sport and Exercise*, 23(1), 53-

59.

- Barbosa, T. M., Barbosa, A. C., Simbana Escobar, D., Mullen, G. J., Cossor, J. M., Hodierne, R., . . . Mason, B. R. (2023). The role of the biomechanics analyst in swimming training and competition analysis. *Sports Biomechanics*, 22(12), 1734-1751.
- Bozano, A., Schiaffino, A., Spessa, A., Valeriani, F., Mancinelli, R., Micheli, V., & Dolcetta, D. (2020). Description of the Lesch-Nyhan neurobehavioral disorder and its management through participant observation of three young individuals. *JIMD reports*, 52(1), 63-71.
- Britton, E., Kindermann, G., Domegan, C., & Carlin, C. (2020). Blue care: A systematic review of blue space interventions for health and wellbeing. *Health promotion international*, 35(1), 50-69.
- Camacho-Morles, J., Slemp, G. R., Pekrun, R., Loderer, K., Hou, H., & Oades, L. G. (2021). Activity achievement emotions and academic performance: A meta-analysis. *Educational Psychology Review*, 33(3), 1051-1095.
- Charmas, M., & Gromisz, W. (2019). Effect of 12-week swimming training on body composition in young women. *International journal of environmental research and public health*, 16(3), 346.
- De Sousa, R. A. L., Improta-Caria, A. C., Aras-Júnior, R., de Oliveira, E. M., Soci, Ú. P. R., & Cassilhas, R. C. (2021). Physical exercise effects on the brain during COVID-19 pandemic: links between mental and cardiovascular health. *Neurological Sciences*, 42, 1325-1334.
- Etxebarria, N., Mujika, I., & Pyne, D. B. (2019). Training and competition readiness in triathlon. *Sports*, 7(5), 101.
- Feijen, S., Tate, A., Kuppens, K., Claes, A., & Struyf, F. (2020). Swim-training volume and shoulder pain across the life span of the competitive swimmer: A systematic review. *Journal of Athletic Training*, 55(1), 32-41.
- Godinić, D., & Obrenovic, B. (2020). Effects of economic uncertainty on mental health in the COVID-19 pandemic context: social identity disturbance, job uncertainty and psychological well-being model.
- Greenwood, S., & Fletcher, T. (2021). Open water swimming events, social capital, and sociality. *Event Management*, 25(6), 665.
- Griban, G., Kuznietsova, O., Dzenzeliuk, D., Malynskyi, I., Dikhtiarenko, Z., Yeromenko, E., . . . Prontenko, K. (2019). Dynamics of psycho-emotional state and individual psychological characteristics of students in the process of physical education classes.
- Guo, S., Huang, Y., Zhang, Y., Huang, H., Hong, S., & Liu, T. (2020). Impacts of exercise interventions on different diseases and organ functions in mice. *Journal of sport and health science*, 9(1), 53-73.
- Haddad, M., Abbes, Z., Mujika, I., & Chamari, K. (2021). Impact of COVID-19 on swimming training: practical recommendations during home confinement/isolation. *International journal of environmental research and public health*, 18(9), 4767.
- Haible, S., Volk, C., Demetriou, Y., Höner, O., Thiel, A., & Sudeck, G. (2020).

- Physical activity-related health competence, physical activity, and physical fitness: analysis of control competence for the self-directed exercise of adolescents. *International journal of environmental research and public health*, 17(1), 39.
- Herbert, C., Meixner, F., Wiebking, C., & Gilg, V. (2020). Regular physical activity, short-term exercise, mental health, and well-being among university students: the results of an online and a laboratory study. *Frontiers in Psychology*, 11, 509.
- Hutchison, A. (2022). *The Swim Prescription: How Swimming Can Improve Your Mood, Restore Health, Increase Physical Fitness and Revitalize Your Life*: Hatherleigh Press.
- Karasievych, S., Maksymchuk, B., Kuzmenko, V., Slyusarenko, N., Romanyshyna, O., Syvokhop, E., . . . Vykhreshch, V. (2021). Training future physical education teachers for physical and sports activities: Neuropedagogical approach. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 12(4), 543-564.
- Keiner, M., Wirth, K., Fuhrmann, S., Kunz, M., Hartmann, H., & Haff, G. G. (2021). The influence of upper-and lower-body maximum strength on swim block start, turn, and overall swim performance in sprint swimming. *Journal of strength and conditioning research*, 35(10), 2839-2845.
- Kekäläinen, T., Freund, A. M., Sipilä, S., & Kokko, K. (2020). Cross-sectional and longitudinal associations between leisure time physical activity, mental well-being and subjective health in middle adulthood. *Applied Research in Quality of Life*, 15, 1099-1116.
- Leguizamo, F., Olmedilla, A., Núñez, A., Verdaguer, F. J. P., Gómez-Espejo, V., Ruiz-Barquín, R., & Garcia-Mas, A. (2021). Personality, coping strategies, and mental health in high-performance athletes during confinement derived from the COVID-19 pandemic. *Frontiers in public health*, 8, 561198.
- Maj, M., Stein, D. J., Parker, G., Zimmerman, M., Fava, G. A., De Hert, M., . . . Wittchen, H. U. (2020). The clinical characterization of the adult patient with depression aimed at personalization of management. *World Psychiatry*, 19(3), 269-293.
- Mamurov, B., Mamanazarov, A., Abdullaev, K., Davronov, I., Davronov, N., & Kobiljonov, K. (2020). *Acmeological Approach to the Formation of Healthy Lifestyle Among University Students*. Paper presented at the III International Scientific Congress Society of Ambient Intelligence 2020 (ISC-SAI 2020).
- Ntoumanis, N., Ng, J. Y., Prestwich, A., Quested, E., Hancox, J. E., Thøgersen-Ntoumani, C., . . . Williams, G. C. (2021). A meta-analysis of self-determination theory-informed intervention studies in the health domain: Effects on motivation, health behavior, physical, and psychological health. *Health psychology review*, 15(2), 214-244.
- Park, B.-J., Shin, C.-S., Shin, W.-S., Chung, C.-Y., Lee, S.-H., Kim, D.-J., . . .

- Park, C.-E. (2020). Effects of forest therapy on health promotion among middle-aged women: Focusing on physiological indicators. *International journal of environmental research and public health*, 17(12), 4348.
- Poole, D. C., Copp, S. W., Colburn, T. D., Craig, J. C., Allen, D. L., Sturek, M., . . . Musch, T. I. (2020). Guidelines for animal exercise and training protocols for cardiovascular studies. *American Journal of Physiology-Heart and Circulatory Physiology*, 318(5), H1100-H1138.
- Praks, P., & Brkić, D. (2020). Suitability for coding of the Colebrook's flow friction relation expressed through the Wright ω -function. *Reports in Mechanical Engineering*, 1(1), 174-179.
- Silva, L. A. D., Doyenart, R., Henrique Salvan, P., Rodrigues, W., Felipe Lopes, J., Gomes, K., . . . Silveira, P. C. (2020). Swimming training improves mental health parameters, cognition and motor coordination in children with Attention Deficit Hyperactivity Disorder. *International Journal of Environmental Health Research*, 30(5), 584-592.
- Sivakumaran, Y., Khashram, M., & Haggart, P. C. (2018). An ilio-iliac arteriovenous fistula following spontaneous rupture of a right common iliac artery aneurysm. *Vascular & Endovascular Review*, 1(1), 30-32.
- Stenner, B. J., Buckley, J. D., & Mosewich, A. D. (2020). Reasons why older adults play sport: A systematic review. *Journal of sport and health science*, 9(6), 530-541.
- Xie, Y., Li, Z., Wang, Y., Xue, X., Ma, W., Zhang, Y., & Wang, J. (2019). Effects of moderate-versus high-intensity swimming training on inflammatory and CD4+ T cell subset profiles in experimental autoimmune encephalomyelitis mice. *Journal of neuroimmunology*, 328, 60-67.