Article

Not peer-reviewed version

Yoga and Swimming – a Symbiotic Approach with Positive Impact on Health and Athletes' Performance

Rocsana Bucea-Manea-Țoniș [*] , Andreea Natalia Jureschi (Gheorghe) , Luciela Vasile

Posted Date: 24 July 2024

doi: 10.20944/preprints202407.1856.v1

Keywords: yoga practice; social and health benefits; therapeutic approaches

Article

Yoga and Swimming—a Symbiotic Approach with Positive Impact on Health and Athletes' Performance

Rocsana Bucea-Manea-Țoniș *, Andreea Natalia Jureschi (Gheorghe) and Luciela Vasile

Doctoral School, National University of Physical Education and Sport, 060057 Bucharest, Romania; rocsense39@yahoo.com, njureschi@gmail.com, lucielav05@gmail.com

* Correspondence: njureschi@gmail.com

Abstract: Yoga promotes acceptance, compassion, physicality, active postures, mental and emotional awareness, and spiritual benefits. It involves breath techniques, postures, and body locks, maintaining balance and strength. It's based on ethical principles. Beyond simple performance, swimming is a catalyst for overall well-being. Complementarily, yoga serves as an invaluable adjunct for swimmers, enhancing flexibility, strength, and body awareness - a triad essential to aquatic excellence. The confluence of yoga and swimming, particularly through the practice of aqua yoga asanas, presents a new paradigm for both athletes and non-performers alike. Athletes who embrace the harmonious fusion of swimming and yoga unearth the potential for achieving not just athletic mastery but also a more balanced and fulfilling lifestyle. This blend provides a route not only to enhance performance in the water but also to elevate the overall quality of life. We examined the feasibility of incorporating yoga and swimming practice into Romanian subjects' lifestyles, designing a factor analysis in SmartPLS software, based on an online survey. The study assesses the participants' knowledge of yoga's theory and philosophy, as well as their perceptions of the swimming practice's benefits for social and health issues. According to our study, Romanian participants practice yoga and swimming as often as possible to reduce stress, improve concentration for work-related tasks, and improve joint elasticity, balance, and muscular tone. Thus, Yoga and swimming are substitutes for other approaches in prevention and therapy.

Keywords: yoga practice; social and health benefits; therapeutic approaches

1. Introduction

Yoga is a centuries-old occupation adapted to Western culture and is frequently done for its alleged health advantages. Textbooks from the past discuss its benefits for various kinds of arthritis. Two small investigations on the effects of yoga on carpal tunnel syndrome and hand osteoarthritis demonstrate higher pain relief compared to control groups. Yoga is said to help with some musculoskeletal issues since it increases strength and employs stretching [1–3].

The Sanskrit term that means unification is where the name yoga originates. It is an old method of physical and spiritual practice that dates back to South Asia's Indus Valley Civilization. This practice was originally documented in writing in the Yogasutra by Patanjali in about 200 BC. Thirteen The eight-fold path, or Ashtanga yoga, was the system. Numerous descriptions of yoga may be found in modern literature. Yoga is "a systematic practice and implementation of mind and body in the living process of human beings to keep harmony within the self, within society, and with nature" in a more contemporary context [3,4].

Yoga, a traditional practice involving lifelong dedication and strict austerities, has evolved into a more accessible form for various users. The eight steps of Ashtanga yoga, including Yama, Niyama, Asana, Pranayama, Pratihara, Dharana, Dhyana, and Samadhi, are now used in various yoga schools [5]. Yoga offers relief from stress, anxiety, depression, and obsessive thoughts, promotes better sleep, and helps cope with PTSD. Pranayama alters autonomic responses, increases GABAergic activity, and reduces stress-induced cortisol release, and hyperglycemia. It also lowers seizure frequencies,

 doi:10.20944/preprints202407.1856.v1

prevents cognitive decline in Alzheimer's disease, and aids in poststroke rehabilitation. Yoga also reduces blood pressure and heart rate, increases variability, and improves musculoskeletal flexibility. It is a viable adjunct to drug therapy for depression and anxiety and a promising alternative to psychoanalysis and cognitive behavior therapy. Yoga also prevents lifestyle disorders. However, the efficacy of these techniques is not well-established, with yoga being one of the techniques that have been studied [6].

Yoga has been proven to reduce psychological, physiological, and emotional suffering in survivors of interpersonal trauma. It integrates the mind, body, and spirit through physical postures, breathwork, and meditation. Research shows that yoga and mindfulness-based therapies can lessen symptoms related to trauma and show comparable efficacy [7].

Yoga is a practice that promotes acceptance, compassion, physicality, active postures, body locks, mental and emotional awareness, and spiritual benefits. It involves setting intentions, focusing on breath, breathing techniques, physicality, active poses, restorative poses, and body locks. Yoga-specific components like meditation and spirituality produce less physical exertion overall, and scales such as Spirituality, Breathwork, and Health Benefits are associated with greater teacher warmth and friendliness. Yoga also involves individual attention, physical support, and teacher-facilitated social interaction. It is based on ethical principles like yamas and personal observances like purity, diligence, contentment, self-study, and union with the divine. Further research is needed to fully understand its effectiveness in addressing trauma [8].

Yoga has been found to have therapeutic value in patients with persistent limb pain, improving body awareness through simulated movements like motor imagery. However, the mechanisms behind these findings remain unclear [9]. Yoga may also help patients with PTSD by reducing symptomatology and helping them accept physical and sensory sensations associated with helplessness and dread. Future research could explore whether yoga-based interventions improve motor imagery performance [10].

Yoga has been shown to reduce stress and prevent chronic diseases. It enhances respiratory and immune system functioning, leading to the creation of integrated yoga modules for illness prevention. Hatha yoga classes have also improved cardiovascular hemodynamic variables and physical capability in patients with ST-elevation myocardial infarction. A revised Hatha yoga training regimen is more effective than conventional cardiac rehabilitation [11–14].

Yoga is a popular exercise for subjects to improve their performance and self-control while reducing the risk of post-traumatic stress disorder. Physical exercise therapies, including motor control, yoga, and strengthening, are effective for pain and disability. Yoga has been recommended for various diseases, including spinal cord injuries, strokes, Parkinson's, and HIV/AIDS. Carpal tunnel syndrome symptoms have also shown positive results with yoga, kinesiotaping, and manipulation therapies. Mindfulness practices are central to these therapies [15–17].

Top subjects can improve their self-awareness and self-regulatory skills through regular yoga practice and meditation. Yoga helps establish harmony between the body and mind, improves flexibility, muscular strength, endurance, and cardiovascular performance, and reduces body fat. It also enhances cardiovascular fitness, abdominal muscular endurance, and mobility. The metamorphosis of elite subjects requires physical endurance, flexibility, stress management, and spiritual growth. Yoga can be integrated into training regimens to improve performance by combining attention, emotion, and yoga-inspired aspects with intellectual, metacognitive, and procedure management techniques. Factors such as load, volume, frequency, mental-physical link, and exercise duration affect muscle adaptation to high-level training [18–23].

The U.S. Substance Abuse and Mental Health Services Administration (SAMHSA) defines trauma as a phenomenon that “results from an event, series of events, or set of circumstances that is experienced by an individual as physically or emotionally harmful or threatening and that has lasting adverse effects on the individual’s functioning and physical, social, emotional, or spiritual well-being [7]. Interpersonal trauma is a form of violence where individuals intentionally apply force, deprivation, and neglect against others, often in a family, intimate partner, or community context. It is more detrimental than non-interpersonal trauma due to the element of betrayal and repeated

 doi:10.20944/preprints202407.1856.v1

exposure to the same type of trauma over time. Interpersonal trauma can lead to increased emotional and psychological difficulties, behavioral challenges, and physical health problems. Studies show that interpersonal trauma is more likely to contribute to the development of PTSD than non-interpersonal trauma. Yoga seems a very appropriate tool to treat interpersonal trauma [7].

Yoga asanas, breathing, mudras, top training, and the use of mantras and yogic meditation reduce post-traumatic stress disorder. The research also sought the perspectives of sportsmen and instructors to develop outreach programs and support yoga participation in medical rehabilitation. Yoga is particularly effective in preventing injuries in sports like running, basketball, tennis, baseball, and football. It promotes balance, flexibility, strength, endurance, and efficient movement. Yoga's breathing methods, such as pranayama, reduce the effort needed to breathe, resulting in improved respiratory capacity and improved performance in practice and competition [24–27].

Yoga improves memory and cognition, social-emotional competency, and overall mental and physical wellness. It can be included in injury prevention plans due to its relaxation, core stability, and mobility benefits. Research shows that practicing yoga for four weeks leads to weight loss, increased leg and back strength, and improved back strength in handball players. Yoga can also reduce body fat and enhance fat-free mass. Long-term yoga programs can lead to significant improvements in agility, flexibility, balance, and VO2 max. Yoga also enhances subjects' physiques and endurance measurements [28–30].

The pandemic has increased the number of injuries among subjects, with psychosocial stresses and training regimens putting cognitive and physical strains on them. Sports-related concussions may require more neurobiological recovery time than clinical recovery time, increasing the risk of repeated musculoskeletal injuries. Players with a prior injury face a higher frequency of acute-noncontact injuries, particularly females. Subjects' rates of injury per 1000 encounters and injury incidence ratios are also affected. It is recommended that individual sports participants receive more focused attention, regardless of gender [31–34].

Yoga can help reduce injury risk factors, such as generalized tiredness and perceived injury susceptibility, in sports like soccer, handball, swimming, winter sports, and baseball. Regular use of yogic breathing techniques can improve pulmonary function and VO2 max in male football players. Yoga and self-myofascial release techniques can also increase flexibility and explosive strength in the legs. Additionally, yoga can help treat urinary incontinence syndrome in women, suggesting improvements in symptoms when combined with other therapy exercises [35–37].

A global public health concern, osteoporosis affects people all over the world. Bone loss can be prevented and reversed with yoga. Yoga may lead to increased strength, coordination, range of motion, balance, and posture—all of which reduce the risk of fractures and falls [38].

Yoga & Swimming – a perfect match

Swimming is a sport that benefits all muscular groups and offers numerous health benefits for non-performers, in cardiovascular, nervous, muscular, respiratory, and metabolic systems [39]. Yoga is beneficial for swimmers, as it helps stretch the chest, hip flexors, and quads, strengthen the upper back and glutei, develop body awareness through balance, improve breathing efficiency, increase hips and shoulder mobility, strengthen the upper back, improve balance, and create openings through the chest and shoulders [40,41].

For swimmers, the divergence between centers of gravity and buoyancy is a challenge, as they must rotate until the centers of gravity and buoyancy align vertically. This results in a motionless buoy and water supporting the swimmer's weight at that angle. Aqua yoga asanas in deep water combine the benefits of yoga asanas with water aerobics, achieving more flexibility, physical fitness, and stress relief. Techniques under innovative yoga asanas practiced in deep water of 10 feet depth are discussed. Over practice sessions, water balance is achieved at the final position of the yoga asana, and 30 different asanas are practiced, improving joint mobility, muscle flexibility, general fitness, stress relief, and decreasing fatigue and lethargy [42].

Aqua yoga asana practice is a unique technique that involves swimming strokes with considerable water balance. It is performed in a swimming pool of depth ranging from 4- to 10 feet, with the asana split and practiced in shallow waters before moving to deeper waters. This practice

 doi:10.20944/preprints202407.1856.v1

makes it easy to perform asanas in water, as body weight is no longer a hindrance [42]. Those of us who are swimmers and practice yoga would proudly proclaim that a 200 Fly is the best thing you can ever accomplish for your divinely endowed body [43].

Combining swimming and yoga offers athletes several key benefits:

1. Enhanced Flexibility: Yoga promotes greater flexibility, which can help swimmers achieve better form and technique in the water [44].
2. Increased Strength: Targeted yoga poses can build strength in muscle groups that are essential for swimmers, particularly the upper back, shoulders, and core [44].
3. Injury Prevention: Yoga helps to lengthen muscles and tendons, reducing the risk of strains, sprains, and other injuries that swimmers may encounter [45].
4. Improved Breathing Techniques: Yoga emphasizes breath control and capacity, which are crucial for swimmers to maintain endurance and proper oxygenation during intense physical exertion [46].
5. Mindfulness and Focus: The meditative aspect of yoga can enhance an athlete's concentration and the ability to maintain a flow state, which is beneficial during both training and competition [47].
6. Body Awareness: Through yoga, swimmers can develop better body awareness, and understanding of their movements, balance, and alignment, which are essential for efficient swimming [48].
7. Recovery and Relaxation: Yoga provides a calming and restorative practice, aiding in recovery after intense swimming workouts and meets, and helping to reduce stress and fatigue [48,49].

Research suggests that athletes with higher mindfulness scores are more likely to experience the flow state, and yoga may enhance mindfulness and improve athletes' flow dispositions and performance. Participants in a yoga program became more aware of internal sensations, acting with greater awareness during activities like swimming training and competition. They also reported improvements in the ability to reframe negative thoughts through yoga relaxation techniques. Flow disposition dimensions were suggested to include enhanced concentration and a greater sense of control, which has been transferred to school-related activities. Participants also reported using components of yoga training, such as breathing and poses, in their pre-performance routines. Yoga sessions also provided physiology-related benefits, such as improvements in strength and flexibility. The study used temporal qualitative surveys and a focus group at the end of the intervention to analyze the effects of yoga within 10 weeks [50]

2. Materials and Methods

2.1. Preliminary Phase of the Research

Yoga, sports, and physiotherapy (Topic), 2019-2023 (Year of Publication), breath (All Fields), technology (All Fields), articles or review articles (Document Types), and all Web of Science Categories were used to define the research design. We reviewed numerous articles on the benefits of yoga for injury prevention and the relationship between yoga practice and medical recovery in sports. Yoga does not have an extensive background in Romania. As a result, we decided to investigate the extent of awareness about this issue and its possible influence on elite subjects.

The study looks into how yoga may help with sports performance as an adjunct way to providing the best possible sustainable system of including yoga in subjects training, and medical rehabilitation.

The main hypotheses of the research are:

H1: The participants who perform yoga asanas possess a high degree of consciousness and comprehend the principles of yoga.

 doi:10.20944/preprints202407.1856.v1

H2: The participants with a deeper comprehension of yoga are persuaded of its social and health advantages.

2.2. Design and Research Phase

Participants in the poll came from Bucharest's private sports clubs. These students must attend to stay in good health and be fit. The study, which included roughly 250 people, ran from August 2023 to November 2023. This research is preliminary. Most of the closed-ended questions on the questionnaire had many correct responses or very specific options. With consent from participants to manage their responses in compliance with GDPR, it was done online via Google Forms. We also provided open-ended questions to get the qualitative analysis going.

The questionnaire was informed by previous research, including those conducted by other authors [51–53] as well as the primary author's own experience in teaching yoga and swimming. We intend to see if yoga is chosen as an alternative solution for different medical conditions.

At this point, both the theoretical and the practical variables had been established, and scales had been chosen for assessing them, defining the knowledge-gathering approach, selecting the data acquisition device, and constructing the methodological framework to organize the information. The data were evaluated using the partial least squares (PLS) structural equation modeling technique, which analyzes simultaneous interactions among latent, formative, or reflecting variables even for smaller samples. Three latent reflective constructs (Asanas type, Awareness and Philosophy, Health and Social Benefits) are present in our model. All variables, with their descriptive items, are presented in Table 1.

Our analysis contains an SEM confirmatory factor analysis using SmartPLS. In the field of structural equation modeling (SEM), statistical methods like confirmatory factor analysis (CFA) and path analysis are frequently employed to examine intricate correlations between variables.

SmartPLS is a software program that offers a simple user interface for carrying out SEM analysis. It is intended specifically for Partial Least Squares (PLS) path modeling, a variance-based method of SEM. Researchers can evaluate the structural model (relationships between latent variables) using PLS-SEM and the measurement model (reflective and formative indicators) using SmartPLS.

Confirmatory Factor Analysis (CFA) is a statistical technique that evaluates the measurement characteristics of a group of observed variables (indicators) and how they relate to latent variables (constructs). It is a confirmatory strategy to factor analysis in which researchers build a hypothesized factor structure based on theory or earlier research and compare it to the observed data. By looking at the factor loadings, measurement errors, and overall model fit indices, CFA is used to assess how well the suggested measurement model fits.

Path analysis is a method for analyzing how variables in a theoretical model are related causally. It enables researchers to evaluate both the immediate and long-term interactions between variables. To assess the associations between variables, several regression equations are simultaneously calculated in path analysis. To gauge the degree and relevance of the directional links (paths) between the variables, researchers might evaluate their respective coefficients.

Loading factors, sometimes referred to as factor loadings or standardized factor loadings, are coefficients used in confirmatory factor analysis (CFA) to indicate the degree and direction of the association between observable variables (indicators) and latent variables (factors).

How much of the variance in an observed variable may be attributed to the underlying latent variable is indicated by the loading factor. It represents, while accounting for measurement error, the correlation between the observable variable and the latent variable. Loading factors vary from -1 to 1, and they can be either positive or negative.

Interpreting loading factors:

Positive loading: A positive loading indicates a direct relationship between the observed variable and the latent variable. Higher values indicate a stronger relationship.

Negative loading: A negative loading indicates an inverse relationship between the observed variable and the latent variable. Higher absolute values indicate a stronger inverse relationship.

 doi:10.20944/preprints202407.1856.v1

The magnitude of loading: The absolute value of the loading factor indicates the strength of the relationship. Values closer to 1 indicate a stronger relationship, while values closer to 0 indicate a weaker relationship.

Statistical significance: Loading factors can be tested for statistical significance to determine if they are significantly different from zero. Significant loading factors indicate a meaningful relationship between the observed variable and the latent variable.

When conducting CFA, researchers typically assess the quality of the measurement model by examining the loading factors. High and statistically significant loading factors suggest that the observed variables are good indicators of the underlying latent variables, indicating a strong measurement model fit.

It is important to note that loading factors are specific to the particular model being tested and may vary depending on the context, sample, and measurement instrument used in the analysis.

Table 1. Name, code, and significance of analyzed variables.

Variables	Items	Description
	Yoga includes the following types of exercises/ asanas:	
Asanas Type	Asanas	equilibrium, relaxation, stretching, mental concentration and endurance in anaerobic conditions and breathing, postural correction, muscle toning, lymphatic drainage (such as inversions), and therapeutic (therapeutic: stress relief of the spine, stimulation of blood circulation, pulse regulation and respiratory frequency, pain relief, endocrine system balancing, etc.)
	What do you know about Yoga?	
Awareness and Prophylaxis	Swimming	Yoga & Swimming are practiced for health benefits within the spare time
	Health	entered as a health practice, through the hours led by yoga-authorized instructors in sports clubs in Romania
	Prophylaxis	it is a primary and therapeutic prophylaxis method if practiced correctly
	Philosophy	it is a system of thought and philosophy originating from Asia, which aims at harmonizing between body, mind, and spirit
	AnyAge	can be practiced at any age
	Appreciate the role of yoga	
Health and Social Benefits	Treatment	therapeutic (can treat respiratory, circulatory, digestive, endocrine, neuro-muscular, neuro-mental, immune diseases, etc.)
	Fitness	primary prophylaxis. fitness and stress elimination
	Evolution	self-development and self-knowledge
	Control	educational, moral, social physical control
	Collab	promotes tolerance, cooperation, and respect
	Attitude	develop a positive attitude in front of victory and defeat
	Discrimination	removes cultural, gender, and ethnic discrimination

3. Results

The frequency, the association of variables, graphical images, and table were created using the examined data, and the SmartPLS tool also created a qualitative study regression model.

We used Path Analysis because it: (a) lowers the variance of endogenous construct residuals; (b) has minimal detection concerns; (c) yields relevant findings regardless of tiny sample sizes; and (d) predominantly blends formative and reflective components, SmartPLS is a trustworthy regression approach [48]. Whenever the structural model becomes exceedingly complicated, the sample is quite small, and the hypothesis contains both formative and reflective elements, PLS-SEM (partial least squares SEM) or path analysis is recommended to be utilized [54]. When a study involves developing theories or forecasting (with contributions to theory development), PLS-SEM is the optimal approach. Its primary applications are in predictive analysis and the clarification of complicated linkages [28].

 doi:10.20944/preprints202407.1856.v1

We examine if the survey's questions help establish the relevance of a claim or hypothesis to assure the reliability of the survey. A survey is considered to be trustworthy and reliable when all of its questions and results match up (overall score).

The coefficient of Cronbach's alpha index rises with the number of items (questions). However, it serves no use to keep things whose cumulative score contribution is negative, small or travels in the other way. Identification, removal, or modification of these elements to more accurately represent the trait being assessed is one of the objectives of item analysis.

It is recursive in nature and chooses items according to how they contribute to the overall score after evaluating how each item's relationship to each other and the final score is related to that of the other items. The main criterion for this process is Cronbach's alpha index, which must have a value between 0 and 1. For consistency, a scale ought to be as near to 1 as feasible, with 0.70 being usually accepted as the highest limit. Cronbach's alpha, however, cannot fall less than 0.60.

3.2.1. Construct Reliability and Validity

The study made use of SmartPLS [55], as shown in Table 2, to evaluate consistency using composite reliability. The permitted acceptable thresholds for a reliable model include composite reliability (>0.6), Cronbach's alpha, rho_A (>0.7), and average variance extracted (AVE > 0.5). The survey items are suitable for our research, as they are based on Cronbach's alpha coefficients, which suggests that our assumptions are supported. For each test, all of our variables display high values. (Table 2). The coefficient of determination or R-squared claims that the variance of Asanas explains 45% of the variance of Awareness & Prophylaxis (AP) and AP variance explains 73%, and the Health and Social Benefits (HSB) (Table 2 and Figure 1).

Table 2. Validation steps.

Reflective Constructs	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)	R Square
Asanas	0.94	0.95	0.94	0.66	
Awareness & Prophylaxis (AP)	0.88	0.89	0.88	0.56	0.45
Health and Social Benefits (HSB)	0.94	0.94	0.94	0.70	0.73

 doi:10.20944/preprints202407.1856.v1

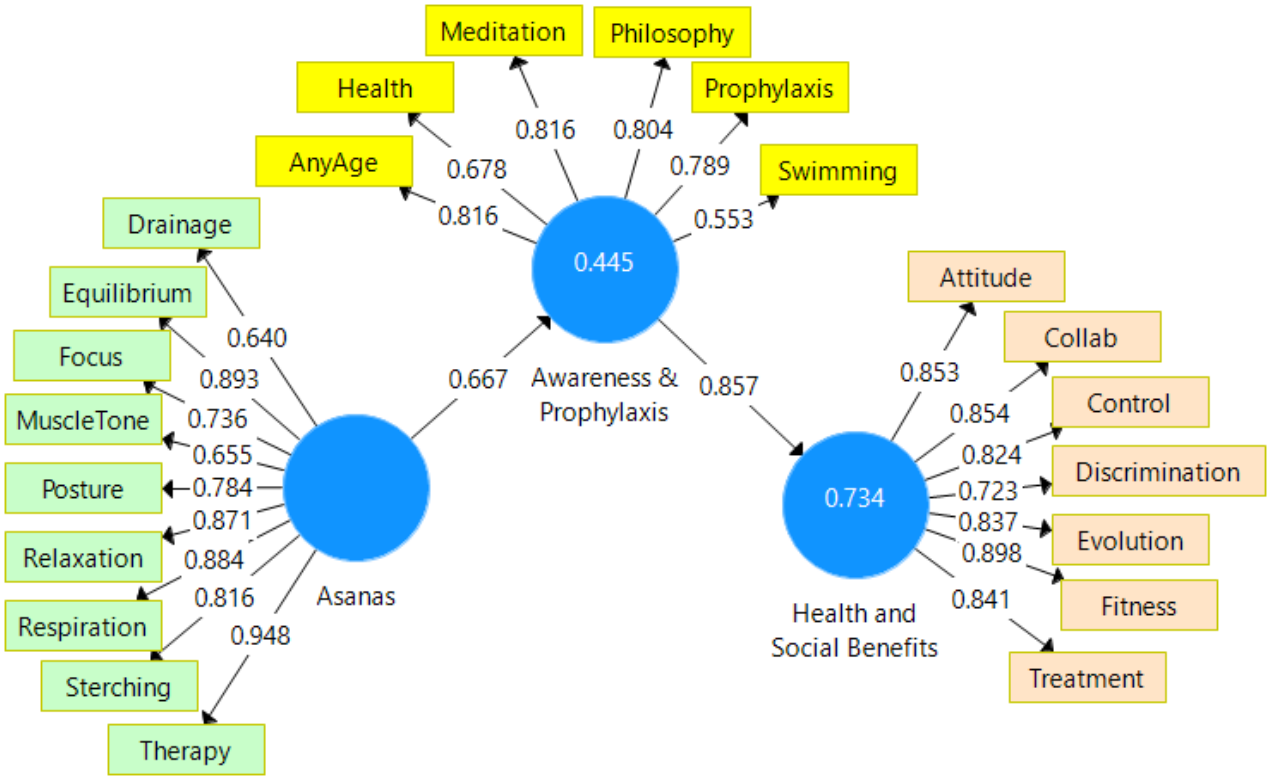

Figure 1. Cronbach's alpha analysis and path coefficients.Source: SmartPLS analysis (reprinted from SmartPLS software, version 3.3.9, created on 18 April 2024).

3.2.2. Correlation between Variables

The latent variable correlation shows a very strong positive correlation between Awareness & Prophylaxis and Health and Social Benefits (0.86) (Table 3), and the path coefficient (0.857) also has a high value (Figure 1), meaning that H2 is accepted: The participants who perform yoga asanas possess a high degree of consciousness and comprehend the principles of yoga. Another medium positive correlation is observed between Asanas and Awareness & Prophylaxis (0.67) meaning that H2 is accepted: Those with a deeper comprehension of yoga are persuaded of its social and health advantages. Between Asanas and Health and Social Benefits, there is also a medium positive correlation (0.65).

Table 3. Correlation coefficients.

Latent Constructs	Asanas	Awareness & Prophylaxis	Health and Social Benefits
Asanas	1.00	0.67	0.65
Awareness & Prophylaxis	0.67	1.00	0.86
Health and Social Benefits	0.65	0.86	1.00

Source: SmartPLS analysis (reprinted from subjectSmartPLS software, version 3.3.9, created on 18 April 2024).

Figure 1 shows that the loading factors for all of the Asanas, AP, and HSB sub-item have values greater than 0.6. There is only one exception for Swimming (LF=0.553) which proves their impact on the variable's weight. These high values ensure that the survey was well designed, and the items that form the four main variables (Asanas, AP, and HSB) are highly representative of our analysis [49].

3.2.3. Discriminant Validity

The calculation of discriminant validity was performed. It is defined as the extent to which a variable in the structural model empirically differs from other variables [49,50]. The model is

 doi:10.20944/preprints202407.1856.v1

statistically robust as Heterotrait–Monotrait (HTMT) criteria are met. HTMT ratios should be <0.85 to achieve discriminant validity [57], meaning that all constructs were statistically differentiated from each other when taken two by two (Table 4).

Table 4. Discriminant validity.

	Fornell-Larcker Criterion			HTMT	
Latent Constructs	Asanas	AP	HSB	Asanas	AP
Asanas	0.81				
Awareness & Prophylaxis	0.67	0.75		0.668	
Health and Social Benefits	0.65	0.86	0.83	0.649	0.85

Source: SmartPLS analysis (reprinted from SmartPLS software, version 3.3.9, created on 18 April 2024).

3.2.4. Model Fit

Model fit was assessed using approximate fit indices such as standardized root mean square residual (SRMR ≤ 0.05). In our case, SRMR has a value of 0.075, which is less than 0.05. Additionally, all Chi-Square, d_ULS, and d_G values of the estimated model are higher than the saturated model threshold. NFI has a high value, close to 1 (Table 5) [57].

Table 5. Model Fit.

	Saturated Model	Estimated Model
SRMR	0.05	0.05
d_ULS	0.55	0.72
d_G	0.53	0.54
Chi-Square	646.71	652.15
NFI	0.86	0.85

Source: SmartPLS analysis (reprinted from SmartPLS software, version 3.3.9, created on 18 April 2024).

3.2.5. Multicollinearity Analysis

To evaluate the importance of variables, the SmartPLS algorithm computed the variance inflation factor (VIF) of each construct. Table 6 provides a summary of the findings. Given that there are no VIF values greater than 5, there is no multicollinearity between the variables.

Table 6. Collinearity analysis.

Variable	**VIF**	**Variable**	**VIF**	**Variable**	**VIF**	**Variable**	**VIF**
AnyAge	2.49	Equilibrium	3.92	MuscleTone	2.26	Stretching	3.81
Attitude	3.76	Evolution	3.7	Philosophy	2.55	Therapy	4.1
Collab	3.96	Fitness	3.17	Posture	3.47	Treatment	2.96
Control	4.12	Focus	2.42	Prophylaxis	2.51	Swimming	1.35
Discrimination	2.28	Health	1.6	Relaxation	3.83		
Drainage	2.06	Meditation	2.64	Respiration	3.58		

Source: SmartPLS analysis (reprinted from SmartPLS software, version 3.3.9, created on 18 April 2024).

The p-values for each of the five SEM regressions are all less than the 0.05 cutoff, demonstrating once more the strength of our models' design (Table 7). The t-test data are indicative. Figure 2 gives a summary of the results. Two-tailed t-tests had a bootstrapping value greater than 1.96.

Table 7. The *t*-test statistics and *p*-values of the bootstrapping analysis.

Direct/ Indirect effect	**Original Sample (O)**	**Sample Mean (M)**	**Standard Deviation (STDEV)**	***t* Test Statistics (|O/STDEV|)**	***p* Values**
Asanas→ AP	0.667	0.671	0.064	10.495	0.000

 doi:10.20944/preprints202407.1856.v1

AP → HSB	0.857	0.858	0.037	22.938	0.000

Source: SmartPLS analysis (reprinted from SmartPLS software, version 3.3.9, created on 18 April 2024).

After taking into account all of the validation steps shown in Tables 2–7 and Figures 1 and 2, we may assume that the construct indicators are strongly positively associated, and those assumptions H1–H2 have been approved. Subjects who practice yoga asanas have a high level of awareness and understand the fundamentals of the practice. Subjects who understand yoga better are convinced of its positive social and health effects.

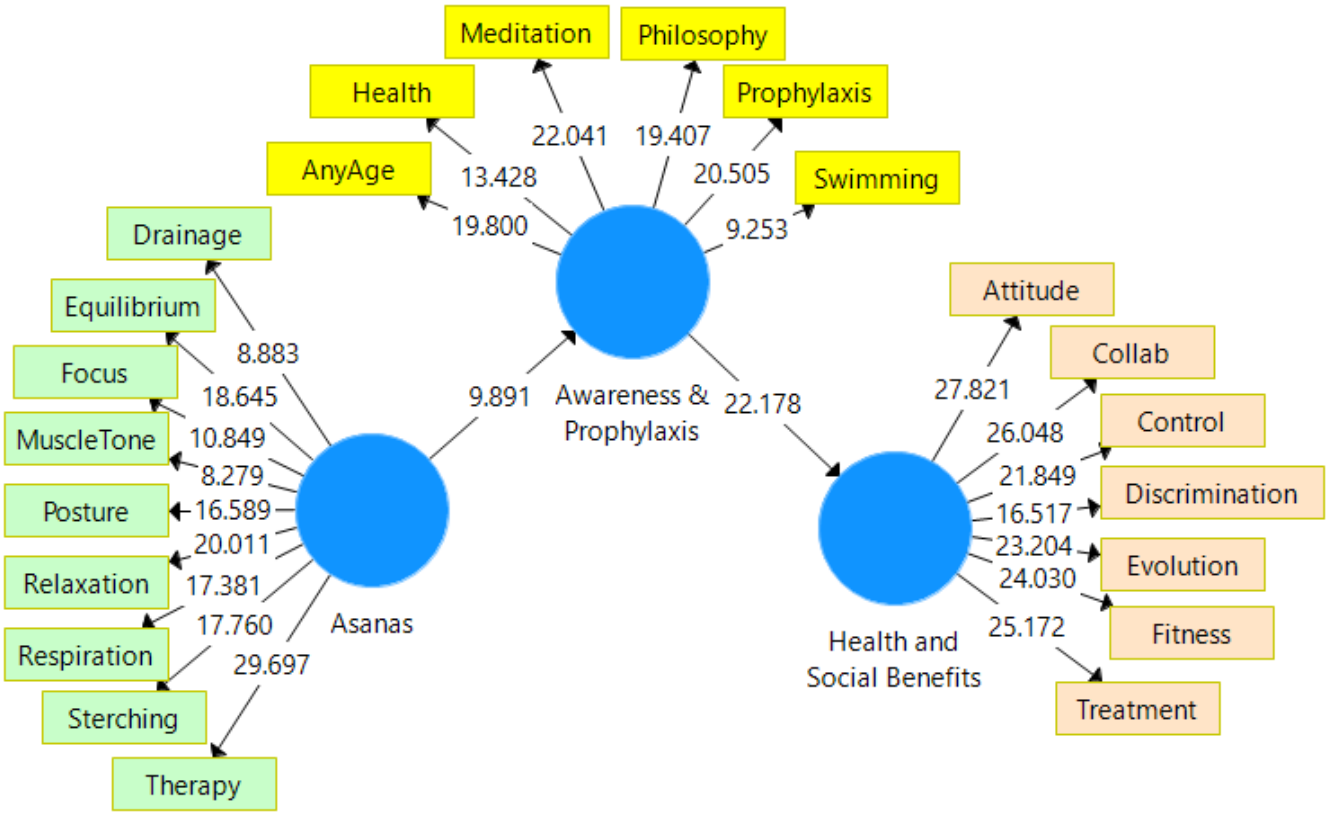

Figure 2. Bootstrapping. Source: SmartPLS analysis (reprinted from SmartPLS software, version 3.3.9, created on 18 April 2024).

4. Discussion

4.1. Result Summary and Interpretation

The study used SmartPLS to evaluate consistency using composite reliability, ensuring the survey items were suitable for the research. All variables displayed high values, with Asanas explaining 45% of the variance of Awareness & Prophylaxis (AP), AP variance explaining 73%, and Health and Social Benefits (HSB). The latent variable correlation showed a strong positive correlation between Awareness & Prophylaxis (AP) and Health and Social Benefits (HSB), and a medium positive correlation between Asanas and Awareness & Prophylaxis (AP). The loading factors for all Asanas, AP, and HSB sub-items had values greater than 0.6, indicating the survey was well designed. The SmartPLS algorithm computed the variance inflation factor (VIF) of each construct, indicating no multicollinearity between the variables.

The high level of explained variance and the high values of correlations empowers us to conclude that the practicians who practice yoga asanas have a high level of awareness and understand the fundamentals of the practice. Becoming constant practician of yoga asanas empower the user to better understand and appropriate yoga. As a consequence, the practicians observe the positive effects on society and their health. They believe that yoga has numerous therapeutic effects, including treating various diseases (respiratory, circulatory, digestive, endocrine, neuro-muscular,

 doi:10.20944/preprints202407.1856.v1

neuro-mental, immune diseases, etc.), providing primary prophylaxis, promoting fitness and stress elimination, fostering self-development, promoting tolerance, cooperation, respect, and a positive attitude, and eliminating cultural, gender, and ethnic discrimination.

4.2. Comparison with Existing Research

In our study, we reached the same conclusion as many authors, that Romanians enjoy yoga and swimming to spend their spare time and for their health benefits. Yoga, a traditional practice that integrates the mind, body, and spirit through physical postures, breathwork, and meditation, has been shown to reduce psychological, physiological, and emotional suffering in survivors of interpersonal trauma. It promotes acceptance, compassion, physicality, active postures, body locks, mental and emotional awareness, and spiritual benefits [7]. Yoga helps manage affective arousal, fosters a sense of physical safety, and offers advantages like internal harmony, acceptance, powerful relationships, and empowerment. Research on yoga and trauma has increased since 2018, but studies do not fully consider relationship traumas. Yoga also promotes individual attention, social aspects, and spiritual practices, such as chanting and mindfulness [8].

Our statistical analysis proved that the persons who practice yoga asanas have a high level of awareness and understand the fundamentals of the practice. Yoga asanas can be practiced underwater and the swimmers love to use asanas to improve their performance. We may also be able to affirm that those who understand yoga better are convinced of its positive effects on society and their health.

Yoga has been found to have therapeutic value in patients with persistent limb pain, improving body awareness through simulated movements like motor imagery. However, the mechanisms behind these findings remain unclear [9]. Yoga has also been shown to reduce stress, prevent chronic diseases, and enhance respiratory and immune system functioning. Hatha yoga classes have improved cardiovascular hemodynamic variables and physical capability in patients with ST-elevation myocardial infarction [11–14]. Regular yoga practice and meditation can improve self-awareness, self-regulatory skills, flexibility, muscular strength, endurance, and cardiovascular performance. Integrating yoga into training regimens can improve performance by combining attention, emotion, and yoga-inspired aspects with intellectual, metacognitive, and procedure management techniques [18–23].

Yoga therapy asanas have gained popularity among subjects due to their numerous benefits for physical and mental health. These asanas can improve flexibility, strength, balance, and mental focus, which are crucial for subject performance. They also help subjects manage stress, improve focus and concentration, and enhance mental clarity. Advanced subjects' knowledge of yoga can positively influence their opinion of its benefits as a therapeutic method. They may be more willing to incorporate yoga into their daily routine and seek information from qualified professionals.

Yoga enhances memory, cognition, social-emotional competency, and overall mental and physical wellness. It can be included in injury prevention plans due to its relaxation, core stability, and mobility benefits [28–30]. Research shows that practicing yoga for four weeks leads to weight loss, increased leg and back strength, and improved back strength in handball players. Long-term yoga programs can improve agility, flexibility, balance, and VO2 max [31–34]. The pandemic has increased the number of injuries, and yoga can help reduce injury risk factors in sports like soccer, handball, swimming, winter sports, and baseball [35–37]. It can also help treat urinary incontinence syndrome in women [38].

The current study emphasizes that Yoga is a practice that promotes acceptance, compassion, physicality, active postures, body locks, mental and emotional awareness, and spiritual benefits. It involves setting intentions, focusing on breath, breathing techniques, physicality, active poses, restorative poses, and body locks. Body awareness helps maintain balance, flexibility, and strength. Health benefits include physical, emotional, mental, and spiritual health. Individual attention is crucial for postural alignment and sensations. Yoga philosophy is based on ethical principles like personal observance, contentment, and self-study.

 doi:10.20944/preprints202407.1856.v1

Swimming is a sport that benefits all muscular groups and non-performers, with numerous health benefits [39]. Yoga is beneficial for swimmers, as it helps stretch the chest, hip flexors, and quads, strengthen the upper back, and improve breathing efficiency [40,41]. Aqua yoga asanas in deep water combine yoga asanas with water aerobics, achieving flexibility, physical fitness, and stress relief [42]. This unique technique involves swimming strokes with considerable water balance, making it easy to perform asanas in water. Research suggests that yoga may enhance mindfulness and improve athletes' flow dispositions and performance. Participants in yoga programs became more aware of internal sensations, acting with greater awareness during activities like swimming training and competition [43]. Flow disposition dimensions included enhanced concentration and a greater sense of control, which has been transferred to school-related activities [50].

4.3. Implications for Each Finding

Yoga and swimming are two disciplines that promote mindfulness and mental well-being. The integration of these practices not only enhances athletic performance but also enriches daily life. The synergy between these practices not only boosts aquatic performance but also nurtures resilience, mindfulness, and overall mental well-being. This holistic approach not only supports athletes in their athletic pursuits but also positively impacts personal and professional lives, promoting athletic excellence and a harmonious lifestyle.

Having a wide range of therapeutic benefits, (immune, respiratory, circulatory, digestive, endocrine, neuro-muscular, neuro-mental, and immune diseases, among others); and primary prophylaxis yoga & swimming can reduce the pressure on economic/ financial resources. The beneficiaries of yoga & swimming practice will spend less on treatments, and medical insurance, they will prevent the installation of other disses which is less expensive than treatment. The beneficiaries of yoga & swimming practice will be healthier due to increased fitness and stress reduction, will have more energy, will be more creative, and have a higher potential to solve job tasks due to cutting-edge critical thinking.

The social impact is materialized in the self-development of yoga practicians, which will also be reflected in the increased level of tolerance, cooperation, respect, and a positive outlook. These social traits will increase the level of interpersonal communication, impacting positively the eradication of discrimination based on culture, gender, ethnicity, and teamwork.

Both yoga and swimming have a substantial impact on mental health, offering economic benefits beyond personal well-being. Enhanced mental health from these activities can boost workplace productivity, with yoga specifically shown to improve focus, cognitive function, and overall well-being, enhancing work performance and efficiency. Moreover, swimming's capacity to prevent and manage chronic health conditions can lead to long-term reductions in healthcare costs. By fostering wellness and mental resilience, these practices not only benefit individuals but also enhance societal and economic well-being through improved productivity and potential healthcare savings.

5. Conclusion

Yoga is inexpensive and safe. Given yoga's numerous benefits for improving health, preventing illness, treating ailments, and aiding in rehabilitation, its integration into modern medicine requires greater emphasis.

Practicing yoga in water goes beyond just enhancing physical flexibility and promoting mental calmness; it provides a distinctive experience that fosters a harmonious blend of mental and physical well-being, resilience, and reduced fatigue. Engaging in aquatic activities has a positive impact on various body systems, offering potential public health benefits in addressing prevalent issues like obesity, diabetes, and arthritis. Combining swimming with yoga nurtures mindfulness, enhancing focus, self-regulation, and overall performance. For those who embrace the discipline of yoga alongside swimming, every movement is imbued with a sense of mindful awareness, revealing untapped levels of potential. This integrated approach not only enhances athletic performance but also deeply enriches daily life. The synergy between swimming and yoga extends beyond enhancing aquatic performance to nurturing resilience, cultivating mindfulness, and enhancing overall mental

 doi:10.20944/preprints202407.1856.v1

well-being. This comprehensive approach to well-being not only supports athletes in their athletic pursuits but also carries positive impacts on their personal and professional lives. Embracing the integration of swimming and yoga provides a route to athletic excellence and a more harmonious lifestyle.

Author Contributions: Conceptualization, R.B.-M.-Ț., L.V., N.J.G.; methodology, R.B.-M.-Ț..; software, R.B.-M.-Ț.; validation, R.B.-M.-Ț.; formal analysis, R.B.-M.-Ț.; investigation, R.B.-M.-Ț., L.V., N.J.G.; resources, R.B.-M.-Ț., L.V.; data curation, R.B.-M.-Ț.; writing—original draft preparation, R.B.-M.-Ț.; writing—review and editing, R.BMT., L.V., N.J.G.; visualization, L.V., N.J.G; supervision, R.B.-M.-Ț. and L.V.; project administration, R.B.-M.-Ț. All authors have read and agreed to the published version of the manuscript.

Funding: Please add: "This research received no external funding".

Informed Consent Statement: "Written informed consent has been obtained from the patient(s) to publish this paper" if applicable.

Data Availability Statement: Provided on request.

Conflicts of Interest: "The authors declare no conflicts of interest."

References

1. Garfinkel, M., & Schumacher, H. R., Jr (2000). Yoga. *Rheumatic Diseases Clinics of North America*, *26*(1), 125–x. https://doi.org/10.1016/s0889-857x(05)70126-5
2. Sharma M. (2014). Yoga as an alternative and complementary approach for arthritis: a systematic review. *Journal of evidence-based complementary & alternative medicine*, *19*(1), 51–58. https://doi.org/10.1177/2156587213499918
3. Sharma M. (2014). Yoga as an alternative and complementary approach for stress management: a systematic review. *Journal of evidence-based complementary & alternative medicine*, *19*(1), 59–67. https://doi.org/10.1177/2156587213503344
4. Maharishi YV. *Journey of Consciousness*. New Delhi, India: Macmillan India; 1992:2–50.
5. Romas JA, Sharma M. *Practical Stress Management. A Comprehensive Workbook*. 6th ed. San Francisco, CA: Pearson; 2014.
6. Santra G. (2022). Yoga and the Need of Its Integration in Modern Medicine. *The Journal of the Association of Physicians of India*, *70*(12), 11–12. https://doi.org/10.5005/japi-11001-0142
7. Isabelle Ong Gaffney, PhD; Ashley W. Gulden, PsyD; Len Jennings, PhD; Mackenna L. Page, MA (2023) Yoga and the Healing of Interpersonal Trauma: A Qualitative Meta-Analysis, Int J Yoga Therapy, 33, https://doi.org/10.17761/2023-D-22-00048
8. Crystal L. Park, PhD; A. Rani Elwy, PhD; Meghan Maiya, MA; Andrew J. Sarkin, PhD; Kristen E. Riley; Susan V. Eisen, PhD; Ian Gutierrez; Lucy Finkelstein-Fox; Sharon Y. Lee; Danielle Casteel, MA; Tosca Braun; Erik J. Groessl, PhD(2018) The Essential Properties of Yoga Questionnaire (EPYQ): Psychometric Properties, Int J Yoga Therap 28 (1): 23–38., https://doi.org/10.17761/2018-00016R2
9. Susannah H Hartnoll; T David Punt (2017) Yoga practice is associated with superior motor imagery performance, Int. J. Yoga. Therap. (2017) 27 (1): 81–86., https://doi.org/10.17761/1531-2054-27.1.81
10. van der Kolk, B. A., Stone, L., West, J., Rhodes, A., Emerson, D., Suvak, M., & Spinazzola, J. (2014). Yoga as an adjunctive treatment for posttraumatic stress disorder: a randomized controlled trial. *The Journal of Clinical Psychiatry*, *75*(6), e559–e565. https://doi.org/10.4088/JCP.13m08561
11. Nagarathna, R.; Nagendra, H.R.; Majumdar, V. A Perspective on Yoga as a Preventive Strategy for Coronavirus Disease. Int. J. Yoga (2020), 13, 89–98. https://doi.org/10.4103/ijoy.IJOY_22_20.
12. Sawant, R.S.; Zinjurke, B.D.; Binorkar, S.V. Preventive aspect of ayurveda and yoga towards newly emerging disease COVID-19. J. Complement. Integr. Med. (2021), 18, 667–678. https://doi.org/10.1515/jcim-2020-0175.
13. Abu Elkhair, Ahlam et al. Effects of different exercise types on quality of life for patients with atrial fibrillation: a systematic review and meta-analysis. J. of cardiovascular medicine (Hagerstown, Md.) vol. 24,2 (2023), 87-95. doi:10.2459/JCM.0000000000001386
14. Grabara, Małgorzata et al. Effects of Hatha Yoga on Cardiac Hemodynamic Parameters and Physical Capacity in Cardiac Rehabilitation Patients. J. of cardiopulmonary rehabilitation and prevention vol. 40,4 (2020): 263-267. doi:10.1097/HCR.0000000000000503

15. Zhang, Yong-Hui, et al. "Exercise for Neuropathic Pain: A Systematic Review and Expert Consensus." Frontiers in medicine 8, (2021), doi:10.3389/fmed.2021.756940
16. Gräf, Julia Katharina et al. Physio- und sporttherapeutische Interventionen zur Behandlung eines Karpaltunnelsyndroms : Eine systematische Übersichtsarbei (Physiotherapy and sports therapeutic interventions for treatment of carpal tunnel syndrome : A systematic review). Schmerz (Berlin, Germany) vol. 36,4 (2022): 256-265. doi:10.1007/s00482-022-00637-x
17. de Zoete, Rutger MJ, et al. "Comparative effectiveness of physical exercise interventions for chronic non-specific neck pain: a systematic review with network meta-analysis of 40 randomised controlled trials." British J. of sports medicine. (2020), doi:10.1136/bjsports-2020-102664
18. Tolbaños-Roche, L.; Menon, P. Applying the S-ART Framework to Yoga: Exploring the Self-Regulatory Action of Yoga Practice in Two Culturally Diverse Samples. Front. Psychol. (2021), 12, doi 10.3389/fpsyg.2021.585300.
19. Iyengar, B.K.S. Yoga: The Path to Holistic Health, 1st ed.; Dorling Kindersley, Great Britain: London, UK, 2021.
20. Laishram Shila Devi, Arun Kumar Chatla, Deepak Pandey, Gaganpreet Kaur, and Sapam Sanatombi Devi. Effect of Yoga and Self-myofascial release on flexibility and Leg Muscle Explosive Power Among Men Football Players. J. of Pharmaceutical Negative Results, (2022), 426-30, doi:10.47750/pnr.2022.13.S06.059.
21. Subhra, C.; Subhojit, C.; Shubham, T.; Manpreet, B. Effect Of 4-Week Yoga Intervention on Selective Physical and Body Composition Variables in Indian Male Track and Field Subjects. J. Yoga Physiother. (2021), 9(1), 1-8. https://doi.org/10.19080/JYP.2021.09.555755.
22. Alice, S. Mindfulness Focussed Yoga: The Role of Interoceptive Awareness in Mindfulness and Yoga Interventions for Trauma and Pain. J. Yoga Physiother. (2021), 9(2), 1-4. Doi: 10.19080/JYP.2021.09.555759. orhttps://juniperpublishers.com/jyp/pdf/JYP.MS.ID.555759.pdf
23. Cheshire, A.; Cartwright, T. A Population-Practice-Based Model to Understand How Yoga Impacts on Human Global Functioning: A Qualitative Study. J. Altern. Complement. Med. (2021), 27, 991–1001. Doi: 10.1089/acm.2021.0104.
24. Jeitler, M.; Högl, M.; Peters, A.; Schumann, D.; Murthy, V.; Bringmann, H.; Seifert, G.; Michalsen, A.; Stöckigt, B.; Kessler, C.S. Qualitative study of yoga for Young adults in school sports. Complement. Ther. Med.2020, 55, https://doi.org/10.1016/j.ctim.2020.102584.
25. Jeitler, M.; Kessler, C.S.; Zillgen, H.; Högl, M.; Stöckigt, B.; Peters, A.; Schumann, D.; Stritter, W.; Seifert, G.; Michalsen, A.; et al. Yoga in school sport—A non-randomized controlled pilot study in Germany. Complement. Ther. Med.2020, 48, 102243. https://doi.org/10.1016/j.ctim.2019.102243.
26. Molina, D.M.; Fernández, A.H.; Navío, E.P. Analysis of Yoga as an Inclusive Sport in Educational Contexts. Educ. Sci. (2020), 10, 162. https://doi.org/10.3390/educsci10060162.
27. Woodyard, C. Exploring the therapeutic effects of yoga and its ability to increase the quality of life. Int. J. Yoga2011, 4, 49–54. https://doi.org/10.4103/0973-6131.85485.
28. Chin, J.; Henseler, H.; Wang, E. Handbook of Partial Least Squares: Concepts, Methods, and Applications, 1st ed.; Springer: Berlin/Heidelberg, Germany, 2010; pp. 655–690. ISBN 978-3-540-32825-4. https://doi.org/10.1007/978-3-540-32827-8. or https://link.springer.com/book/10.1007/978-3-540-32827-8
29. Randeep, R.; Genboku, T.; Yosuke, S.; Rei, A.; Toshiyuki, O. Yoga in Higher Education in Japan: Reflection on the 7-Year, Journey through Lens of Graduate General Education Courses (GGEC) Yoga Course with Research and Social Innovation Outcomes. J. Yoga Physiother. 2021, 9, 555761. https://doi.org/10.19080/JYP.2021.09.555761.
30. Bucea-Manea-Țoniș, R.; Paun, D.G.; Mindrescu, V.; Cătună, C. Yoga, an Appurtenant Method to Improve the Sports Performance of Elite Romanian Subjects. Sustainability (2023), 15, 4264. https://doi.org/10.3390/su15054264
31. Arbo, G.D.; Brems, C.; E Tasker, T. Mitigating the antecedents of sports-related injury through yoga. Int. J. Yoga (2020), 13, 120–129. Doi: /10.4103/ijoy.IJOY_93_19.
32. Hilton, L.G.; Libretto, S.; Xenakis, L.; Elfenbaum, P.; Boyd, C.; Zhang, W.; Clark, A.A. Evaluation of an Integrative Post-Traumatic Stress Disorder Treatment Program. J. Altern. Complement. Med. (2019), 25, S147–S152.
33. Biese, K.M.; Kliethermes, S.A.; Watson, A.M.; McGuine, T.A.; Lang, P.J.; Bell, D.R.; Brooks, M.A. Musculoskeletal Injuries and Their Association With Previous Concussion History: A Prospective Study of

High School Volleyball and Soccer Players. Am. J. Sports Med.2021, 49, 1634–1641. https://doi.org/10.1177/03635465219971164.

34. Reynoso-Sánchez, L.F.; Pérez-Verduzco, G.; Celestino-Sánchez, M..; López-Walle, J.M.; Zamarripa, J.; Rangel-Colmenero, B.R.; Muñoz-Helú, H.; Hernández-Cruz, G. Competitive Recovery–Stress and Mood States in Mexican Youth Subjects. Front. Psychol.2021, 11, 627828. https://doi.org/10.3389/fpsyg.2020.627828.
35. Jangam, S; Sathya, P; Paul, J, Effect of Yogic Breathing Manoeuvre on Pulmonary Function and VO2 Max in Male Football Players, J. of Clinical and Diagnostic Research 16(05) 2022 ,DOI: 10.7860/JCDR/2022/52122.16346
36. Weghaus, C. Yoga—The Secret Ingredient to Success in Soccer & Footy. 2017. Available online: https://www.inner-smileyoga.com/post/2017-12-09-yoga-the-secret-ingredient-to-success-in-soccer-footy (accessed on 29 January 2023).
37. Ferradás-Galloso, Mónica et al. Therapeutic Exercise Combined or not with Pelvic Floor Muscle Training for Urinary Incontinence. Archivos espanoles de urologia vol. 75,6 (2022): 494-506. doi:10.56434/j.arch.esp.urol.20227506.74
38. Fishman L. M. (2021). Yoga and Bone Health. *Orthopedic nursing*, *40*(3), 169–179. https://doi.org/10.1097/NOR.0000000000000757
39. Vasile, L. (2023). Theory and Practice in Performance Sport - Swimming, Discobolul
40. Grace, J. (2020). Yoga for Swimmers: Four Essential Yoga Poses to Focus. Available on https://swimswam.com/yoga-for-swimmers-four-essential-yoga-poses-for-every-swimmer/. (accessed at 04.04.2024)
41. The Outdoor Swimming Society. Available on https://www.outdoorswimmingsociety.com/yoga-for-swimming/ (accessed at 04.04.2024)
42. Dasari Srilakshmi, (2019) Aqua Yoga Asanas-An Innovative Exercise in Deep Waters, GJRA - Global Journal for Research Analysis; 8(8):39-41
43. Mandapaka, R.T. Srinivas Rachabathuni, and Jyothirmai (2016) Yoga as an Exercise in the Professional Life of a Swimmer Leads to Perfection - A Review J. Yoga Phys Ther 2016, 6:2, DOI: 10.4172/2157-7595.1000239
44. Barbarosa, T. M., et al. Physiological assessment of head-out aquatic exercises in healthy subjects: a qualitative review. *Journal of sports science & medicine*, (2009), 8.2: 179.
45. Robinson, L. E., et al. The effects of land vs. aquatic plyometrics on power, torque, velocity, and muscle soreness in women. *The Journal of Strength & Conditioning Research*, 2004, 18.1: 84-91.
46. Al Rabadi, W. The effect of using the aqua yoga exercises on the improvement of breathing and relaxation operations by beginners in swimming sport. 2009.
47. Smith, S. J. Swimming in flow motion: an ecopedagogy for health and physical education. *Sport, Education and Society*, (2021), 26.4: 417-428.
48. Beker, B. E., et al. Biophysiologic effects of warm water immersion. *International Journal of Aquatic Research and Education*, (2009), 3.1: 4.
49. Huber, I. An exploration of aquanatal exercise. *British Journal of Midwifery*, 2003, 11.4: 218-222.
50. Briegel-Jones, R. M., Knowles, Z., Eubank, M. R., Giannoulatos, K., & Elliot, D. (2013). A Preliminary Investigation Into the Effect of Yoga Practice on Mindfulness and Flow in Elite Youth Swimmers. The Sport Psychologist, 27(4), 349-359. Retrieved Jun 4, 2024, from https://doi.org/10.1123/tsp.27.4.349
51. Ross, A.; Friedmann, E.; Bevans, M.; Thomas, S. National survey of yoga practitioners: Mental and physical health benefits. Complement. Ther. Med. (2013), 21, 313–323. https://doi.org/10.1016/j.ctim.2013.04.001.
52. Cartwright, T.; Mason, H.; Porter, A. Yoga practice in the UK: A cross-sectional survey of motivation, health benefits, and behaviors. BMJ Open (2020), 10, e031848. https://doi.org/10.1136/bmjopen-2019-031848.
53. Cramer, H.; Quinker, D.; Schumann, D. Adverse effects of yoga: A national cross-sectional survey. BMC Complement. Altern. Med. (2019), 19, 190. https://doi.org/10.1186/s12906-019-2612-7.
54. Reinartz, W.J.; Haenlein, M.; Henseler, J. An Empirical Comparison of the Efficacy of Covariance-based and Vari-ance-based SEM. Social Science Research Network Electronic Library. 2009.
55. Hair, J.F.; Risher, J.J.; Sarstedt, M.; Ringle, C.M. When to use and how to report the results of PLS-SEM. Eur. Bus. Rev. (2019), 31, 2–24. https://doi.org/10.1108/EBR-11-2018-0203.

 doi:10.20944/preprints202407.1856.v1

56. Hair, J.F.; Ringle, C.M.; Sarstedt, M. PLS-SEM: Indeed a Silver Bullet. J. Mark. Theory Pract. 2011, 19, 139–152. https://doi.org/10.2753/MTP1069-6679190202.
57. Henseler, J.; Ringle, C.M.; Sarstedt, M. A new criterion for assessing discriminant validity in variance-based structural equation modeling. J. Acad. Mark. Sci. (2015), 43, 115–135. https://doi.org/10.1007/s11747-014-0403-8. Or https://link.springer.com/article/10.1007/s11747-014-0403-8