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The comparison of the effects of recreational aerobics and swimming on the psychosomatic status of women

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Abstract.

The modern lifestyle/sedentary has provided people with a high degree of comfort that concurrently leads to the other extreme, lack of movement, stress, and unhealthy/poor nutrition that cause health problems and illness. The purpose of the study is to compare the differences in the influence of two experimental programs, recreational aerobics, and swimming, on the psychosomatic status of sedentary middle-aged women. The sample of the participants is the population of healthy women, chronological age from 35 to 45, who predominantly lead a sedentary lifestyle. The psychosomatic status assessment scale / SPPSS was used in the study. The scale consists of 32 characteristic ailments (disorders) that are divided into eight groups: shoulder and arm pain; back pain; leg pain; fatigue and sensorial discomfort; indigestion; cardiovascular disorders; neuropsychiatric disorders, symptoms of general fatigue. The Mann-Whitney test revealed that there were no statistically significant differences between the recreational aerobics and swimming groups in the variables of subjective assessment of the psychosomatic status at the initial and final testing.

Key words: *differences, influence, aerobics, middle-aged women, swimming, psychosomatic status*

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Introduction

The scientific and technological development of society has imposed the current sedentary way of life. Never in human civilization have societies been so developed and so endangered in health A sedentary lifestyle negatively affects health and causes many disorders[2,6] is associated with a higher risk of mortality than all causes and certain chronic diseases such as cardiovascular disease, diabetes, and osteoporosis[10]. An active lifestyle increases a person's life energy and mobility[1,31], and regular physical activity as its important part, reduces the risk of type 2 diabetes, obesity, cardiovascular disease, stroke, hypertension, colon cancer, breast cancer, osteoporosis, anxiety, and depression[14], reduces depression and helps stress management and improvement of general mood[23]. To live a healthy life and improve the quality of life, regular physical activity is necessary, and the advantage is in systematic exercise[10,19]. The recommendation of the American College of Sports Medicine and the American Heart Association for adults is to participate in exercise 30 minutes a day with moderate-intensity for at least 5 days a week or at least 20 minutes of increased physical activity for 3 days a week to acquire health benefits[10,22]. The greatest reduction in the risk of all-cause mortality occurs in sedentary individuals who become moderately active36. Aerobic activities such as swimming, aerobics, running, walking, and water aerobics are excellent activities that can bring health benefits to the general population as well as to the patients with chronic diseases such as heart failure/weakness[27]. Because of the imposed professional, household, and family obligations, middle-aged women, find it harder to find time for healthy lifestyles, and therefore they belong to the group with risk factors. In addition to the fact that they are insufficiently active, the fact that they are in the premenopausal, or menopausal period is also important, which additionally affects their psychosomatic health. With regard that systematic aerobic exercise[16] may prevent non-communicable diseases (hypertension, diabetes, cardiovascular diseases, obesity and the prevention of other diseases)8 and some conditions caused by the professional environment, in this study, it is important to compare how subjects assess their psychosomatic status before and after the treatment with different aerobic programs. One of the ways to assess current health is by subjective assessment. Subjective health or self-assessment of health is used in health-related research[5] and is considered a reliable measure in health status evaluation[33] as well as a significant predictor of mortality[11,13,20]. In population and epidemiological research, self-assessment of health status is performed by using standardized questionnaires in the manner of self-assessment. As a subjective measure, self-assessment of health is related to human well-being and includes assessment of physical and emotional health[12]. In a subjective health

assessment, participants should have an adequate degree of control over their health behavior and the belief that that behavior has a certain impact on their health[17]. A subjective health assessment can be influenced by physical activities[28] that can reduce the risk of cardiovascular disease, overweight, obesity, and diabetes[31]. The previous body of research on physical activity and health, which included aerobic activities such as walking, running, aerobics and swimming, has identified positive effects of these activities. In the present study, the aim is to test the differences in the subjective assessment of the psychosomatic status of two different aerobic treatments on land - aerobics, and water - swimming in sedentary middle-aged women. Furthermore, according to the findings, it will be established whether the experimental treatments had a positive effect on relieving the symptoms/ailments of sedentary middle-aged women.

Materials and methods

Sample of participants and variables

The study was conducted on a sample of 76 participants divided into two experimental groups, recreational aerobics (n = 38) and recreational swimming (n = 38). Women who do sedentary office jobs were randomly selected into the experimental treatments. Participants, who voluntarily accepted to participate in the experiment, had to be healthy, do sedentary office work, do not participate in other organized forms of physical activity, and regularly attend recreational aerobics and swimming training. All participants in the experiment were given instructions on the importance of exercise and a proper diet. Before and after the experimental treatment, the Scale for subjective assessment of psychosomatic status - SPPSS[3,33] was applied.

The SPPSS scale consists of 32 characteristic ailments (disorders) that are divided into eight groups: shoulder and arm pain; back pain; leg pain; fatigue and sensorial discomfort; indigestion; cardiovascular disorders; neuropsychiatric disorders, symptoms of general fatigue. Each participant estimates the existence and severity of each of the 32 listed disorders. In this way, a numerical expression of the subjective assessment of the severity of each disorder is obtained and represented on a scale of 1–9 (from 1 - does not feel to 9 - unbearable) and the average value of the assessment for each of the eight groups of problems, as well as for the scale as a whole.

Experimental treatment

Recreational aerobics and swimming programs lasted for three months, ie. 12 weeks. All training sessions were held three times a week and led by licensed trainers. Each training lasted 60 minutes and was realized according to the basic structure of the workout class: warming up, the main part of the training, cooling down, and stretching.

Aerobics program

Warm-up 8-10 minutes, music tempo 120-135 bpm, steps - march, step touch, side to side); the main part of training - aerobic A - part 20 minutes, music tempo 135-155 bpm, steps - combinations of Low impact and High impact cardio training[34], B - part of the main training 10 minutes, music tempo 120- 135 bpm, muscle strengthening exercises: abdomen, back, arms and shoulders, legs and gluteal region[9] ; cooling down and stretching for 5-10 minutes, tempo up to 100 bpm, relaxation and static stretching exercises[15,24]. Training sessions are planned by months with the volume and intensity of the load from 60% to 85% of the maximum heart rate[29], which means that in the first month the load ranged from 60-65% of the maximum heart rate, and in the second month 65-75 %. In the third, last month of the experiment, the intensity was in the zone of 75–85% of the maximum heart rate.

Swimming program

Warm-up and cooling down exercises lasted 10 minutes each, and the main exercises lasted 40 minutes. Detailed swimming program is presented in Table 1.

	Exercises	Week	Load	Rate
Warming up (10 min)	Stretching		RPE 75	
Main exercises (40 min)	1.Crawl – leg stroke	1- 4 week	55-65% HRR (RPE 8-10)	3 times/week
	2. Breathing while moving			
	3. Floating horizontally			
	4. Movements with swimming board			
	5. Crawl arms	5-8 week	65-75% HRR (RPE 10-12)	
	6. Free style combination			
	7. Leg movements in backstroke			
	8. Crawl swimming			
	9. Backstroke of arms	9-12 week	75–85% HRR (RPE 12-14)	
	11. Backstroke swimming			
	12. Breaststroke swimming - legs			
	13. Breaststroke -arms			
	14. Breaststroke swimming			
	15. Breaststroke combination			
Cooling down (10 min)	Stretching		RPE 75	

Instrument

The research data for the present study were obtained by the Questionnaire for subjective assessment of psychosomatic status - SPPSS[3,33]. The SPPSS questionnaire consists of 32 characteristic ailments (disorders) that are divided into eight groups: shoulder and arm pain; back pain; leg pain; fatigue and sensorial discomfort; indigestion; cardiovascular disorders; neuropsychiatric disorders, symptoms of general fatigue. Each participant assesses the existence and severity of each of the 32 listed disorders. In this way, a numerical expression of the subjective assessment of the severity of each disorder is obtained and represented on a scale of 1–9 (from 1 - does not feel to 9 - unbearable) and the average value of the assessment for each of the eight groups of problems, as well as for the scale as a whole.

Statistical data processing

The data collected during the study were processed using the application statistical program for personal computers IBM SPSS 20.0. For the analysis of basic statistical data and distribution of results at the initial and final measurement, the basic descriptive parameters arithmetic means and KS test of normality of distribution of results were calculated. Mann-Whitney test was used to test the difference between the initial and final state of the subjective assessment of psychosomatic status. The statistical significance was determined at the level of $p < 0.05$.

Results and discussion

The analysis of the health status of the participants was performed using a questionnaire that consists of 8 composite variables. They are formed by summing the scale scores of individual assessment indicators that are grouped on these variables. Given the initial characteristic of the assessment scale that belongs to the ordinal level of measurement, we checked the normality of the distribution of the formed composite variables (Table 2) to opt for further data processing. The obtained values of the Kolmogorov-Smirnov test indicate the fact that the distributions of the obtained variables in most cases statistically significantly deviate from the normal distribution. Considering established statistically significant deviation of data distribution in most of the obtained composite variables at the initial measurement, both in the whole sample and by groups, testing of differences in subjective assessment of the psychosomatic status of analyzed groups was performed by nonparametric data processing techniques. The Mann-Whitney test was used to test the differences between the groups on the initial and final measurements.

Table 2. *Normality of distribution test of variables for subjective assessment of the psychosomatic status of the participants on the initial testing, total sample and by groups*

Variable	Total sample			Swimming			Aerobics		
	AS	KS test	p	AS	KS test	p	AS	KS test	p
Shoulder and arm pain	5.81	2.39	**.000**	5.84	1.63	**.010**	5.78	1.75	**.004**
Back pain	5.48	1.56	**.015**	5.39	1.39	**.041**	5.57	1.28	.074
Leg pain	6.05	1.57	**.014**	6.44	1.07	.196	5.65	1.23	.097
Fatigue and sensorial discomfort	5.93	1.80	**.003**	6.26	1.28	**.072**	5.60	1.30	.065
Indigestion	3.76	3.10	**.000**	3.71	2.24	**.000**	3.81	2.14	**.000**
Cardiovascular disorders	6.46	1.44	**.031**	6.65	.97	.304	6.26	1.08	.188
Neuropsychiatric disorders	7.82	1.64	**.009**	7.97	1.27	.076	7.68	1.14	.148
Symptoms of general fatigue	7.65	1.46	**.027**	7.78	.96	.305	7.52	1.12	.160

Table 3. *Normality of distribution test of variables for subjective assessment of the psychosomatic status of the participants on the final testing, total sample and by groups*

Variable	Total sample			Swimming			Aerobics		
	AS	KS test	p	AS	KS test	p	AS	KS test	p
Shoulder and arm pain	10.13	1.20	.112	10.84	.80	.529	9.42	1.07	.202
Back pain	10.21	.85	.464	10.68	.59	.875	9.73	.67	.760
Leg pain	10.55	1.28	.073	11.57	.84	.480	9.52	1.12	.162
Fatigue and sensorial discomfort	9.59	1.09	.179	10.50	.99	.273	8.68	.88	.408
Indigestion	5.46	1.97	**.001**	6.00	1.14	.142	4.92	1.65	**.009**
Cardiovascular disorders	11.84	1.27	.077	12.47	.84	.473	11.21	.91	.368
Neuropsychiatric disorders	13.18	1.32	.060	14.76	.81	.523	11.60	.92	.363
Symptoms of general fatigue	13.19	.97	.300	14.10	.76	.605	12.28	.88	.409

Table 2 presents the results of the analysis of differences between the recreational aerobics and swimming groups in the subjective assessment of psychosomatic status at the initial measurement. Based on the mean ranks of groups in the analyzed variables, the size of the Z coefficient, and the assessment of its significance, it can be concluded that there are no statistically significant differences between the analyzed groups in the variables of subjective assessment of the psychosomatic status of participants at the initial measurement. The observed differences are small and stochastic. The swimming group had higher values of mean ranks on the initial measurement compared to the aerobics group in six groups of variables, namely: Shoulder and arm pain 39.11> 37.89; Leg pain 41.05> 35.95; Fatigue and sensorial discomfort 40.00> 37.00; Cardiovascular disorders 40.49> 36.51; Neuropsychiatric disorders 38.70> 38.30; Symptoms of general fatigue 40,11 > 36.89. However, aerobics group had higher values of mean ranks in two group of variables: Back pain 39,82 > 37,18 Indigestion 38,74 > 38.26.

Table 4. *Differences between the analyzed groups in variables of subjective assessment of psychosomatic status of participants on the* ***initial*** *testing*

Variable	Group	Mean rank	Z	p
Shoulder and arm pain	Aerobics Swimming	37.89 39.11	-0.250	0.802
Back pain	Aerobics Swimming	39.82 37.18	-0.528	0.597
Leg pain	Aerobics Swimming	35.95 41.05	-1.032	0.302
Fatigue and sensorial discomfort	Aerobics Swimming	37.00 40.00	-0.611	0.541
Indigestion	Aerobics Swimming	38.74 38.26	-0.106	0.915
Cardiovascular disorders	Aerobics Swimming	36.51 40.49	-0.798	0.425
Neuropsychiatric disorders	Aerobics Swimming	38.30 38.70	-0.079	0.937
Symptoms of general fatigue	Aerobics Swimming	36.89 40.11	-0.645	0.519

Table 5 shows the results of the analysis of differences between the recreational aerobics and swimming groups in the subjective assessment of the psychosomatic status of the participants at the final measurement. Based on the mean ranks of groups in the analyzed variables, the size of the Z coefficient, and the assessment of its significance, it can be concluded that there are no statistically significant differences between the analyzed groups in the variables of subjective assessment of the psychosomatic status of participants at the final measurement. The observed differences are small and stochastic. The swimming group had higher values of mean ranks on the final measurement compared to the aerobics group in all groups of variables, namely: Shoulder and arm pain 41.99> 35.01; Back pain 40.93> 36.07; Leg pain 42.64> 34.36; Fatigue and sensorial discomfort 41.93> 35.07; Indigestion 41.88> 35.12; Cardiovascular disorders 40.26> 36.74; Neuropsychiatric disorders 42.20> 34.80 and Symptoms of general fatigue 41.07> 35.93.

Table 5. *Differences between the analyzed groups in variables of subjective assessment of psychosomatic status of participants on the* ***final*** *testing*

Varijable	Group	Mean rank	Z	p
Shoulder and arm pain	Aerobics Swimming	35.01 41.99	-1.392	0.164
Back pain	Aerobics Swimming	36.07 40.93	-0.964	0.335
Leg pain	Aerobics Swimming	34.36 42.64	-1.643	0.100
Fatigue and sensorial discomfort	Aerobics Swimming	35.07 41.93	-1.363	0.173
Indigestion	Aerobics Swimming	35.12 41.88	-1.390	0.165
Cardiovascular disorders	Aerobics Swimming	36.74 40.26	-0.699	0.485
Neuropsychiatric disorders	Aerobics Swimming	34.80 42.20	-1.463	0.143
Symptoms of general fatigue	Aerobics Swimming	35.93 41.07	-1.015	0.310

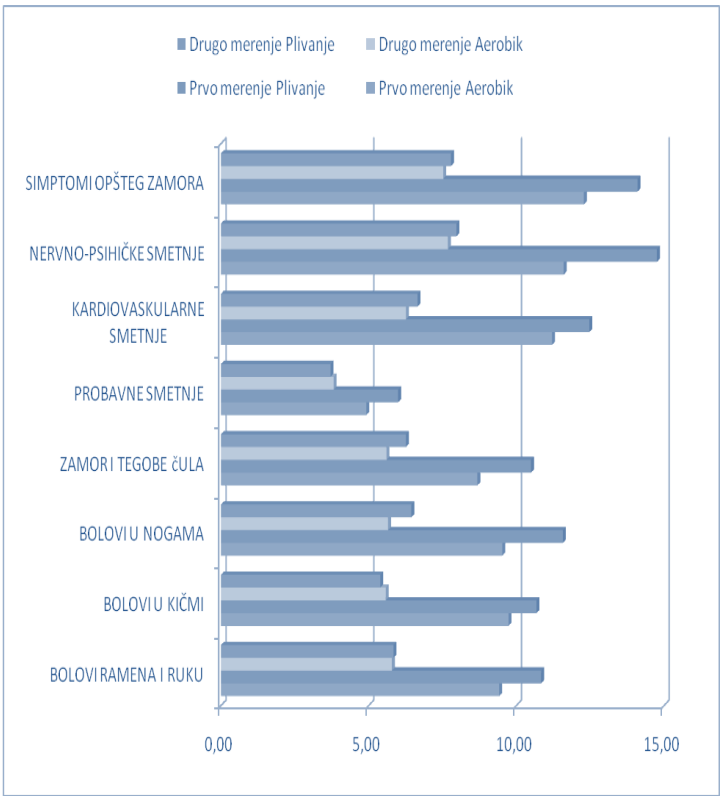

Figure 1. *Changes in psychosomatic status indicators for both groups*

Figure 1 shows the changes and differences of the participants' subjective experience of the recreational aerobics and swimming programs. Study findings indicate that there were statistically significant changes in the participants of both groups[35] on the final measurement in the subjective assessment of psychosomatic status. No differences in the final measurement were found, which confirms the effectiveness of both experimental programs and their positive impact in assessing the health status of the participants. The present study aimed to examine whether two different recreational exercise models, aerobics and swimming, differ in their impact on the subjective assessment of the psychosomatic status of sedentary middle-aged women. The results acquired by this research suggest that between the analyzed groups, based on mean ranks, the size of the Z coefficient, and the assessment of its significance, there are no statistically significant differences in the variables of subjective assessment of the psychosomatic status of the participants at the initial and final measurement. The noted differences are small and stochastic (random). The presence of systematically higher values of the mean ranks for the Swimming group compared to the Aerobics group can be observed in both testing. In the first group of variables Hand and shoulder pain, higher values of mean ranks were noted for the swimming group compared to the aerobics group on the initial and final

measurements, but they were not statistically significant (initial: Z = -0.250, p <0.802; final: Z = - 1,392, p <0.164). This could be supported by the fact that the environment/water in which the swimming activity took place contributed to the elimination of pain in the arms and shoulder girdle. We must also emphasize that when hands are working in the water, there is an active phase of hand movement and a passive phase of hand movement were the muscles are more or less alternately loaded, which has an impact on relieving hand and shoulder problems and it is a motive for recreational swimmers' continuing activities. The shoulders are the most painful spots after the spine and hip joint when it comes to joint condition/pain. One phase of the movement of the arms in the water is in front of the shoulders, which additionally burdens the muscles of the shoulder girdle. The amplitude and movement of the arm in the water in front/above the shoulder is often many times larger/longer in swimming training with a vast number of consecutive repetitions, which enables the engagement of a larger number of shoulder girdle muscles and greater movements in the shoulder joint. Furthermore, during the active phase of the arm movement through the water, all the muscles of the arm and shoulder girdle are active, and the water is an additional resistance with its density, which has a positive effect on the functionality of the arm and shoulder girdle[18,19]. All these movements of the hands in the water have their therapeutic/preventive effect on the symptoms of pain in the hands and shoulder girdle which enables the engagement of a larger number of shoulder girdle muscles and greater movements in the shoulder joint. Furthermore, in the active phase of the arm movement through the water, all the muscles of the arm and shoulder girdle are active, and the water is an additional resistance with its density, which has a positive effect on the functionality of the arm and shoulder girdle. In the second group of variables Back pain (in the neck, chest, and low back area) it was noticed that the aerobics group had higher values of the mean ranks compared to the swimming group on the initial measurement (Z = -0.528, p <0.597), and on the final measurement the swimming group had higher values of mean ranks (Z = -0.964, p = 0.335). The differences between the groups in these variables were not statistically significant on the initial and final measurements. Water activities have a great advantage over activities on the ground (vertical/upright position) in terms of joint pain. The advantage of swimming when it comes to joint pain is the horizontal position of the body in the water and the buoyancy of the water that keeps the body in a horizontal position. In the water all the joints are weight-free, they hardly touch, which means that they do not damage the cartilaginous surface of the joint when certain parts of the body are moving/working. In the horizontal position of the body in the water, almost all muscles are active, and the joints in the weight-free position get the necessary substrates for their functioning through the activity of the muscles in the best possible

way. Sitting work with a static vertical position of the torso heavily burdens the spine, and swimming with a horizontal weight-free position is an activity that can have a preventive and therapeutic effect on back pain. In the third group of variables Leg pain (in the area of hips, knees, calves, and feet) the higher values of mean ranks for swimming group on the initial and final testing were found (initial: Z = -1.032, p <0.302; final -1.643, p <0.100). For these variables, there is no statistical significance on the initial and final testing. Sedentary jobs affect normal circulation in the lower extremities when the hip and knee joints are flexed/bent. Likewise, due to such a position, bloodflow is obstructed by bent knees and hip joints and cannot get from the feet to the heart so easily to remove by-products and bring back fresh blood supplied with nutrients necessary for muscle cells. It is recommended to take several short active breaks lasting 1-2 minutes with a break from sitting work and perform dynamic exercises for the lower extremities, which will normalize circulation and thus remove the burden from the hips and lower extremities. Leg pain requires dynamic work, and the advantage is in swimming due to the horizontal position of the body in the water and the even load on most of the muscles that participate in elimination of these problems[7].

In the fourth group of variables Fatigue and sensorial discomfort (sensitivity to noise, silence and monotonous work, fatigue and eye pain) it was also found that the swimming group had higher values of the mean ranks on the initial and final measurement (initial: Z = - 0.611, p < 0.541, final -1.363, p <0.173). Differences between the groups were not statistically significant in these variables on the initial and final testings. In most sedentary jobs, after many years of work, chronic fatigue occurs. Adequate therapy for such conditions is 7-10 days of active programmed rest outside of the place of residence with the continuation of an appropriate model of exercise in the place of residence, or a change in line of work. This recommended exercise addition should be under the control and recommendations of a specialist doctor. The specificity of the influence of recreational aerobics and swimming is that it can partially stop the progression of the symptoms of chronic fatigue, and in the early phase with the recommendations/control of a doctor they can help a lot.

For the fifth group of variables Indigestion (nausea, indigestion, and loss of appetite) it was confirmed that aerobics group had higher values of mean ranks at the initial testing (Z = -0.106, p <0.915), and the swimming group at the final measurement respectively (Z = -1.,390, p <0.165). The differences between groups in these variables were not statistically significant at the initial and final testing. Regular aerobic training such as swimming and aerobics with a consistently healthy diet can be a good preventative for indigestion. The outcome of aerobic activities is the improvement in the functions of all human body systems. Consumed

calories/food must be balanced, i.e. to have sufficient building materials necessary for the structure/composition of muscles, bones, joints, and other organ systems. The role of exercise in the diet is to improve the breakdown of ingested substances and help in all metabolic processes. Diversely, excess calories can be compensated for in the healthiest way by exercise or removed from the body in a natural way. Therefore, exercise is required to normalize indigestion.

In the sixth group of variables Cardiovascular disorders (shortness of breath, rapid fatigue, increased sweating, and heart disorders) it was found that the swimming group had higher values of mean ranks at the initial and final measurement (initial: $Z = -0.798$, $p < 0.425$; final: $Z = -0.699$, $p < 0.485$). Differences between groups in these variables were not statistically significant at the initial and final testing. The causes of cardiovascular disorders can be different and the following ones can be highlighted: stressful situations, lack of physical activity, smoking, alcohol consumption, congenital conditions, etc. Regular check-ups with a doctor and regular aerobic physical activity recommended by the licensed trainer are important for prevention. Swimming and aerobics strengthen the cardiovascular system, stabilize blood pressure, improve breathing, increase lung capacity and have a positive impact on general health[8]. Since cardiovascular diseases are the primary cause of death in almost 50% of cases, and exercise is considered one of the best preventive measures, it is very important to get proper instructions about heart rate intensity for the preventive exercise that is appropriate to the patient's condition.

In the seventh group of variables Neuropsychiatric disorders (headache, bad mood, indifference-apathy, general discomfort, and irritability) it was established that the swimming group had higher values of mean ranks at the initial and final measurement (initial: $Z = -0.079$, $p < 0.937$ final: $Z = -1.463$, $p < 0.143$). Differences between groups in these variables were not statistically significant at the initial and final measurements. Swimming is recommended when one needs to relax, reduce anxiety (anxiety) or reduce stress levels because deep breathing during swimming lowers the level of cortisol – 'stress hormone', which causes anxiety. Aerobic activities are useful in neuropsychiatric disorders because moderate physical activity has a positive effect on the immune system, improves physical and mental health. Swimming has a slight advantage because the body is more relaxed in the water. The horizontal position of the body in the water, as well as swimming from the edge to the edge of the pool, is motivating and it engages all muscles, organ systems and, very importantly, breathing is deepened[25,26]. Swimmers' breathing with selected swimming techniques in continuity can have a positive effect on mental health as confirmed by the results of the final testing.

For the eighth group of variables Symptoms of general fatigue (monotony, drowsiness, insomnia and feeling weak) it was revealed that the swimming group had higher values of mean ranks at the initial and final measurement (initial: Z = -0.645, p <0.519; final: Z = - 1.015, p <0.310). Differences between groups in these variables were not statistically significant at the initial and final measurements. Sedentary office work literally enacts symptoms of general fatigue after many years of professional work if the workers did not do compensatory exercises during the work hours or in their free time, which would rehabilitate their health condition and work capacity. There are several types of active breaks during the work process that can improve occupational and health status. Depending on the toughest part of the working day/peak fatigue time, working process should be halted and preventative exercises applied in order to boost function of passive organ systems and relaxation of fatigued body parts. Depending on the nature of the work, the critical working time is determined. Another way of preventive recovery from sedentary work is the active use of free time. In free time, recovery from the symptoms of fatigue should be considered in more details. This means that the current health condition should be evaluated by a team of specialists (occupational medicine doctors, occupational safety specialist, psychologist, sociologist and specialist trainer). After the diagnostic analysis, a detailed recovery plan from the symptoms of general fatigue is prescribed. Our designed program of recreational swimming and aerobics, which consisted of aerobic exercises, strength exercises and stretching exercises, had a positive effect on the symptoms of general fatigue. In the further text we will present similar studies where the differences on the influence of different models of recreational exercise on health status were compared.

A similar study was conducted by[17] in which they investigated the influence of pilates and yoga on behaviors that promote health and subjective health status. They designed a program of pilates and yoga that lasted eight weeks. The study included 90 participants (aged 30 to 49) who did not have previous experience with pilates and yoga, men and women respectively. Subjects were divided into three groups, two experimental groups of pilates and yoga who had regular workouts and a control group that did not participate in the workouts. All participants completed two surveys, a health-promoting lifestyle profile (HPLP II) and a Health Self-Assessment Scale (HSRS), before and after the experimental program[32,36]. The results of their research indicate that the pilates and yoga groups demonstrated greater engagement in health-promoting behaviors than the control group after the treatment. Subjective health status, as measured by HSRS, also improved significantly among pilates and yoga participants in comparison to those in the post-program control group. Furthermore, a significant difference in these influences was found in both genders. The authors concluded that pilates and yoga help in recruiting behaviors

that promote health in participants and create positive beliefs about their subjective health status.

Additionally, a study similar to our research was conducted by[4] where they compared the health aspects of swimming with other types of physical activity and sedentary lifestyle habits. Their study aimed to evaluate the characteristics of participants in the longitudinal study of the Aerobics Center and to compare health habits and physiological characteristics among swimmers, runners, walkers, and sedentary women and men in assessing the health benefits of swimming compared to other types of physical activity. The participants were 10,518 women and 35,185 men aged 20–88 who underwent a health examination between 1970 and 2005. Differences in the distribution of selected characteristics between swimmers and those participating in other types of activities (sedentary, walkers, or runners) were tested using logistic regression for proportions and ANOVA for continuous variables. The main findings of their report are that swimming, as well as walking and running, have health benefits compared to a sedentary lifestyle. Again, the authors conclude that swimming could be a healthy alternative to traditional ways of exercising to improve CRF (cardiorespiratory fitness) for the general population, as well as for patients suffering from chronic diseases. Swimming offers several health benefits and is a viable alternative to other forms of physical activity. Their results indicate that swimming has health benefits similar to those of running and that it was more beneficial than walking or a sedentary lifestyle. Future research is needed for further comparison of the health benefits of swimming and other means of physical activity.

The influence of different models of swimming and football training on bone formation in middle-aged women was investigated by[21]. They tested the hypothesis that football training and two different swimming training protocols instigate different and specific osteogenic adaptations and cause different effects on bone formation in sedentary middle-aged women. The study involved 83 randomly selected participants divided into groups: football (n = 21), swimming of moderate-intensity (n = 21), swimming of high intensity (n = 21) and the control group (n = 20). The program of the training groups lasted 15 weeks with three training sessions per week and an individual training session of one hour. All training sessions in groups were led by licensed trainers. The control group did not participate in the training protocols. The authors conclude that their study demonstrated an improvement in lower extremity bone mass and bone markers' changes after 15 weeks of football training in middle-aged sedentary premenopausal women, while no effect was observed in swimming training. The authors also conclude that overall football training provides a strong osteogenic stimulus and can be

recommended as a health-improving intervention to prevent osteoporosis in pre-menopausal women.

A questionnaire on the subjective assessment of the effects of exercise (functional and motor abilities, mood, and reduction of health problems)[30] on the quality of life of middle-aged women was utilized by[12]. The study included two groups of middle-aged women (Group A: up to 5 years of exercise and Group B: over 5 years of exercise) who attend dance recreational activities. The participants from group B achieved statistically significantly higher results in all statements in the subjective assessment of the effect of the dance recreational activity program compared to the participants from group A. The largest differences were observed in the following statements: I maintain body weight more easily, I move easier and safer, my self-confidence has improved, I am more satisfied with my appearance and I made new friends. The authors concluded that the active participation of middle-aged women in dance recreational activities has a positive effect on their life quality and contributes to the experience of better life satisfaction. The participants from group B attained statistically significant higher results on all statements of subjective assessment of dance recreational activity. The largest differences were noted in the following statements: I maintain body weight more easily, I move easier and safer, my self-confidence has improved, I am more satisfied with my appearance, and I made new friends.

Conclusion

The study aimed to compare the differences in the effects of two recreational models of aerobic exercise and swimming on the subjective assessment of the psychosomatic status of sedentary middle-aged women. The results of the research show that there are no statistically significant differences between the groups before and after the experimental treatment, which means that the experimental treatments had an equally positive effect on alleviation/elimination of problems in the participants/sedentary middle-aged women. Our results are concordant with similar research on the positive impact of different recreational models of aerobic exercise on the self-assessment of the psychosomatic status of middle-aged women. The authors recommend similar research to compare the subjective and objective effects of exercise in water and on land in a sedentary population of women.

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References

1. *Arcury TA, Snively BM, Bell RA, Smith SL, Stafford, JM, At Al. (2006). Physical activity among rural older adults wit diabetes. J Rural Health. 22 (2), pp:164-168.*

2. *Biçer YS, Peker İ, ve Savucu Y. (2005). The Effects of Planned Regular Walking on Body Composition Values in Female Patients with Cardiovascular Occlusion. Fırat University Journal of Health Sciences. 19 (4), pp: 241-248.*

3. *Blagajac, M. (1989). Primena skala za subjektivnu procenu efekata programa u sportskoj rekreaciji. Zbornik radova IX ljetne škole pedagoga fizičke kulture, str. 146-152. Ohrid.*

4. *Chase NL, Sui X, and Blair SN. Comparison of the Health Aspects of Swimming With Other Types of of Physical Activity and Sedentary Lifestyle Habits. International Journal of Aquatic Research and Education, 2008, 2, 151-161.*

5. *Congdon P. Health status and healthy life measures for population health need assessment: modeling variability and uncertainty. Health Place, 2001, 7, 13–25.*

6. *Çolakoğlu FF. (2003). The Effects of 8-Week Run-and-Walk Exercise on Physiological, Motoric and Somatotype Values in Sedentary Middle-Aged Obese Women. Journal of Gazi Education Faculty. 23 (3), pp: 275-290.*

7. *Despot Lučanin J, Lučanin D, Havelka M. Quality of Ageing – Self-Perceived Health and Needs for Community Care Services. Drus Istraz 2006;15:801-17.*

8. *Forbes, G.B. (1991). Exercise and body composition. Journal of Applied Physiology, 70(3): 994-997.*

9. *Furjan-Mandić, G., Kosalec, V., & Vlašić, J. (2011). The effects of aerobic exercise on the increase of repetitive strength in women. In S. Simović (Ed.), 3th International aspects of Sports, Physical education and Recreation (pp. 75-83). Banjaluka, Bosnia and Herzegovina: Faculty of Physical Education and Sport. doi: 10.5550/SP.3.2011.09*

10. *Haskell, W.L., Lee, I.M., Pate, R.R., Powell, K.E., Blair, S.N., & Franklin, B.A. (2007). Physical activity and public health: Updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. Medicine and Science in Sports and Exercise, 39, 1423–1434. 39 (5): 377-387.*

11. *Idler, E.L. i Banyamini, Y. (1997). Self-rated health and mortality: arewiew of twenty-seven community studies. Journal of Health and Social Behaviour, 38, 21–37.*

12. *Katić S, Kvesić M, Lukanović B, Babić M. Učinak tjelovježbe na kvalitetu života žena srednje životne dobi. Zdravstveni glasnik, 2018. Vol. 4. No. 2.*

13. *Kaplan GA, Goldberg DE, Everson SA, et al. Perceived health status and morbidity and mortality: evidence from the Kuopio ischaemic heart disease risk factor study. Int J Epidemiol. 1996; 25:259–65. [PubMed: 9119550]*

14. *Kesaniemi, Y.K., Danforth, E., Jr., Jensen, M.D., Kopelman, P.G., Lefebvre, P., & Reeder, B.A. (2001). Dose-response issues concerning physical activity and health: An evidencebased symposium. Medicine and Science in Sports and Exercise, 33, S351–S358.*

15. *Kostić, R. (1999). Fitnes. Niš: Fakultet za fizičku kulturu.*

16. *Koksal, F.; Koruc, Z. & Kocaeksi, S. (2006). Effect of participation in an 8-week step-aerobic dance on physical self-perception in women. 9th International Sports Sciences Congress Proceedings (1033-1035). Mugla, Turkey. 3-5 November 2006.*

17. *Lim, E-J., Hyun,; E-J. The Impacts of Pilates and Yoga on Health-Promoting Behaviors and Subjective Health Status. Int. J. Environ. Res. Public Health 2021, 18, 3802. https://doi.org/10.3390/ijerph18073802.*

18. *Lin, S.Y., Davey, R.C., & Cochrane, T. (2004). Community rehabilitation for older adults with osteoarthritis of the lower limb: A controlled clinical trial. Clinical Rehabilitation, 18, 92–101.*

19. *McGrath JA, O'Malley M, Hendrix TJ. (2011). Group exercise mode and health-related quality of life among healthy adults. Journal of Advanced Nursing, 67, pp: 1365-2648*

20. *Milunpalo, S., Vuori, I., Oja, P., Pasanen, M. i Urponen, H. (1997). Self-rated health status as health measure: the predictive value of self-reported health status on the use of physican service and on mortality in the working-age population. Journal of Clinical Epidemiology, 50, 517-528.*

21. *Mohr M, Helge E. W, Petersen1 L. F, Lindenskov A, Weihe P, Mortensen J, Jørgensen N. R, Krustrup P. Effects of soccer vs swim training on bone formation in sedentary middle-aged women. Eur J Appl Physiol. 2015 Dec;115(12):2671-9. doi: 10.1007/s00421-015-3231-8*

22. *Nelson, M.E., Rejeski, W.J., Blair, S.N., Duncan, P.W., Judge, J.O., & King, A.C. (2007). Physical activity and public health in older adults: Recommendation from the American College of Sports Medicine and the American Heart Association. Circulation, 116, 1094–1105*

23. *Nieman, D.C., Custer, W.F., Butterworth, D.E., Utter, A.C., & Henson, D.A. (2000). Psychological response to exercise training and/or energy restriction in obese women. Journal of Psychosomatic Research, 48, 23–29.*

24. *Nićin, Đ. (2003). Fitnes, Fakultet za menadžment u sportu Univerziteta "Braća Karić" i Viša škola za sportske trenere, Beograd.*

25. *Okano G, Miyake H, Mori M. Leisure time physical activity as a determinant of self-perceived health and fitness in middle-aged male employees. J Occup Health. 2003; 45:286–92. [PubMed14646269]*

26. *Penedo, F.J.; Dahn, J.R. Exercise and Well-being: A Review of Mental and Physical Health Benefits associated with Physical Activity. Curr. Opin. Psychiatry 2005, 18, 189–193. [CrossRef]*

27. *Schmid, J.P., Noveanu, M., Morger, C., Gaillet, R., Capoferri, M., & Anderegg, M. (2007). Influence of water immersion, water gymnastics and swimming on cardiac output in patients with heart failure. Heart (British Cardiac Society), 93, 722–727.*

28. *Sun S, Chen J, Johannesson M, Kind P, Burström K. Subjective well-being and its association with subjective health status, age, sex, region, and Socioeconomic characteristics in a Chinese population study. International Journal of Happiness Studies. 2016 Apr;17(2):833-73.*

29. *Stojiljković, S. (2005). Fitness. Fakultet sporta i fizičkog vaspitanja. Beograd.*

30. *Trkulja Petković D, Vučić D, Đuras G, Širić V, Vladović Z, Širić Ž. Primjer anketnog upitnika za utvrđivanje utjecaja tjelesnog vježbanja na neke segmente kvalitete života žena starije životne dobi. 20. ljetna škola kineziologa Republike Hrvatske. Zagreb: Hrvatski kineziološki savez; 2011.*

31. *van den Berge JC, Dulfer K, Utens EM, Hartman EM, Daemen J, van Geuns RJ, van Domburg RT. Predictors of subjective health status 10 years postPCI. International Journal of CardiologyHeart and Vasculature. 2016 Mar: 11, 19-23. https://doi. org/10.1016/j.ijcha.2016.03.011.*

32. *van Herten LM, van de Water HP. New global Health for All targets. BMJ. 1999; 319:700–3. [PubMed: 10480832]*

33. *Vučković, S. (2003). Rekreativne aktivnosti u funkciji preventivno-zdravstvene usmjerenosti. X međunarodni naučni skup FIS KOMUNIKACIJE 2003. Niš: Fakultet sporta i fizičkog vaspitanja.*

34. *Zagorc, M., Zaletel, P., Ižanc, N.: (1998). Aerobika. Fakultet za šport, Ljubljana.*

35. *Zrnić, R., Jovanović, S., Vukić, Ž., Tešanović, G. (2021). The influence of recreational aerobics on subjective assessment of psychosomatic status of women. Quality of Life, 12, (13-4):104-112.*

36. *Williams, P.T. (2003). The illusion of improved physical fitness and reduced mortality. Medicine and Science in Sports and*

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