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THE USE OF PILATES AS A STRATEGY FOR IMPROVING HEALTH AND FUNCTIONAL STATUS OF ADULTS

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ABSTRACT

This pilot study investigated the effects of Pilates on the health and functional status of adults. The sample comprised 43 participants of both genders, with a mean age of 41 years. The study was conducted in Belgrade in 2024, in two phases (test-retest). An 11-item questionnaire was developed to gather data on the significance and impact of Pilates on health and functional status. Various descriptive and inferential statistical techniques were used in data processing and analysis. The findings indicated a substantial impact of Pilates on participants' health and functional status, showing a statistically significant improvement from the initial phase to the three-month follow-up after consistent practice. Pilates exercises significantly improved functional performance in adult participants and may be used as a preventive strategy to maintain and enhance physical and mental health, thereby improving quality of life.

Keywords: exercise, physical activity, mental health, physical health

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PRIMENA PILATESA KAO METODE ZA UNAPREĐENJE ZDRAVSTVENOG I FUNKCIONALNOG STATUSA ODRASLIH OSOBA – PILOT ISTRAŽIVANJE

APSTRAKT

Ovo pilot istraživanje je imalo za cilj da ispita uticaj pilatesa na zdravstveni i funkcionalni status odraslih osoba. Uzorak je formiran od 43 ispitanika, oba pola, prosečnog uzrasta 41 godinu. Istraživanje je realizovano u Beogradu, u dve faze (test-retest), tokom 2024. godine. Za prikupljanje podataka o značaju i uticaju pilatesa na zdravstveni i funkcionalni status kreiran je upitnik koji se sastojao od 11 pitanja na koja su ispitanici samostalno odgovarali. U obradi i analizi podataka primenjene su određene mere deskriptivne i inferencijalne statistike. Rezultati istraživanja su pokazali da postoji veliki uticaj vežbanja pilatesa na zdravstveni i funkcionalni status ispitanika, odnosno utvrđeno je statistički značajno povećanje uticaja pilatesa na status ispitanika od perioda počinjanja do perioda nakon tri meseca redovnog vežbanja. Možemo reći da su vežbe pilatesa dovele do značajnog poboljšanja funkcionalnih performansi kod odraslih ispitanika i da se pilates može primenjivati kao preventivna strategija u cilju održavanja i poboljšanja fizičkog i psihičkog zdravlja, pa samim tim i unapređenja kvaliteta života.

Ključne reči: vežbanje, fizička aktivnost, psihičko zdravlje, fizičko zdravlje

Introduction

Physical activity can be described as bodily movement that improves health and represents an essential component of a healthy lifestyle (Department of Health and Human Services, 2008). Regular exercise provides numerous health benefits, such as improved fitness, increased muscle strength, and reduced blood pressure. Participation in regular physical activity also positively affects mental health (O'Dougherty et al., 2012; Tavolacci et al., 2013). Adults should avoid an inactive and sedentary lifestyle; even minimal physical activity is considered better than none (Petrović et al., 2024).

It is recommended that adults engage in at least 150 minutes of moderate-intensity physical activity per week or 75 minutes of vigorous-intensity aerobic activity. Additionally, adults should participate in muscle-strengthening activities of moderate or high intensity involving all major muscle groups (Department of Health and Human Services, 2008). Despite strong evidence supporting the benefits of moderate exercise, more than 60% of adults worldwide do not exercise regularly, and nearly 25% lead a sedentary lifestyle (Seefeldt et al., 2002). The importance of physical activity for maintaining and improving daily functioning has been confirmed by numerous studies (Kura et al., 2004; Maj, 2003; Pieron, 2004, as cited in Siqueira Rodrigues et al., 2010).

Physical activity in adulthood is associated with improved sleep quality and duration, healthier physiological patterns, reduced risk of falls, better cognitive functioning, greater life satisfaction, and lower incidence of anxiety and depressive symptoms (Anderson & Spector, 2000). At the same time, physical activity has preventive and therapeutic effects on cardiovascular diseases, cancer, diabetes, osteoporosis, rheumatic and other conditions (Maček et al., 2016; Ostojić et al., 2009).

In addition to studies examining the physical and mental benefits of physical activity, research has also focused on socioeconomic aspects related to maintaining functional independence and improving quality of life (Orsini et al., 2007). Participation in group-based and tailored exercise programs represents an important avenue for social engagement among adults. The choice of physical activity is influenced by various factors such as motivation, attitudes, prior motor experiences, skills, lifestyle, and preferences (Maček et al., 2016). For middle-aged and older adults, recommended activities include walking, running, swimming, cycling, strength training, etc. Another example of beneficial physical exercise is the Pilates method, known as a popular training modality among adults. Pilates was created by Joseph H. Pilates in the 1920s (Latey, 2001). Over time, the original method evolved, adopting characteristics of martial arts, dance, and yoga while retaining its fundamental philosophy. To perform Pilates movements correctly, six core principles must be followed: concentration, centering, precision, breathing, control, and flow (Tolossa & Bekele, 2014; Wells et al., 2012), although some authors include nine principles: concentration, control, centering, breathing, postures, sequence, precision, endurance, and relaxation (Dević, 2024). In that way, Pilates exercises focus on movement quality and therefore rely on fewer repetitions. The method integrates both body and mind (Wells et al., 2012). The method can be practised on a mat or equipment (e.g. ladder barrel, wall unit, and chair), with or without props (e.g. elastic band, ball, magic circle, etc.) (Latey, 2001). The application of Pilates on unstable surfaces (e.g. rollers, Pilates balls) leads to improvement in the mobility of joints and soft tissues, balance, movement coordination, core stability and mobility (Ignjatović, 2020, as cited in Abohllala et al., 2024), which improves the quality of functional movement patterns, which are the basis for functional mobility.

Pilates, particularly popular among women worldwide, is associated with improved physical health (muscle strengthening, endurance, trunk stabilisation, respiratory muscle strength), psychological well-being (improved mood, motivation, and body awareness), and motor function (muscle control, dynamic postural control, balance, and coordination). Pilates consists of physical exercises that use resources such as gravity and spring resistance, either to resist or assist movement performance (Gagnon, 2005). It aims to prevent automatic movement patterns that may contribute to undesired

muscle activity and injury (Petrofsky et al., 2007). Pilates, as a system of exercises, focuses on strengthening body muscles, stabilising the lumbar spine and pelvis, improving strength, flexibility, and breathing, thus significantly contributing to better overall health (Marandi et al., 2013). At the same time, Pilates helps reduce back pain and improve body posture and postural control (Natour et al., 2015).

Pilates exercises can be divided into the following phases: assistive movement (to inhibit improper muscle action), dissociation, stabilisation, mobilisation, dynamic stabilisation and functional re-education (Anderson & Spector, 2000).

The Pilates method has been studied in relation to the effects it has on autonomy, i.e. on the growth and development of each individual (Johnson et al., 2007), body posture (Blum, 2002; Kaesler et al., 2007), pain control (Lin et al., 2016), muscle strength (Schroeder et al., 2012), flexibility (Segal et al., 2004), and motor skills (Lange et al., 2000).

The available research findings indicate the positive effects of applying the Pilates method in the adult population. Bertoli and colleagues (Bertoli et al., 2017) found that only six weeks of Pilates practice was sufficient to improve the functional capacity of active and inactive women. In a similar study, ten weeks of Pilates training improved gait, muscle strength, and mobility in sedentary older women (Choi et al., 2021). Liposcki et al. (2019) reported improved quality of life in sedentary women after six months of Pilates practice. De Oliveira et al. (2015) believe that Pilates is an effective activity that leads to better posture, balance and quality of life. A study by Segal et al. (2004) showed that a six-week Pilates exercise program in adults resulted in significant improvements in flexibility, trunk stability, and muscle strength. Similar results are reported by Kesler et al. (2007), who confirmed that Pilates can improve movement control and postural stability in older adults, which is key to preventing falls.

In addition to the physical effects, the mental aspects of Pilates are also significant. A study by Curi et al. (2018) showed that regular practice of Pilates in adult women led to a reduction in symptoms of depression and anxiety, as well as to an improvement in sleep quality. Johnson and colleagues (2007) point out that Pilates contributes to a greater degree of awareness of one's own body and movements, which has a positive effect on emotional well-being and stress reduction.

Domestic literature also highlights the benefits of Pilates, especially regarding balance and lower-limb and core strength (Stojanović Tošić & Đorđević, 2013, as cited in Đorđević et al., 2015). Individuals with chronic low back pain achieve significant functional improvement through Pilates (Dević, 2024).

What makes Pilates special is its broad applicability and accessibility. It can be practised in controlled conditions without specialised equipment and adapted to individual abilities. This makes it suitable for a wide population, including people who are not physically active, the elderly population, and those with specific health conditions.

In accordance with the above, this pilot study aimed to investigate the impact of Pilates on the health and functional status of adults. The research was based on the assumption that practising Pilates has a positive effect on the health and functional status of middle-aged people.

Method

The research sample was purposive and consisted of 43 participants of both sexes (65.2% female and 34.8% male), aged 35 to 55 years (AS = 41.05, SD = 4.65), who started practising Pilates at the beginning of 2024. The research was conducted in Belgrade, at a fitness centre, in two phases. The first phase involved surveying participants as soon as they started practising Pilates, or a maximum of one month after the first Pilates session. The second phase was conducted after three months, during which the participants performed Pilates exercises at least twice a week for an hour. The inclusion criteria were the following: capability for moderate physical activity, absence of chronic diseases (e.g., cardiovascular, neuromuscular, and orthopaedic); ability to understand verbal instructions and actively follow the exercise program; willingness to regularly attend the Pilates exercise program during the planned duration of the study (minimum three months); and provision of informed consent to participate in the study.

A questionnaire was developed to gather preliminary data on the significance and effects of Pilates on the health and functional status of individuals of both sexes. This instrument, informed by pertinent literature, comprised 11 questions with predetermined response options, to which participants responded independently. A preliminary assessment of the questionnaire's reliability and validity was conducted through content validity, test-retest methodology, and internal consistency analysis. An expert evaluation was conducted to determine the content validity of the instrument. Three specialists in special education and rehabilitation, with expertise in research on physical activity and the psychological impacts of exercise, assessed the relevance, clarity, and representativeness of each questionnaire item. The specialists employed a four-tiered scale (1 – not relevant, 2 – slightly relevant, 3 – mostly relevant, 4 – entirely relevant). The item content validity index (I-CVI) and the scale content validity index (S-CVI) were computed based on their ratings. The I-CVI values ranged from .80 to 1.00, whereas the S-CVI was .91, indicating strong consensus among experts and sufficient content coverage of the

instrument. The test-retest technique revealed that, for the majority of items, there were no significant differences in response distributions between the two assessments, indicating the consistency of attitudes and the stability of measurements over time. The internal consistency of the questionnaire is indicated by Cronbach's α, which was .932 for the entire instrument, indicating a high level of reliability.

Different methods of descriptive and inferential statistics were used to process and analyse the data. The descriptive statistics included count measures (frequency, percentages, and 95% confidence intervals with lower (LL) and upper (UL) limits), measures of central tendency (arithmetic mean), and measures of variability (standard deviation). The Kolmogorov-Smirnov test indicated a normal distribution of results, leading to the application of a paired-samples t-test to assess the impact of Pilates practice on participants' health and functional status. An alpha level of 0.05 was established for all statistical tests. The Statistical Package for Social Sciences (SPSS for Windows, version 21.0, 2020) was used for data processing.

Results

Table 1

Distribution of responses to the questionnaire assessing the importance and effects of Pilates on participants' health and functional status

Item	Test N (%)	Retest N (%)	95% CI LL-UL	*p*
1. Do you think exercise is good for your health?				
Yes	37 (86%)	42 (97.7%)	.033-.432	**.024**
No	/	/		
Maybe	6 (14%)	1 (2.3%)		
2. How often do you exercise?				
Daily	1 (2.3%)	/	-.264 - .125	.473
Weekly	7 (16.2%)	/		
Several times a week	29 (67.4%)	43 (100%)		
Never	6 (14%)	/		
3. What is the reason for practicing Pilates?				
Preservation and improvement of health	33 (76.7%)	30 (69.7%)	-.134 - .134	1.000
Relaxation	7 (16.2%)	11 (25.6%)		
Regulation of body weight	2 (4.6%)	2 (4.6%)		
New acquaintances	/	/		
Something else	1 (2.3%)	/		

4. Do you notice any changes after exercising?				
Yes No	26 (60.4%) 17 (39.6%)	43 (100%) /	.243 - .548	**.000**
5. Do you think that exercise helps the body to withstand effort, tension and to fight stress?				
Yes No Maybe	34 (79%) / 9 (21%)	42 (97.7%) / 1 (2.3%)	.130 - .614	**.003**
6. Do you think that exercise has an effect on improving concentration and work performance?				
Yes No Maybe	23 (53.4%) 3 (7%) 17 (39.5%)	30 (69.7%) / 13 (30.3%)	.065 - .447	**.010**
7. Do you find that exercise has an effect on the reduction of neck and back pain?				
Yes No Maybe	33 (76.7%) / 10 (23.3%)	43 (100%) / /	.202 - .728	**.001**
8. Do you notice that after exercising there is an increase in muscle strength, elasticity, and endurance?				
Yes No	26 (60.4%) 17 (39.6%)	42 (97.7%) 1 (2.3%)	.222 - .523	**.000**
9. Do you know that Pilates exercises are applicable in the treatment of respiratory, rheumatic, and neurological diseases?				
Yes No	17 (39.6%) 26 (60.4%)	43 (100%) /	.452 - .757	**.000**

10. Can exercise help control anger?				
Yes No Maybe	15 (34.9%) 4 (9.3%) 24 (55.8%)	29 (67.4%) 1 (2.3%) 13 (30.3%)	.319 - .844	**.000**
11. Would you recommend Pilates to your friends?				
Yes No	43 (100%) /	43 (100%) /	-	n.a.

Note: Statistically significant results are in bold.

Table 1 shows the participants' responses to the first (test) and second (retest) examination (survey), as well as the results of the paired-samples t-test. The results indicate a change in responses on almost all items in the retest. After three months of regular Pilates practice, almost 98% of participants reported that exercise was good for their health, and all 100% began exercising several times a week. Also, during retest, all participants reported noticing changes after exercise, and 98% reported an increase in muscle strength, elasticity, and endurance, as well as that exercise helped the body withstand effort and tension and fight stress.

Using the paired-samples t-test, the influence of Pilates practice on participants' health and functional status was determined. A statistically significant increase in the impact of Pilates on participants' health and functional status was observed from the beginning to the period after three months of regular exercise. The average value of Eta-squared (η^2 = .24) indicates that the influence of Pilates practice was large.

Discussion

Given the sample size (N = 43), the results should be interpreted as preliminary findings. The study, designed as a pilot, aimed to explore the effects of Pilates on the health and functional status of adults and provide guidelines for future research with larger samples. The assumption that practising Pilates has a positive effect on the health and functional status of middle-aged people has been confirmed. Namely, it was determined that after three months during which the participants performed Pilates exercises at least twice a week for an hour, the effect of Pilates on both the health and functional status of the participants significantly increased ($p < .05$). The obtained results are in accordance with the available data from the literature, which were previously mentioned (Bertoli et al., 2017; Choi et al., 2021; Liposcki et al., 2019).

In the first phase of the research, 86% of participants reported that exercise was good for their health, while in the second phase, that percentage was almost 98%. At the same time, during repeated assessment, 100% of participants reported noticing changes after exercise, and 98% were aware that exercise helped the body withstand effort. These percentages were significantly lower in the first assessment. Exercise frequency changed substantially at retest, but the difference between the two measurements was not statistically significant.

Askarnia and colleagues (2024) conducted a study aimed at examining the impact of Pilates on the psychological and mental well-being of teachers, including aspects such as depression and self-esteem. The findings indicated that Pilates exercises were a good choice for improving mental health, self-esteem, life satisfaction, efficiency, positive mood, and reducing mental and emotional tension in teachers. Ahmadi and Mehravar (2019) point out that Pilates exercises are a useful strategy for managing stress in women who lead a sedentary lifestyle. 97.7% of our participants in the second survey believe that Pilates exercises help the body withstand effort and tension and fight stress.

A test-retest assessment was conducted on a sample of 52 inactive adults. The subjects were divided into a group that practised Pilates and a group that did aerobic exercises three times a week for four weeks. Selective attention, inhibitory control, verbal fluency and movement speed were assessed. Both Pilates and aerobic exercise were found to lead to short-term improvements in selective attention, verbal fluency, and inhibitory control in inactive adults, while Pilates exercises may contribute to better movement speed (Kaya & Alpozgen, 2022). In people who practice Pilates, structural and functional changes occur in the brain, improving cognitive function (Smith & Kelly, 2015). In the group of our participants, it was determined that almost 70% reported at retest that exercise affected cognitive functions and led to improved concentration and work performance.

After three months of regular exercise, all participants in our sample reported that Pilates exercises reduced neck and back pain. Data in the literature show that one of the most effective options for regulating back pain is physical exercise (de Campos, 2017), namely aerobic exercises, yoga and Pilates (Abdulla et al., 2013). Our findings are consistent with existing evidence supporting the benefits of Pilates in improving functional outcomes and reducing pain in individuals with chronic and subacute low back pain. The results of Natour et al. (2015) showed that subjects who had back pain after six months of Pilates experienced a significant reduction in back pain and improvement in certain aspects related to quality of life (functional capacity and vitality). Pilates exercises have been proven to have no harmful effects on people diagnosed with chronic non-specific back pain. In a systematic literature

review, Dević (2024) analysed studies examining the impact of Pilates exercises on preventive measures, alleviating symptoms, and improving the general condition of people with lower back pain. The findings of this review indicate that almost all analysed papers found significant reductions in back pain and improvements in functional abilities, muscle strength, and endurance. Also, Pilates-based rehabilitation was more effective than a home-based exercise program in reducing pain, preventing disability, and improving quality of life in people with low back pain. These findings support the inclusion of Pilates in early rehabilitation to prevent chronicity (Asik & Sahbaz, 2025).

Almost 98% of participants reported an increase in muscle strength, elasticity, and endurance after three months of regular Pilates practice. These results are consistent with data in the literature. In a sample of 50 active middle-aged men and women, who performed Pilates exercises for 12 weeks, during two 60-minute training sessions per week, a statistically significant increase in abdominal endurance, flexibility, and upper-body muscle endurance was observed (Koubec, 2010).

Segal and colleagues (2004) conducted an observational, prospective, repeated-measures study to evaluate the effects of Pilates on flexibility, body composition (height, weight, BMI), and health status in adults of both sexes (mean age 41 years). Their results showed that Pilates exercises led to improved flexibility and posture, and the cessation of morning stiffness, while there was no statistically significant change in body composition. Other studies also confirm the positive effect of Pilates on increasing flexibility (Irez et al., 2011; Plachy et al., 2012). Pilates exercises do not require too much time or a large number of props and equipment, and can lead to improvements in strength and flexibility.

Anger is an unpleasant emotion and is considered the most difficult to regulate. Physical activity, relaxation, and meditation are some of the techniques recommended for managing anger and releasing emotional tension (Kjærvik, 2023). Physical activity stimulates various neurotransmitters and hormones in the brain that produce a feeling of happiness and relaxation. People feel better when they exercise regularly, which can boost their confidence and improve their self-esteem. Physical and mental health are interconnected. Improving physical fitness supports better emotional regulation, and when exercise is used in combination with therapy and anger management strategies, it helps control anger and frustration (Malhotra, 2019). A study conducted by Roh (2016) showed that Pilates has a psychologically positive and calming effect. The results of our research show that after three months of practising Pilates, almost 70% of participants reported that exercise can influence anger control.

This research has certain limitations. One of the limitations of this study is related to the sample size. Although the sample of 43 participants enables the detection of statistically significant medium and large effects, it is not sufficient to generalise the results to the entire adult population in Serbia. However, given that the research was designed as a pilot study, the results provide important preliminary insights and can serve as a basis for future studies with larger and more representative samples. Next, a subjective, non-standardised assessment instrument was used. Although the results show stable response patterns and statistically significant correlations for most items ($p < .05$), indicating that the instrument consistently measures the target attitudes of participants at two time points and confirming the appropriate level of reliability and quality of the instrument at this stage of the research, these findings should serve as a basis for further validation and improvement of the instrument in a larger sample. Furthermore, it is suggested that objective, standardised instruments be used in future research to establish the robustness of the data. Also, further research and analysis should include additional sociodemographic data and factors that may affect Pilates practice.

The significance of this research and the obtained results can be viewed as a motive for the further development of a healthy lifestyle through the application of education and various programs on the importance of physical activity.

Conclusion

It has been scientifically proven that leading an active lifestyle is beneficial for general well-being and quality of life across all age groups, and that it has both psychological and physical benefits. Participating in physical activity increases life expectancy and slows the ageing process.

Pilates, as a modern exercise method, is becoming increasingly recognised in the field of recreational physical activity, rehabilitation, and health promotion. Its application in adults has proven to be useful in many ways, both in improving the general state of health and in enhancing functional abilities, which are crucial for preserving independence and quality of life in adulthood.

Based on the preliminary analysis and the obtained data, we can conclude that there are positive changes in physical and psychological characteristics, i.e., in the health and functional status of adults who practise Pilates. In other words, Pilates exercises led to significant improvements in functional performance in adults.

Thanks to its adaptability and safety, Pilates is accessible to a wide population—from physically inactive individuals to those with specific health

problems. Its application does not require expensive equipment, and the exercises can be individually adapted to the needs and capabilities of each individual. The integration of Pilates into public health, prevention, and rehabilitation programs could contribute to the long-term reduction of risk factors, preservation of independence, and improvement of the quality of life of adults, especially in the context of a modern lifestyle that is often characterised by sedentary behaviour patterns. Pilates, like any other appropriate physical activity, should be practised regularly.

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