

The Effects of Reformer Pilates Exercises on Psychosocial Parameters in Healthy Women

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Abstract

Aim: The aim of this study is to examine the effect of reformer pilates exercises on self-esteem, level of anxiety, exercise perception, and quality of life in healthy women.

Method: Thirty-seven healthy women (mean age=21.08±1.09 years) were divided into two groups: the intervention group (n=17) and the control group (n=19). The intervention group completed a 24-session reformer pilates program for 8 weeks, 3 days a week, while the control group did not participate in any exercise program. All assessments were performed at the beginning of the study and the end of 8 weeks using the Rosenberg Self-Esteem Scale, State-Trait Anxiety Scale, Exercise Benefits-Barriers Scale and World Health Organization Quality of Life Scale-Short Form (WHOQOL-BREF).

Results: At the end of the intervention period, the level of state anxiety decreased statistically significantly in the control group ($p<0.05$). Exercise Benefits-Barriers Scale-Benefit score decreased significantly only in the experimental group ($p<0.05$). Changes in psychosocial parameters were not significantly different between the intervention and control groups ($p>0.05$).

Conclusion: Reformer Pilates exercises are effective in improving the perception of exercise benefits in healthy women.

Keywords: Pilates based exercises, quality of life, exercise, self esteem, anxiety

Sağlıklı Kadınlarda Reformer Pilates Egzersizlerinin Psikososyal Parametrelere Etkisi

Öz

Amaç: Bu çalışmanın amacı, reformer pilates egzersizlerinin sağlıklı kadınlarda benlik saygısı, kaygı düzeyi, egzersiz algısı ve yaşam kalitesi üzerindeki etkisini incelemektir.

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ETHICAL STATEMENT: This study received ethical approval from the Ethics Committee of Kutahya Health Sciences University on November 16, 2022, with the decision number 2022/11-17. An informed consent form was obtained from all participants, indicating their voluntary participation in the study. All study procedures adhered to the principles of Good Clinical Practice and were conducted in compliance with the Helsinki Declaration.

Yöntem: Otuz yedi sağlıklı kadın (ortalama yaş=21,08±1,09 yıl) iki gruba ayrıldı: müdahale grubu (n=17) ve kontrol grubu (n=19). Müdahale grubu haftada 3 gün olmak üzere 8 hafta boyunca 24 seans reformer pilates programını tamamlarken, kontrol grubu herhangi bir egzersiz programına katılmadı. Tüm değerlendirmeler çalışmanın başında ve 8 haftanın sonunda Rosenberg Benlik Saygısı Ölçeği, Durumluk ve Sürekli Kaygı Ölçeği, Egzersiz Faydaları-Engelleri Ölçeği ve WHOQOL-BREF kullanılarak yapıldı.

Bulgular: Müdahale döneminin sonunda, durumluk anksiyete düzeyi kontrol grubunda istatistiksel olarak anlamlı şekilde azaldı ($p<0,05$). Egzersiz Faydaları-Engelleri Ölçeği-Yarar skoru yalnızca deney grubunda anlamlı olarak azaldı ($p<0,05$). Psikososyal parametrelerdeki değişimler açısından müdahale ve kontrol grupları arasında anlamlı bir farklılık gözlemlenmedi ($p>0,05$).

Sonuç: Reformer pilates egzersizleri sağlıklı kadınlarda egzersiz yarar algısını geliştirmede etkilidir.

Anahtar Sözcükler: Pilates temelli egzersiz, yaşam kalitesi, egzersiz, benlik saygısı, anksiyete

Introduction

Physical inactivity is defined as insufficient physical activity that does not adhere to the most recent physical activity recommendations. Any skeletal muscle motion requiring the use of energy is physical activity. In healthy people, regular exercise can lower mortality from any cause, which includes heart disease, cancer, psychological health (lowering feelings of depression and anxiety), high blood pressure, cognitive health, sleep, type 2 diabetes, and body fat¹.

One in four persons does not meet the aerobic exercise recommendations in the Physical Exercise Guidelines for Health published by the World Health Organization in 2010, according to the most recent study to assess the level of physical activity worldwide². It is quite difficult for people to engage in enough physical activity, for a variety of reasons. This scenario has several facets and is affected by personal, interpersonal, environmental, and political forces. Changing the underlying causes of any of these elements can boost physical activity levels and have a favorable impact on the physiological and psychological well-being of the public³.

The six key concepts of Pilates, which Joseph Pilates developed in the 1920s, are centering, focus, control, smoothness, fluency, and breathing⁴. Pilates exercises can be done on different devices for "apparatus work" or the floor for "mat work." The Reformer is the tool that is utilized the most frequently. The reformer equipment includes an apparatus that travels back and forth while using springs to control resistance and tension⁵. Gains in lumbopelvic control, flexibility, static and dynamic balance, muscle strength, and stamina were observed as the physiological benefits of Pilates exercises⁶. Enhancements in sleep and quality of life, a decline in perceived stress and anxiety levels, and a boost in self-efficacy are some examples of psychological effects^{7,8}. Pilates group exercises have become a popular form of exercise that is substantially accessible, inexpensive, fun, and increases one's responsibility and commitment to exercise^{9,10}. This study aims to examine the effects of reformer pilates on anxiety levels, perspectives on the benefits and

difficulties of exercise, and quality of life in young, sedentary women throughout an 8-week group exercise program.

Material and Methods

Design

The study was initially designed as a healthy, sedentary controlled experiment. 37 university students who volunteered to take part in the study at two state universities in Kutahya were used for this study. This study received ethical approval from the Ethics Committee of Kütahya Health Sciences University on November 16, 2022, with the decision number 2022/11-17. All participants signed informed permission forms proving their free will to take part in the study. All study procedures were performed in compliance with the Helsinki Declaration and the standards of Good Clinical Practice.

Inclusion and Exclusion Criteria

The inclusion criteria for the study were being aged of 18 years or older, the absence of advanced orthopedic, neurological, or cardiopulmonary diseases that would hinder exercise participation, and having a low level of physical activity according to the International Physical Activity Questionnaire-Short Form (IPAQ-SF). Participants who engaged in regular exercise, pregnant individuals, and participants in the exercise group who did not demonstrate regular attendance were excluded from the study.

Setting

For this research, forty volunteer participants were split into an experimental group and a control group. Due to their disobedience to the exercise group, three participants were dropped from the study. For eight weeks, the experimental group worked out with a reformer-certified and -experienced trainer. The daily activities of the control group were continued. For eight weeks, the experimental group performed reformer-based Pilates movements for 55 minutes each day, three times per week. The Reformer Pilates training program is shown in Table 1. The exercises were started at an intensity of 50-60% and the program process was continued by changing the number of springs and repetitions in line with the personal development of the participants, and the program was ended after 8 weeks. The participants were evaluated at the onset of the study and again at the end of the 8 weeks.

Table 1. Exercise Program

Exercises	
Footwork Series	Pelvic Tilt
Hundreds	Arms Opening
One Leg Stretch	Side Kick
Double Leg Stretch	Leg Press (single and double)
Shoulder Bridge	Chest Expansion
Swan	Eve's lunge

Measurements

Demographic Information Form

The participant's height, body mass index, age, occupation, smoking and alcohol use were evaluated through a form.

International Physical Activity Questionnaire-Short Form (IPAQ-SF)

The validity and reliability research of the IPAQ-SF was conducted by Saglam et al. to assess the physical activity levels of persons aged 15 to 65 in Turkey¹¹. With the use of the questionnaire, it was discovered that the participants had engaged in at least 10 minutes of walking, moderate exercise, and vigorous exercise within the previous week. The time spent being inactive during the day is questioned in the final question. The metabolic equivalent (MET) approach is used to calculate one's degree of physical activity. The score for overall physical activity; walking is calculated as the sum of vigorous and moderately intense exercise. Less than 600 MET-min/week is considered low levels of physical activity; between 600 and 3000 MET-min/week is considered moderate levels; and more than 3000 MET-min/week is considered high levels.

Exercise Benefits/Barriers Scale (EBBS)

EBBS was created in 1987, and the validity and reliability study of the scale was carried out by Ortabağ et al. in Turkey^{12,13}. The scale consists of 43 items and is evaluated in a 4-point Likert type. The total score of the 4th, 6th, 9th, 12th, 14th, 16th, 19th, 21st, 24th, 28th, 33rd, 37th, 40th and 42nd questions on the scale (14-56) represents the obstacles to exercise score, the total score of the remaining questions (29-116) gives the benefits of exercise score and the sum of the two gives the total score.

Rosenberg Self-Esteem Scale (RSES)

The scale was created in 1965, and Cuhadaroglu conducted validity and reliability research on it in Turkey in 1986¹⁴. The first ten items on the scale were utilized in this study to gauge general self-esteem. The scale's positive questions are 1, 2, 4, 6, and 7, while the negative questions are 3, 5, 8, and 10. According to a person's positive or negative self-evaluation, each item on the scale is

given a score between 0 and 3 or 3-0. This measure has a total score that goes from 0 to 30, with 15 to 25 points signifying adequate self-esteem and under 15 points signifying inadequate self-esteem.

The State-Trait Anxiety Inventory (STAI)

The degree of state and trait anxiety are measured separately in the Spielberger et al.¹⁵ questionnaire. The translation into Turkish was done in 1983¹⁶. The STAI is generated up of two distinct measurements that, combined, have forty components. The Trait Anxiety Inventory is an indicator of how a person feels usually whereas the State Anxiety Inventory is a measurement tool composed of statements that show how a person feels at particular times. The accepted range of the scores from both scales is 20 to 80. Anxiety levels range from low to high, with a high score indicating greater anxiety.

World Health Organization Quality of Life Scale-Short Form (WHOQOL-Bref)

The World Health Organization created a scale to evaluate people's quality of life. Eser et al.¹⁷ conducted the validity and reliability evaluation of the scale in Turkey. There are 27 questions in the WHOQOL-BREF, divided into four sub-dimensions: physical health, psychological health, social relationships, and environment. Participants are asked to respond while taking the 15 days prior into consideration. Each question is given a score between 1 and 5, with higher sub-dimension scores reflecting a higher quality of life.

Statistical Analysis

The statistical analysis was performed using SPSS 17 (Statistical Package for Social Sciences). The Shapiro-Wilk test was used to assess the data distribution. The t-test was used to examine variations between independent groups when parametric test assumptions were provided. The Mann-Whitney U test was used to assess differences across independent groups without making any parametric test assumptions. Pairwise Student's t-tests and Wilcoxon tests were employed in within-group analyses to compare the mean scores before and after the program. The accepted statistical significance level was 0.05.

Results

The 40 women (21.08±1.09 years) who participated in this study were divided into two groups as intervention and control. Three participants were excluded from the study due to their lack of adherence to the exercise group. During the intervention period, no participants reported any injuries or side effects, and all women attended at least 91.6% of the sessions. There were no statistically significant differences in demographic and clinical characteristics between the groups at baseline ($p>0.05$) (Table 2).

Table 2. Baseline characteristics of the study group

	Total	Intervention group (n=17)	Control group (n=20)	p value*
Age (years)	21.08±1.09	21.47±1.00	20.95±1.09	0.074**
Height (cm)	162.54±5.08	162.41±5.16	162.45±5.14	0.899
Body weight (kg)	55.94±9.84	55.00±9.07	56.75±10.61	0.597
BMI (kg/m²)	21.15±3.41	20.90±3.64	21.36±3.27	0.691
RSES	20.56±5.45	21.23±5.14	20.00±5.78	0.501
STAI-S	40.48±10.66	36.82±7.58	43.60±12.04	0.053
STAI-T	45.24±8.33	42.64±9.28	47.45±6.91	0.080
EBBS-Benefit	51.89±12.81	49.23±12.06	54.15±13.29	0.250
EBBS- Barrier	28.78±4.52	28.35±4.42	29.15±4.69	0.601
WHOQOL-BREF				
General health	6.27±1.21	6.29±1.04	6.25±1.37	0.914
Physical health	26.40±3.49	27.05±4.23	28.85±2.71	0.302
Psychological health	20.21±3.97	21.52±3.55	19.10±4.05	0.063
Social relationship	10.35±1.81	10.88±1.99	9.90±1.55	0.101
Environment	27.35±3.59	26.47±3.64	28.10±3.46	0.172

IPAC-SF: International Physical Activity Questionnaire Short Form, RSES: Rosenberg Self Esteem Scale, STAI-S: State Trait Anxiety Inventory- State, STAI-T: State Trait Anxiety Inventory- Trait, EBSS: Exercise Benefits Barriers Scale, WHOQOL: The World Health Organization Quality of Life Instrument.

Variables are expressed as mean ± Standard Deviation.

**Independent-samples T test unless indicated otherwise.*

***Mann-Whitney U test.*

Table 3 displays pre- and post-intervention values regarding clinical parameters in both groups. While at the end of the intervention period, STAI-S scores decreased in both groups, these results were statistically significant only in the control group ($p < 0.05$). In the intervention group, there was a significant decrease in the Exercise Benefits/Barriers Scale-Benefit score ($p < 0.05$).

Table 3. Comparing changes in clinical parameters before and after the study in the two groups

	Intervention group			Control group		
	Pre	Post	p value*	Pre	Post	p value*
RSES	21.23±5.14	21.35±4.55	0.916	20.00±5.78	19.50±5.96	0.330
STAI-S	36.82±7.58	34.29±8.48	0.135**	43.60±12.04	39.05±9.48	0.049
STAI-T	42.64±9.28	41.82±8.47	0.611	47.45±6.91	47.45±6.32	1.000
EBBS-Benefit	49.23±12.06	41.52±9.32	0.007	54.15±13.29	50.00±12.26	0.064**
EBBS-Barrier	28.35±4.42	27.29±4.02	0.215	29.15±4.69	29.90±6.37	0.543
WHOQOL-BREF						
General health	6.29±1.04	6.35±0.93	0.957**	6.25±1.37	5.90±1.48	0.269**
Physical health	27.05±4.23	27.17±3.24	0.938**	25.85±2.71	25.40±3.26	0.342
Psychological health	21.52±3.55	20.29±2.68	0.191	19.10±4.05	18.85±3.54	0.644
Social relationship	10.88±1.99	10.47±1.17	0.339**	9.90±1.55	9.35±2.20	0.155**
Environment	26.47±3.64	26.17±3.84	0.701	28.10±3.46	27.70±4.02	0.635

RSES: Rosenberg Self Esteem Scale, STAI-S: State Trait Anxiety Inventory- State, STAI-T: State Trait Anxiety Inventory- Trait, EBSS: Exercise Benefits Barriers Scale, WHOQOL: The World Health Organization Quality of Life Instrument.

Variables are expressed as mean ± Standard Deviation.

* Paired-samples T test unless indicated otherwise.

** Wilcoxon signed-rank test

Table 4 shows the comparison of the differences between the baseline and post-program values of clinical parameters in both groups. Changes in clinical parameters did not show a statistically significant difference between the intervention and control groups ($p > 0.05$).

Table 4. Comparing the mean differences of clinical parameters at the beginning and the end of the study in the two groups.

	Intervention group (n=17)	Control group (n=20)	p value*
RSES	0.11±4.55	-0.50±2.23	0.615
STAI-S	-2.52±8.95	-4.55±9.65	0.516
STAI-T	-0.82±6.55	0.00±4.11	0.645
EBBS-Benefit	-7.70±10.20	-4.15±7.80	0.284**
EBBS-Barrier	-1.05±3.38	0.75±5.41	0.270**
WHOQOL-BREF			

General health	0.05±1.14	-0.35±1.42	0.348
Physical health	0.11±4.56	-0.45±2.06	0.641
Psychological health	-1.23±3.73	-0.25±2.38	0.460**
Social relationship	-0.41±1.76	-0.55±1.57	0.803
Environment	-0.29±3.09	-0.40±3.70	0.926

RSES: Rosenberg Self Esteem Scale, STAI-S: State Trait Anxiety Inventory- State, STAI-T: State Trait Anxiety Inventory- Trait, EBSS: Exercise Benefits Barriers Scale, WHOQOL: The World Health Organization Quality of Life Instrument.

Variables are expressed as mean ± Standard Deviation.

** Independent-samples T test unless indicated otherwise.*

*** Mann-Whitney U test.*

Discussion

In this study, we compared the effects of reformer Pilates exercises on healthy women's quality of life, self-esteem, state and trait anxiety, and exercise beliefs. The results of our study showed that the perception of exercise benefits significantly increased in the pilates group, as compared to the control group. The other measured parameters, however, showed no significant improvements.

Individuals' perceptions of benefits and barriers regarding a behavior can influence their inclination towards that behavior positively or negatively. When an individual's perception of benefits outweighs their perception of barriers, it positively affects the occurrence of that behavior¹⁸. Despite the various psychological, physical, and social benefits of regular exercise, in Turkey, 61.1% of women and 37.4% of men have low levels of physical activity¹⁹. In this study, it was found that the reformer Pilates exercises conducted over an 8-week period increased the perception of exercise benefits in sedentary healthy women. According to the study carried out by Korkmaz et al., pilates exercises performed three times per week for eight weeks improved participants' perception of the benefits associated with exercise. The participants were divided into two groups: the home-based exercise group and the supervised group. Although the perception of the advantages of exercise increased in both groups, it did so more significantly in the supervised group²⁰. Popular mind-body workouts include Pilates, which emphasizes increasing strength and flexibility²¹. Pilates exercises have the potential to improve psychological well-being in addition to physical characteristics like muscle strength, flexibility, and endurance, which can have an impact on how people perceive exercise²². Group exercises have a considerable impact on how beneficial exercise is perceived, particularly because of their capacity to boost motivation, offer social support, and develop a sense of community.

An individual's perception of their own worth and significance as a person is referred to as self-esteem. It is a subjective assessment that does not only take into account a person's subjective

abilities or the opinions of others²³. People who have higher levels of self-esteem typically have more emotional stability and stress resistance. They are often more motivated, willing to pursue challenging goals and display persistence in achieving those goals. A primary aspect of overall well-being and quality of life is healthy self-esteem. Additionally, it has been associated with positive health behaviors and health outcomes²⁴. The participants included in our study had a 'sufficient' level of self-esteem before the exercise. There was no significant change in self-esteem after the exercise. The results of other studies investigating the impact of Pilates exercises on self-esteem are similar to the findings of our study^{20,25,26}. We believe that the initial presence of sufficient self-esteem may have influenced the outcome. However, it is possible that the reformer Pilates exercises could lead to a significant improvement in self-esteem for participants who initially have 'insufficient' self-esteem.

The symptoms of anxiety include unsettling emotions of dread and unsettling thoughts, which can frequently be accompanied by physiological activation of the autonomic nervous system²⁷. State anxiety is fleeting tension and worry that can change in intensity from one second to the next. An individual's innate propensity or predisposition to view a situation or stimulus as frightening is referred to as trait anxiety²⁸. In this study, women who performed reformer pilates exercises showed no significant improvements in their levels of state anxiety or trait anxiety. The scores for state anxiety decreased in the control group. Since state anxiety scores represent momentary changes, we believe it may be related to the specific time when the participants completed the questionnaire. It should also be noted that the control group and the reformer Pilates group were evaluated at various intervals.

Quality of life is a subjective concept that is not only related to physical performance but also encompasses emotional and social conditions. The results of studies evaluating the impact of Pilates exercises on quality of life are contradictory. While some studies suggest that Pilates exercises improve quality of life, others report no significant effects²⁹⁻³¹. In this study, we found that the 8-week reformer Pilates exercises did not affect quality of life. We believe that this outcome may be influenced by exercise parameters (duration, frequency, and intensity), measurement tools, and participants' adherence to the exercise.

This study had some limitations. Firstly, the participants were not followed up in the long term. It is unknown how long the perceived benefits of exercise lasted and whether the participants' exercise habits were changed as a result. The results of the study cannot be applied to patient groups or all genders because it was carried out on healthy women.

Conclusion

It has been demonstrated that reformer pilates performed by healthy women for eight weeks under the observation of a supervisor improves their impression of the advantages of exercise. This result might prompt the participants to increase their levels of physical activity. Additional

research is required to determine how reformer pilates workouts affect psychosocial variables in various patient populations.

Conflict of Interest

The authors report no conflict of interest in this research.

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Ethical Approval

This study received ethical approval from the Ethics Committee of Kütahya Health Sciences University on November 16, 2022, with the decision number 2022/11-17. An informed consent form was obtained from all participants, indicating their voluntary participation in the study. All study procedures adhered to the principles of Good Clinical Practice and were conducted in compliance with the Helsinki Declaration.

Authors' Contributions

HK: Conceptualization, data curation, writing, editing, supervision. NT: data curation, data analysis, writing. MBK: Conceptualization, data curation.

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