J. Phys. Ther. Sci.
27: 3437–3443, 2015

Original Article

Impact of the clinical Pilates exercises and verbal education on exercise beliefs and psychosocial factors in healthy women

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Abstract. [Purpose] Exercise is one of the most important components of a healthy life. The purpose of this study was to analyze exercise beliefs and psychosocial factors in sedentary and active healthy women and observe the changes in these parameters resulting from clinical Pilates exercises and verbal education in healthy women. [Subjects and Methods] Sixty-six healthy women were included in the study. Participants were divided into clinical Pilates (n=21), verbal education (n=25), and control groups (n=20). Prior to and at the end of the study, demographic information, body mass index, waist-hip circumference, exercise beliefs, physical activity index, and psychosocial factors (Rosenberg self-esteem scale, Body Cathexis Index, SF-36 quality of life, Beck Depression Scale, visual analog scale for tiredness) of the subjects were recorded. [Results] Meaningful changes for all the parameters took place in the clinical Pilates and verbal education groups. Our analyses indicated that the changes in the clinical Pilates group were more meaningful than those in the verbal education group. When the data of the study groups were compared with those of the control group, the clinical Pilates group showed meaningful differences. [Conclusion] The result of this study indicate that both clinical Pilates and verbal education are effective in changing exercise beliefs and physical and psychosocial parameters.
Key words: Theory of planned behavior, Exercise beliefs, Pilates

(This article was submitted Jun. 23, 2015, and was accepted Aug. 19, 2015)

INTRODUCTION

Technological developments have simplified some tasks for human beings, but these developments have also decreased the physical activity level of the average person. Exercise is a planned activity, and recurrent physical activity helps to protect or improve one or more components of physical suitability[2)]. When modern city life began at the start of the 20th century, the importance of exercise was better understood. In the past, the terms exercise were used interchangeably, but now exercise is defined as a low category of physical activity. The effects of exercise on human health can be divided into two main groups, namely physical and psychological effects.

Clinical Pilates exercises were chosen in this study because of the holistic character of Pilates, which has both physical and psychological effects on human health. The positive effects of the clinical Pilates exercises can be seen in a short time, and the individual's feelings about this improves the sustainability of the exercise behaviour. Different exercise forms and concepts are defined in the literature[1, 3)]. In recent years, clinical Pilates has been gaining popularity, and physical therapists are using this exercise form more frequently[4, 5)]. Pilates, which was introduced by Joseph Hubertus Pilates, is a physical fitness program that uses mat exercise equipment to reshape body, and increase flexibility, strength, balance, and coordination[6)]. Clinical Pilates exercises have a low intensity compared with other aerobic exercise forms; however, it provides many benefits to human health. It reduces cardiac disease risks, osteoporosis, reshapes the body, and develops balance and flexibility. Clinical Pilates exercises have different levels for different conditions[7, 8)]. Also, the Pilates method is a functional form of exercise, because it utilizes a combination of movements in different coordinates, planes, and positions[9)]. Pilates exercises include a breathing component, which has many positive effects on aerobic capacity and is also beneficial for psychological health. This exercise form emphasizes the effect of mental concentration on the physical body by incorporating a focus on breathing[10)].

On the other hand, we think that knowledge about exercise is important. People are told about the benefits of exercise by physical therapists. The cause and effect relationship of this practice may benefit from further study. Thus, we performed

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a study with a group of people who received verbal education about exercise.

We hypothesized that if we could understand exercise beliefs, we could find a way to increase the exercise level of the community, so we sought to analyze the determinants of exercise level. The theory of planned behavior (TPB), which introduces a model about human behavior, was first defined by Icek Ajzen[11, 12]. Many people have positive intentions to participate in an exercise program, but they do not follow through. The theory gives a road map to work on the problems and present appropriate attempts to resolve them[13]. According to the theory, human behavior is guided by three kinds of considerations: beliefs about the likely outcomes of the behavior and the evaluations of these outcomes (behavioral beliefs), beliefs about the normative expectations of others and motivation to comply with these expectations (normative beliefs), and beliefs about the presence of factors that may facilitate or impede performance of the behavior and the perceived power of these factors (control beliefs). In combination, attitude toward the behavior, subjective norm, and perception of behavioral control lead to the formation of a behavioral intention. As a general rule, the more favorable the attitude and subjective norm, and the greater the perceived control, the stronger should be a person's intention to perform the behavior in question. Finally, given a sufficient degree of actual control over the behavior, people are expected to carry out their intentions when the opportunity arises. Intention is thus assumed to be the immediate antecedent of behavior[14, 15]. The validity and reliability of the theory of planned behavior were shown in previous exercise investigations[15–19]. When considered objectively, it is clear that the TPB has been one of the most cited and impressive models since it was first published by Ajzen in 1985.

From this standpoint, we first designed an exercise beliefs questionnaire with guidance from the TPB. Then, the validity and reliability of this form was established.

This study was performed to analyze the exercise beliefs of both sedentary and active healthy women, in addition to psychosocial factors, and to observe the changes in these parameters resulting from clinical Pilates exercises and verbal education.

SUBJECTS AND METHODS

The subjects included in this study were women between 20–45 years old. Subjects who had a systemic, neurological or metabolic disease, had undergone any spinal surgical procedure, or had a BMI over 29.9 kg/m^2 were excluded from the study.

Seventhy healthy women between the ages of 20–45 years participated in this study. However, four subjects declined to participate in the study because of health problems (Fig. 1).

The clinical Pilates (n=21) and verbal education (n=25) groups consisted of sedentary subjects divided according to their intentions. All analyses were done in these groups before the study and after eight weeks. The clinical Pilates group performed clinical Pilates exercises with a trained physical therapist, three times a week for eight weeks at the Pamukkale University Physical Therapy and Rehabilitation High School Exercise Saloon. The verbal education group was told about exercise principles and benefits by the researcher at the beginning of the study and also had individual exercise programs and guidelines for homework. The exercise programs consisted of postural, stretching, and strengthening exercises, in addition to aerobic exercises like walking and cycling. The verbal education group was not called or supervised by the researcher with regard to exercises during the eight-week period.

The control group was composed of healthy subjects who were already walking regularly for one hour three or four times a week for at least one year without supervision (n=20) (Fig. 1). The control group was chosen from active subjects to compare the physical and psychosocial effects of regular and long-term exercise with the effects in the study groups.

All the subjects understood the purpose of this study, agreed to participate in this research, and signed an informed consent form. The study was approved by the Hacettepe University Non-invasive Clinical Research Ethics Committee (LUT 12/58-04).

Demographic information and physical characteristics like age, body mass index (BMI), and waist and hip circumference measurements were collected from all the subjects at the beginning of the study. Moreover, all the subjects answered the exercise beliefs questionnaire, physical activity index, and psychosocial factors (SF-36, Rosenberg self-esteem scale, Body Cathexis Index, Beck Depression Scale, and visual analog scale for tiredness) forms.

The exercise beliefs questionnaire was constructed according to the TPB manual for health services researchers after performing a literature review (Table 1)[20]. Participants were asked to complete the questionnaire on their own in terms with no guidance from the practitioner. Each question was answered on a 6-point Likert scale (1, strongly disagree; 2, largely disagree; 3, partially disagree; 4, partially agree; 5, largely agree on; 6, strongly agree). Attitudes, subjective norms, and perceived behavioral control were assessed

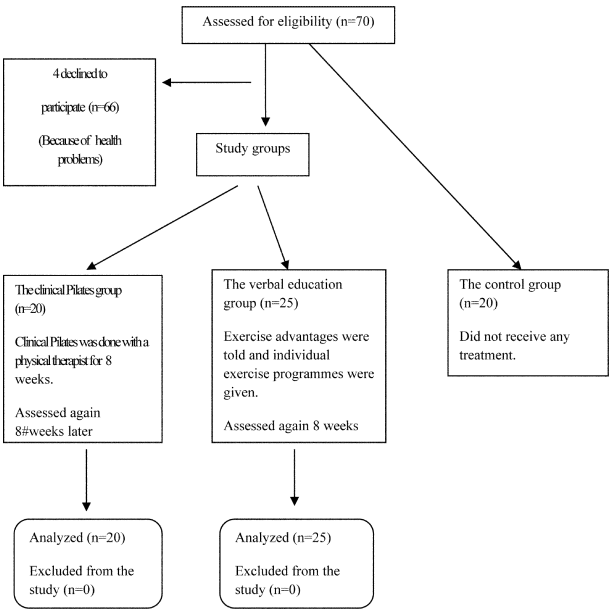

Fig. 1. Flowchart of the study

with control questions, and scoring was done according to a previously reported method[15, 19]. The questionnaire was divided into the following subscales: advantages, subjective norms, and disadvantages.

The exercise beliefs questionnaire was analyzed for reliability (test-retest) with a pilot group (n=15). The Cronbach's alpha values for the advantages and disadvantages was found to be between 0.80–0.89 for this study. In addition, the subjects were asked about the Turkish language suitability, and the form was revised according to this feedback.

The exercise levels of the subjects were analyzed by Sharkey's physical activity index. Physical activity level was calculated as intensity × time × frequency and categorized as shown in Table 2[21].

The SF-36 is a multipurpose, short-form health survey with only 36 questions that evaluate quality of life. It yields an 8-scale profile of functional health and well-being scores as well as psychometrically-based physical and mental health summary measures and a preference-based health utility index[22–24].

The Rosenberg self-esteem scale is a 10-item scale that measures global self-worth by measuring both positive and negative feelings about the self. The scale is believed to be unidimensional. All items are answered using a 4-point Likert scale format ranging from strongly agree to strongly disagree[25, 26]. Higher scores show higher self-esteem[25, 27].

Body Cathexis Scale which was developed in 1953 by Secord and Jourard was used in order to assess body image satisfaction levels. The Body Cathexis Scale evaluates how the individual perceives the body parts in a detailed manner. Scores between 40–200 are obtained from the scale, and higher scores mean higher satisfaction.

The Beck Depression Scale is a widely used 21-item self-report inventory measuring the severity of depression in adolescents and adults. The Beck Depression Scale was revised in 1996 to be more consistent with DSM-IV criteria for depression. The results were categorized as 0–9, nothing/minimal depression; 10–18, low depression; 19–29, medium depression; 30–63, severe depression[28].

Tiredness was analyzed with a visual analog scale (VAS) of 0 to 10. Higher scores represented increased tiredness.

For statistical analyses, SPSS 16.00 was used, and descriptive data were expressed as the mean ± standard deviation and number. The analysis techniques used were the Wilcoxon two-sample paired signed rank, two identical significance between test (paired samples t-test), Mann-Whitney U test, two average differences between the materiality test (independent samples t test or Student's t-test), Kruskal-Wallis analysis of variance, one-way analysis of variance (ANOVA), and chi-square analysis. To determine the reliability of the exercise beliefs questionnaire, the data obtained from the test-retest analysis were evaluated by intraclass reliability coefficient ($p<0.05$).

Table 1. Evaluation and suitability category of activity index rating

Score	Evaluation	Suitability category
>100	Very active lifestyle	High
80–100	Active and healthy	Very good
40–60	Acceptable	Not enough
20–40	Not good enough	Low
<20	Sedentary	Very low

RESULTS

Sixty-six healthy women between the ages of 20–45 years completed the study. The mean age, BMI, waist circumference, and hip circumference of the women in this study were 33.68±8.67 years, 23.38±3.37 kg/m^2, 74.30±10.00 cm, 99.83±9.38 cm, respectively. Twenty subjects (30.3%) were smokers, and 9 subjects (13.6%) were on medications such as contraception pills. The clinical Pilates group (CPG) contained 21 women (31.82%), the verbal education group (VEG) contained 25 women (37.88%), and the control group (CG) contained 20 women (30.30%) (Table 3).

At the beginning of the study, the exercise beliefs, physical activity index and psychosocial factors of the participants were compared, and statistically meaningful differences were found between the CPG, VEG, and CG. In the VEG, the disadvantages subscale, VAS, and Beck Depression Scale scores were meaningfully higher compared with the CG. On the other hand, the advantages subscale, Rosenberg self-esteem scale, and Body Cathexis Scale scores were meaningfully low in the CPG and VEG ($p<0.05$) (Table 4).

The CPG and VEG data and the CG data were also compared. In the CG, the scores for positive subjective norm, body image scale, and the SF-36 were higher and those for the BMI and waist circumference were lower, and these differences were statistically meaningful ($p<0.05$). The result of these analyzes showed that advantages subscale, Rosenberg self-esteem scale, and SF-36 scores VEG, that the

Table 2. Characteristics of the study participants

	CPG (n=21) (31.82%)	VEG (n=25) (37.88%)	CG (n=20) (30.30%)
Age (years)	36.04±1.86	30.88±1.53	34.70±2.10
Body mass index (kg/m^2)	25.30±0.83	22.92±0.61	21.95±0.49
Waist circumference (cm)	78±2.21	73.96±2.12	70.85±1.77
Hip circumference (cm)	105.57±2.45	98±1.73	96±0.96
Physical activity level	3.00±3.00	3.00±2.00	69.60±7.82

*Kruskal-Wallis signed-rank test, **One-way ANOVA, ***CPG: clinical Pilates group; VEG: verbal education group; CG: control group

disadvantages, fatigue, and depression scores were higher, and that these differences were statistically meaningful ($p < 0.05$).

A statistically meaningful reduction was observed in BMI, waist and hip circumference, tiredness score, Beck depression scale score, and disadvantages subscale score in the CPG after the study. On the other hand, a statistically meaningful increase was found using the Rosenberg self-esteem scale, Body Cathexis Scale, SF-36, and advantages subscale scores ($p<0.05$) (Table 5).

We found a statistically meaningful reduction in the disadvantages subscale score, waist and hip circumference, tiredness score, and Beck Depression Scale score in the VEG. On the other side, there was a meaningful increase in the Rosenberg self-esteem scale and SF-36 scores ($p<0.05$).

In this study, the differences between before and after clinical Pilates and verbal education were compared. The analyses showed that there were statistically meaningful differences in the CPG compared with the VEG in BMI, waist and hip circumference, and the Beck Depression Scale, Rosenberg self-esteem scale, Body Cathexis Scale, SF-36, and exercise beliefs advantages subscale scores in favor of the CPG ($p<0.05$). On the other hand, the disadvantages subscale score did not differ groups ($p> 0.05$). The CPG showed significant differences compared with the VEG after training. Although these individuals were initially sedentary, their later parameters approached those of the CG, who already had exercise habits.

DISCUSSION

The aim of the TPB is to encourage a lasting behavior change in people. The objective of our study was permanent changes in exercise and lifestyle. Changes in physical activity and exercise level also lead to changes in beliefs, and this paves the path for permanent changes. By replacing intentions or behavior, the TPB leads to lasting changes in behavior. In the present study, we made changes in the level of exercise to understand the changes in beliefs. We believe that changes in beliefs can prepare the foundation for lasting changes. Our study demonstrates that exercise beliefs can be changed and that behavioral aspects are gained from this change. Since our goal was to change behavior of the CPG and VEG, which were composed of sedentary individuals, we selected individuals who already had a regular exercise habit for the CG. The purpose of the CG, which was composed of active individuals, was to enable comparison of sedentary and active individuals during the same periods.

To predict exercise behavior in Korean Americans, the TPB was used in an identifier norm frame. Intention and perceived behavioral control statistically determined leisure activities[29]. From other aspects, TPB has been applied to explain physical activity in Canadian adults in a population consisting of 4,073 people, and it was descriptive[30]. Positive changes in attitudes and intentions regarding exercise as exercise time increased was shown in a study by Chan et al. In our study, the changes in the CPG before and after the study were similar to those in the CG. With an increase in the

Table 3. Comparison of groups with each other before the study

	CPG (n=21)	VEG (n=25)	CG (n=20)
Exercise beliefs			
Advantages	51.14±2.51	58.72±3.52	76.60±0.41
Subjective norm			
Positive	3.23±0.56	3.40±0.52	5.65±0.33
Negative	5.25±0.99	4.96±0.49	1.00±0.23
Disadvantages	29.42±2.84	34.92±2.62	13.70±0.55
Psychosocialfactors			
VAS	5.61±0.50	5.96±0.44	1.95±0.34
Rosenberg self-esteem scale	22.38±1.09	23.60±1.06	26.65±0.91
Beck Depression Scale	12.14±1.85	10.20±1.40	1.90±0.36
Body Cathexis Index	126.61±7.53	140.32±7.71	171.20±4.46
Quality of life			
Physical function	78.09±2.81	78.80±2.40	100±0
Role limitations-physical	78.57±4.26	78.60±3.87	96.50±1.66
Social function	92.38±2.17	77.78±3.28	95.25±1.96
Pain	80±2.77	70.40±2.59	96.00±1.12
Mental health	75.04±2.64	71.64±6.94	98.20±1.10
Role limitations-emotional	83.80±4.47	60.80±3.11	100±0
Vitality	66.90±2.14	63.40±2.85	98.50±1.09
General health perception	78.38±2.50	70.82±2.43	96.60±1.06

*Kruskal-Wallis signed-rank test

duration of physical exercise, permanent lifestyle changes may be expected[31].

Exercise habits may lead to a permanent change in behavior, and this is possible with a systematic training program. This is possible with verbal information or practical applications. To this end, physiotherapists use these approaches when designing and recommending exercise programs for patients as well as healthy individuals[32]. In the present study, the VEG was informed about benefits of exercise through a program, and moreover an exercise program was designed to meet each participant's individual needs. The other study group, the CPG, participated in therapist-led clinical Pilates exercises. Similarly, in another study, the effects of behavior changes on exercise beliefs were examined with the TPB. The study was designed with sedentary individuals to investigate if an increase in physical activity led to an increase in positive beliefs about exercise. At baseline, after the sixth and twelfth months, 365 adults were asked to complete forms regarding their physical activity and expectations for a more active life in the next year. Objectively, these adults reached the activity levels that the targeted at the beginning by the twelfth month[33]. In our study, an individual's intention to exercise were not questioned before training; but they were allowed to pick their own training group. This established their intention to exercise. Therefore, the significant increase in level of physical activity in the CPG may be associated with the form of instruction the group received as well as the initial intentions of the subjects. When we compared the groups in terms of impact after training, significant differences were observed in the CPG compared with the VEG, but both groups of individuals, which were initially sedentary, later developed exercise habits and approached the CG in terms of many parameters. In previous study by Sirur et al. conducted a home exercise program and physical activity program and demonstrated that treatment was ineffective. Their study revealed the need to increase the commitment to exercise for an effective program of physiotherapy, and there are five theories that suggest a physiotherapistis necessary for this purpose. The five theories consist of a health belief model, protection motivation theory, self-efficacy theory, the TPB and the social cognitive theory[34]. In connection with this search, it is also thought to be possible to ensure the functioning of the protection motivation and social cognitive theories in CPG, while individuals in VEG may only be able to perform the health belief model and induced impact theory. Most of the changes in the CPG brought their data closer to those of the CG. It is thought that this was the result of the 8-week clinical Pilates program, which has often been reported in the literatüre[35–38]. However, significant differences in the CG, like those in body image scale, SF-36 role limitations, emotions, BMI, and waist circumference, which are parameters of a physically active lifestyle could be the result of the long-term and lasting effects of physical activity.

Table 4. Comparison of CPG data before and after the study

Variables	Before	After
Exercise beliefs		
Advantages	51.14±2.51	75.90±0.73*
Subjective norm		
Positive	3.23±0.56	4.28±0.56*
Negative	5.25±0.99	3.40±0.89
Disadvantages	29.42±2.84	17.33±1.24*
Psychosocialfactors		
VAS	5.61±2.31	2.38±1.90*
Beck Depression Scale	12.14±8.48	3.95±3.89*
Rosenberg self-esteem scale	22.38±5.03	27.14±3.65*
Body Cathexis Scale	126.61±7.53	155.57±4.12*
Quality of life		
Physicalfunction	78±2.81	99.28±1.79*
Role limitations-physical	78.57±4.26	86.60±3.19*
Social function	92.38±12.32	100±0*
Pain	80.00±2.77	94.95±2.32*
Mental health	75.04±2.64	97.90±1.42*
Role limitations-emotional	83.80±4.47	100±0*
Vitality	66.90±9.80	96.66±8.56*
General health perception	78.38±11.47	97.42±7.18*
BMI (kg/m^2)	5.30±0.83	24.48±0.70*
Waist circumference (cm)	8.00±10.15	75.14±9.18*
Hip circumference (cm)	105.57±11.23	101.28±10.03*

*Statistically meaningful difference

Table 5. Comparison of the differences between the study groups before and after the study

	CPG (n=21) D[a]±SD	VEG (n=25) D[a]± SD
Exercise beliefs		
Advantages	−1.90±0.05	−0.92±0.50
Subjective norm		
positive	−1.04±0.9	−1.44±1.00
negative	0.66±0.78	1.24±1.02
Disadvantages	1.00±0.90	0.92±0.93
Psychosocialfactors		
VAS	3.23±2.34	2.40±1.23
Beck Depression Scale	8.19±7.90	3.52±4.45
Rosenberg self-esteem scale	−4.76±3.43	−1.80±1.23
Body Cathexis Index	−28.95±23.32	−10.36±5.45
Quality of life		
Physical function	−21±4.45	−5.80±3.42
Role limitations- physical	−21.42±14.4	−8.00±6.67
Social function	−14.95±6.90	−10.80±9.08
Pain	−19.04±12.23	−7.16±3.45
Mental health	−29.76±34.23	−14.60±12.23
Role limitations- emotional	−7.61±6.50	−10.82±7.90
Vitality	−16.20±13.23	−8.33±5.69
General health perception	−22.85±23.21	−17.12±14.31
BMI (kg/m^2)	0.82±0.78	0.22±0.12
Waist circumference (cm)	2.85±1.23	0.88±1.09
Hip circumference (cm)	4.28±3.23	1.24±3.43

*Mann-Whitney U test, **t-test, [a]Difference between the first and last measurements

In our study, significant positive changes were observed in quality of life in the CPG before and after measurements were made. In a study similar to ours, by Leopoldino and colleagues on sedentary individuals, the the effects of the Pilates Matwork method on sleep quality and quality of life were examined. When sleep quality and quality of life levels were compared before and after the study, significant improvements were found[35]. In this sense, the results of our study seem to be consistent with the literature.

This study was planned and implemented with women to exclude differences in gender-specific muscle mass, hormonal changes, etc. The importance of exercise in women for prevention of cancer, diabetes, and hypertension, in addition to the benefits for overall health, has been revealed in several studies[36, 37]. Our study found that an increase in the level of exercise has a positive effect on BMI, waist hip circumference, self-esteem, body image, and quality of life. One of the most important results of our study is the indispensability of Pilates exercises for the female population, which also supports findings in the literature.

Oliveira and colleagues investigated the effects of Pilates on muscle strength, postural balance, and quality of life in older adults with a randomized, controlled, clinical trial. The 16 participants were assigned to a working group and control group randomly in their study. They concluded that Pilates exercises led to significant improvement in isokinetic torque of the knee extensors and flexors, postural balance, and aspects of the health-related quality of life of older adults[38]. In the CPG in our study, reductions in parameters such as the BMI and waist circumference revealed the positive effects of Clinical Pilates on the physical properties of individuals. The positive effects of the Pilates method are supported by our study in terms of improving quality of life.

In a study conducted by McGrath et al., the relationship between health-related quality of life and group exercises was investigated in healthy individuals. There were 143 adult participants in their study. The participants were divided into two groups, namely those who participated in Pilates exercise and those who participated in strengthening exercise. At the end of the study, the Pilates group was found to have significant differences in favor of energy and fatigue components of the SF-36. It was also revealed that the type of group exercises affect health-related quality of life[39]. As shown in our study and others, clinical Pilates is a form of group exercise. The analyses showed that clinical Pilates causes an increase in all parameters of the SF-36. Clinical Pilates seems to be an effective physical fitness program to improve the quality of life. In a study conducted in Portugal that was similar to ours, the, life satisfaction, the impact on physical health and self-confidence levels of Pilates mat exercise were studied in adult women. In that study, positive significant changes were found in parameters such as life satisfaction, the perception of acceptance by other people, physical appearance perception, and functionality perception in the working group at the beginning and after 6 months[40]. In the present study, in the CPG, the positive changes obtained in the CPG in parameters such as self-esteem, body image, and quality of life seem to be consistent with the results of the Portuguese study.

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