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Effects of Pilates-Based Exercise on Life Satisfaction, Physical Self-Concept and Health Status in Adult Women

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*The objective of this study was to determine the effect of Pilates-based mat exercises on life satisfaction, perception of appreciation by other people, perception of physical appearance, perception of functionality, total physical self-concept, and perception of health status in healthy women. A randomized controlled trial was conducted in Évora, Portugal, in 2008, in which 62 healthy adult women were randomized to a Pilates-based mat (experimental group) (*n *= 38, mean age ± SD, 41.08 ± 6.64 years) or a control group (*n *= 24, mean age ± SD, 40.25 ± 7.70 years). Experimental group participants performed the Initial Mat of Body Control Pilates twice per week, 60-minutes per session. Repeated measurements were performed at baseline, 3 months and 6 months. No significant differences between the two groups were observed in life*

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satisfaction, perception of appreciation by other people, perception of physical appearance, perception of functionality, total physical self-concept, and perception of health status at three time point measures (baseline, after 3 months, and after 6 months). No significant differences were observed in the control group over time. The experimental group showed significant improvements between baseline and six months in life satisfaction (p = .04), perception of appreciation by other people (p = .002), perception of physical appearance (p = .001), perception of functionality (p = .01), total physical self-concept (p = .001), perception of health status (p = .013) and between three and six months in life satisfaction (p = .002), perception of appreciation by other people (p = .05), perception of physical appearance (p = .001), perception of functionality (p = .02), and total physical self-concept (p = .001). Life satisfaction, perception of appreciation by other people, perception of physical appearance, perception of functionality, total physical self-concept and perception of health status may improve after 6 months of Pilates-based mat exercise.

KEYWORDS Pilates method, Psychological well-being, healthy women, quality of life, life satisfaction

INTRODUCTION

Progressive physical exercise is posited to contribute to a healthy attitude, including the promotion of positive psychological dimensions (Faria & Silva, 2000) and quality of life (Valois et al., 2004). While current literature supports physical exercise as a means to promote life satisfaction (Rejeski & Mihalko, 2001), physical self-concept (Faria & Silva, 2000; Schneider, Dunton, & Cooper, 2008), and perception of one's health status (Greenspan et al., 2007), few studies have focused on the relationship between mind-body exercise programs and these outcomes in healthy females.

Pilates is a mind-body exercise program that is well-recognized and taught world-wide. Originally called Contrology by its creator, Joseph Pilates (1880–1967), this program of mind-body exercise is based on six key principles: centering, concentration, control, precision, flow and breath (Latey, 2001). These principles recognize the inter-relationships among physical and cognitive processes to produce an outcome of improved life satisfaction, self-concept, and health. According to Pilates (1934), his method is the total coordination of body, mind, and spirit. He believed that the proper balance between body and mind provides the physical and mental power crucial for achieving health and happiness. Pilates further believed that his method, among other physical effects, stimulates the mind, lifts up the spirit,

and decreases mental strain (Pilates & Miller, 1945). Pilates also touted the beneficial effects of Contrology on self-confidence, poise, and consciousness of possessing the power to accomplish one's desires, with renewed vigor and interest in life (Pilates & Miller, 1945).

Recent research has explored the effects of the Pilates-based method of exercise on various health-related outcomes, demonstrating improvements in self-efficacy, positive mood, and sleep quality in college students (Caldwell et al., 2009) and improved quality of life in elderly females (Rodrigues et al., 2010). Despite the Pilates-based method's popularity and health claims, little research has been conducted to measure its effectiveness in healthy adult populations (Emery et al., 2009; Endleman & Critchley, 2008; Herrington & Davis, 2005; Petrofsky et al., 2005; Queiroz et al., 2009; Rogers & Gibson, 2009; Sekendiz et al., 2007). Researchers are critical of the lack of studies concerning the impact of the Pilates-based method in adult populations (Bernardo, 2007; Lange et al., 2000), especially on psychological variables (Sekendiz et al., 2007). None of the aforementioned researchers has utilized the Pilates-based method to study the variables of life satisfaction and physical self-concept. Only Segal, Hein, and Basford, (2004) measured one psychological variable, the perception of health status, after 6 months of one-hour, weekly Pilates classes. The results revealed a minimal improvement in health status, but there were no significant differences on the self-assessment of health.

It is important to investigate the effects of the Pilates-based method of exercise on psychological constructs related to life satisfaction, physical self-concept, and the perception of health status to contribute to the body of scientific evidence for the application of the Pilates-based method of exercise in healthy populations. Such research would support or refute the purported effectiveness of the Pilates-based method of exercise in psychological well-being and quality of life of healthy adults. The purpose of this study was to investigate the effects, after 3 and 6 months of a Pilates-based exercise program in healthy adult women, on life satisfaction, physical self-concept, and perception of health status. The hypothesis of this longitudinal, randomized, controlled trial was that healthy women who engaged in a regular program of Pilates-based exercise would report increases in life satisfaction, physical self-concept, and perception of health status. By comparison, a similar sample of women population without an exercise program would not show changes in these outcomes.

METHODS

Participants

Approval for this study protocol was obtained from the local Ethics Committee. The study was conducted in the Department of Sport and Health

at the University of Évora, Portugal, in 2008. Healthy women aged 25–55 years were recruited in Évora, Portugal, through electronic mailings sent to users of the University of Évora's electronic mail system and notices posted in local trade and public offices. Participants were excluded from the study if they: were pregnant; experienced contraindications to exercise resulting from cardiovascular, neuromuscular or neurological disorders that would prevent full participation in the Pilates sessions; reported other medical conditions, including taking medication that would influence the psychological parameters of the study; had previous experience in Pilates-based exercise; or had been engaging in regular physical exercise during the previous 12 months. Participants were withdrawn from the study by the investigator if they failed to attend at least 85% of all required Pilates sessions. A registered nurse screened the participants and consented eligible participants to the study. The allocation was concealed. All participants voluntarily signed a written informed consent form prior to participation in the study.

Of the 94 participants who were screened, 14 did not meet the eligibility criteria. The remaining 80 were randomly allocated by an honest broker, using a table of random numbers to the Pilates exercise group (EG, $n = 40$) or the control group (CG, $n = 40$). After the randomization and before the first assessment, 18 participants dropped out of the study, 2 from the EG and 16 from the CG. The reasons for withdrawal from the EG were personal issues, such as lack of time, and from the CG were illness ($n = 2$), pregnancy ($n = 1$) and personal issues ($n = 13$), namely the desire to engage in an exercise program. All participants of EG attended more than 85% of Pilates sessions. The final sample consisted of 62 participants, 38 in the EG and 24 in the CG (Figure 1).

Procedures

Intervention. The Pilates-based exercise program and data collection sessions took place at the research institution. The principal investigator, who was a qualified Body Control Pilates instructor, designed, performed, and supervised the Pilates-based exercise program tailored to the study's time frame. The classes involved a Body Control Pilates program that was designed to develop a safe and progressive training schedule to prepare the body for the 34 mat exercises originally created by Joseph Pilates, referred to as classical Pilates. However, due to the restrictive time frame of the study (6 months), combined with the fact that the participants had no prior experience with Pilates, the Pilates-based exercise program for this study consisted of only the Initial Mat. The full repertoire of the Initial Mat introduces the exercises progressively, allowing the participants to achieve the correct performance of all seven of the Classical Pilates exercises ("The One Hundred," "Roll Backs," "Rolling like a Ball," "Spine Stretch Forward," "Single Leg Stretch," "Double Leg Stretch," and "Torpedo") and to gain the

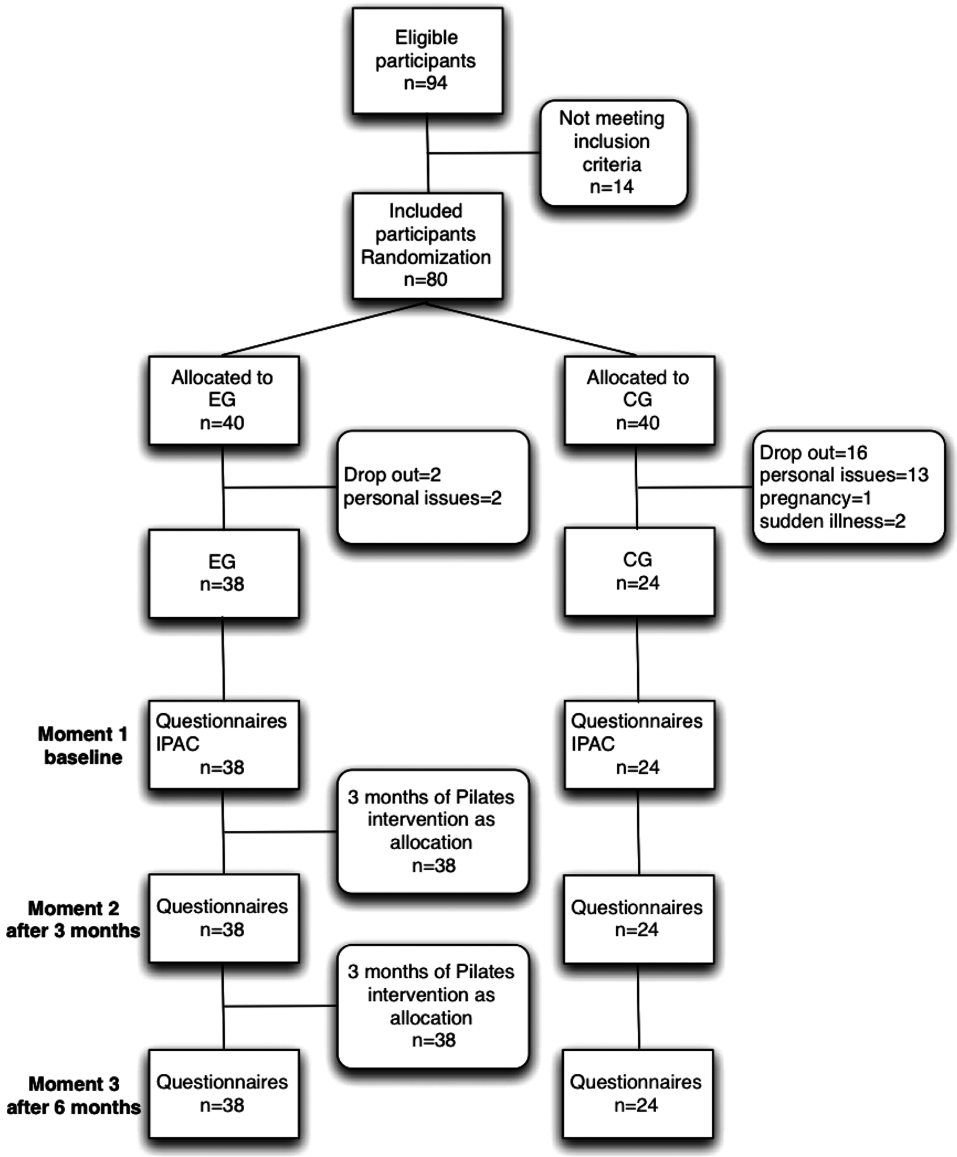

FIGURE 1 Flow chart of participants during the trial.

maximum benefits of the method. The Initial Mat focuses on: alignment and awareness; breathing and release; pelvic stability; scapular stability; spinal movements; and stretches and release.

All exercises were conducted in progressively more difficult sequences. For instance, the weight training and practice of the classical Pilates exercises were first introduced when the participants were able to maintain control of the neutral spine and pelvis. All participants frequently were informed to

work within their level of comfort. Exercises were modified for participants to promote a sense of accomplishment. Individual limitations were respected, and new exercises were introduced only when all participants achieved the previous ones. Each exercise was demonstrated with verbal, visual, and kinesthetic cues that related to the class objectives. The equipment used included a cushion, mat, tennis ball, stretch band, pole, and hand-held weights between 1 and 2 kg.

The EG attended 6 months of Pilates-based exercise classes, which met twice a week on non-consecutive days for 60-minutes per session. The EG received only Pilates-based mat exercise during the study period. The CG did not receive any Pilates-based training or any other form of training during this period, as they were instructed to maintain their existing levels of physical activity. Moreover, they were offered placement in a Pilates-based exercise program at a later stage during the year. However, only 1 participant accepted this offer.

Measures. The psychological parameters were measured with valid and reliable questionnaires at baseline, 3 months, and 6 months by an assessor, blinded to the participants' group assignment. The assessor gave instructions and clarifications for the self-administered questionnaire. Each participant answered the questionnaires in a single session, and the order of the questionnaires remained the same for each data collection period. The participants and researchers did not have access to the previously completed questionnaires.

Life satisfaction. Life satisfaction was measured using the Satisfaction with Life Scale (Diener et al., 1985), which is a global measure of life satisfaction. The questionnaire consisted of 5 statements with a seven-point Likert scale of responses (1 = "strongly disagree" to 7 = "strongly agree"). The possible scores ranged from 5 to 35. An increase in the score corresponded to a positive improvement. The internal consistency of this questionnaire, evaluated by the coefficient of Cronbach's alpha, showed a value of 0.935.

Physical self-concept. The Physical Self-concept Scale (Pais–Ribeiro & Ribeiro, 2003) was used to assess physical self-concept. The questionnaire was a self-report scale with an ordinal answer with 4 alternatives (1 = "No, I'm not like this"; 2 = "No, I'm not more or less like this"; 3 = "Yes, I'm more or less like this"; 4 = "Yes, I'm like this"), where 9 items assessed 3 dimensions. In the dimension "perception of appreciation by other people," the items were: physically pleasing to the people of opposite sex, find themselves physically attractive, and considered that they have a good impression on others with their physical appearance. The dimension of "perception of physical appearance" included: satisfaction with physical appearance, satisfaction with height and weight, and wish to have a different body. The final dimension, "perception of functionality," included the items: the consciousness of having athletic abilities, consciousness of having quick reflexes compared to others, considered to be energetic. An increase in any

one of these dimension scores was considered to be a positive improvement, with a possible range between 3 and 12. The total physical self-concept was measured as the sum of the three dimension scores. The possible range of scores for the total physical self-concept was 9–36, with higher scores indicating greater physical self-concept. The internal consistency, evaluated by the coefficient of Cronbach's alpha, was adequate (perception of appreciation by other people $\alpha = 0.888$; perception of physical appearance $\alpha = 0.930$; perception of functionality $\alpha = 0.846$; total physical self-concept $\alpha = 0.934$).

Perception of health status. The EQ-5D (Brooks, 1996) was used to measure the women's perception of their health status. The EQ-5D is a standardized measure of health status consisting of 2 parts: the EQ-5D descriptive system that comprises 5 dimensions (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression) and the EQ VAS, which measures the perception of health status using a visual analogue scale. For this study, only the EQ VAS was administered. The possible range of EQ VAS scores was 0–100, with 0 being the "worst imaginable health state" and 100 being the "best imaginable health state" and the higher scores indicated a positive improvement.

Level of physical activity. To ensure the homogeneity of the level of physical activity of all participants at the beginning of the study, the short form of the International Physical Activity Questionnaire (IPAQ, 2005) (Craig et al., 2003) was administered at baseline by telephone interview by the assessor, who was masked as to the participants' group allocation. This questionnaire, with 9 items, provided information about the time spent in vigorous and moderate intensity activities and in walking and sedentary activities, with the domains of physical activity split into leisure time physical activities, domestic and gardening activities, and work and transport-associated physical activities.

Physical activity was assessed with 3 categorical levels: (1) low physical activity (those who did not meet criteria for the other 2 categories); (2) moderate activity ($\geq$ 3 days of vigorous activity for $\geq$ 20 min/day or $\geq$ 5 days of moderate-intensity activity or walking for $\geq$ 30 min/day or $\geq$ 5 days of any combination of walking, moderate-intensity or vigorous intensity activities achieving $\geq$ 600 MET-min/week); and (3) high activity (vigorous-intensity activity on at least three days achieving $\geq$ 1500 MET-min/week or $\geq$ 5 days of any combination of walking, moderate-intensity or vigorous-intensity activities achieving $\geq$ 3000 MET-min/week) (IPAQ, 2005). For all physical activity domains, the moderate and vigorous activities were those that required a moderate or high increase in heart and respiratiory rate, respectively. Both activities were performed for at least 10 consecutive minutes.

Statistical Analysis

All statistical analyses were computed using SPSS software, version 17.0 (SPSS

Inc. Chicago, IL). The p value was set at 0.05 for all study analyses. The level of physical activity was treated as a categorical variable and was compared between the EG and CG, using the Chi-square test for homogeneity and a multinomial logistic analysis. To assess for significant differences in outcomes between the EG and CG at baseline, the Independent t-test was applied. Whenever the parametric assumptions were not met, the Mann–Whitney non-parametric tests were used. Following this analysis, the differences between baseline and each assessment time point were calculated for all study variables. A two-way repeated measures ANOVA was used to compare the outcome variables by the group (EG and CG) and time (baseline, after 3 months, and after 6 months). In those instances when the assumptions of this analysis were not met, the non-parametric Friedman's test was used. As this test only allows one factor to be studied, the hypothesis was used separately for each group and, in the cases that rejected the null hypothesis, Bonferroni correction was applied to ensure that a type I error was not made. In this case, to ensure that the experiment's type I error rate did not exceed 0.05, the level of significance was 05/k, with k being the number of simultaneous tests of hypothesis.

The treatment effect was established as the average of the estimated difference between the EG and CG on all variables and was calculated separately for each variable. For each individual, the proportional change between post and pre measurement for each variable was established using the formula: (post-pre)/pre.

RESULTS

At baseline, no significant differences were found between the EG and CG in age (years), educational level (level 1: 4 years' education; level 2: 5–12 years' education; and level 3: higher education), weight (Kg), height (cm), BMI (Kg/m^2), or waist circumference (cm) (Table 1). The results of Chi-square for the IPAQ at baseline demonstrated no significant differences between

TABLE 1 Participant Characteristics at Baseline

Participant characteristics	Exercise group $n = 38$	Control group $n = 24$	P value
Age (years)	41.2 ± 6.6	40.2 ± 7.6	0.65
Educational level	2.76 ± 0.43	2.54 ± 0.58	0.12
Weight (kg)	65.2 ± 10.2	63.5 ± 8.5	0.52
Height (cm)	159 ± 0.09	160 ± 0.05	0.8
BMI (kg/m^2)	25.8 ± 5	25.1 ± 3.4	0.42
Waist circumference (cm)	82.5 ± 9.4	84.4 ± 7.2	0.39

Note. Values are in means ± standard error.

the groups ($p = .11$) in level of physical activity. In the EG, 44.7% ($n = 17$) had low levels of physical activity, 18.4% ($n = 7$) had moderate levels and 36.8% ($n = 14$) had high levels. In the CG, 20.8% ($n = 5$) had low levels, 16.7% ($n = 4$) had moderate levels and 62.5% ($n = 15$) had high levels of physical activity.

The results from multinomial logistic analysis showed no significant differences between the groups ($p = .101$), after adjusting for confounding, including differences between the 2 groups in baseline physical activity. In multinomial logistic regression model, using the low level as reference, the high level participants from the EG had a lower level of physical activity at baseline than those in the CG ($p = .04$). In addition for those in moderate level activity, no significant differences were observed between the two groups ($p = .41$) at baseline.

Furthermore, verbal confirmation was achieved from the CG that they did not change their physical activity levels for the duration of study.

Life satisfaction. The ANOVA test revealed no significant time × group interaction for the 2 groups over 6 months for life satisfaction ($p = .077$). Thus, differences between the EG and CG were not observed in life satisfaction at baseline ($p = .73$), after 3 months ($p = .92$), and after 6 months ($p = .33$). The main effect for time was significant ($p = .037$). Differences observed in the EG scores occurred only between baseline and 6 months ($p = .04$) and between 3 and 6 months ($p = .002$) (Figure 2 and Table 2). No significant differences were observed in CG for the 3 point measures, with a p value greater than 0.9. In addition, a treatment effect of 7.5% ($p =$

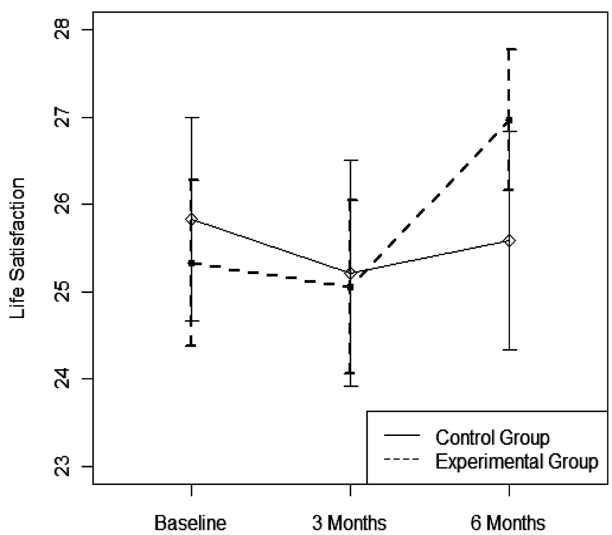

FIGURE 2 Life satisfaction mean scores for EG and CG. The error bars are expressed as mean ± standard deviation.

TABLE 2 Descriptive Statistical of Outcome Measures

Outcome measures	Baseline		3 Months		6 Months	
	EG	CG	EG	CG	EG	CG
Life satisfaction[a]	25.32 (0.95)	25.83 (1.17)	25.05 (0.99)	25.21 (1.30)	26.97 (0.80)	25.58 (1.25)
Perception of appreciation by other people[b]	7.84 (0.32)	7.96 (0.36)	8.21 (0.25)	8.08 (0.26)	8.55 (0.18)	8.08 (0.26)
Perception of physical appearance[b]	7.53 (0.30)	7.25 (0.54)	7.53 (0.33)	7.67 (0.52)	8.18 (0.33)	7.75 (0.54)
Perception of functionality[b]	8.16 (0.24)	8.38 (0.39)	8.29 (0.23)	8.58 (0.37)	8.92 (0.21)	8.63 (0.37)
Total physical self-concept[c]	23.55 (0.65)	23.58 (1.10)	24.03 (0.64)	24.33 (0.96)	25.76 (0.63)	24.46 (0.99)
Perception of health status[d]	80.74 (2.24)	79.46 (2.86)	83.95 (2.16)	82.33 (2.38)	86.63 (1.76)	82.00 (2.69)

Note. Values are in means (standard error).
Possible range scores: [a]5 to 35; [b]3 to 12; [c]9 to 36; [d]0 to 100.

.04) was observed after 6 months of Pilates-based exercise compared with the CG.

Physical self-concept. No significant differences between the EG and CG were observed in physical self-concept at the three time points (baseline, after 3 months, and 6 months), respectively as: perception of appreciation by other people ($p = .81$, $p = .74$, $p = .14$), perception of physical appearance ($p = .66$, $p = .81$, $p = .47$), perception of functionality ($p = .62$, $p = .48$, $p = .45$), total physical self-concept ($p = .98$, $p = .78$, $p = .25$). After 6 months perception of appreciation by other people, perception of physical appearance, perception of functionality, and total physical self-concept were slightly but not significantly better in the EG (8.55 ± 0.18; 8.18 ± 0.33; 8.92 ± 0.21, 25.76 ± 0.63, respectively) than in the CG (8.08 ± 0.26; 7.75 ± 0.54; 8.63 ± 0.37, 24.46 ± 0.99, respectively) (Table 2). The results of the Friedman test indicated significant differences for the EG in total physical self-concept ($p \leq .001$) and in all dimensions measured: perception of appreciation by other people ($p = .008$), perception of physical appearance ($p \leq .001$), and perception of functionality ($p = .03$). The EG had significant changes between the baseline and 6 months on the following: the perception of appreciation by other people ($p = .002$), the perception of physical appearance ($p = .001$), the perception of functionality ($p = .01$), and total physical self-concept ($p = .001$). Significant differences were also observed between 3 and 6 months for: the perception of appreciation by other people ($p = .05$), the perception of physical appearance ($p = .001$), the perception of functionality ($p = .02$), and total physical self-concept ($p = .001$) (Figure 3). No significant differences were observed in the CG in total physical self-concept ($p = .06$), perception of appreciation by other people ($p = .37$), perception of physical appearance ($p = .22$), and perception of functionality ($p = .08$) (Figure 3). After 6 months, the treatment effect of the perception of appreciation by other people, the perception of physical appearance, the perception of functionality, and the total physical self-concept of the EG were, respectively, 7.6%, 1.7%, 6.3%, and 5.7% compared to the CG.

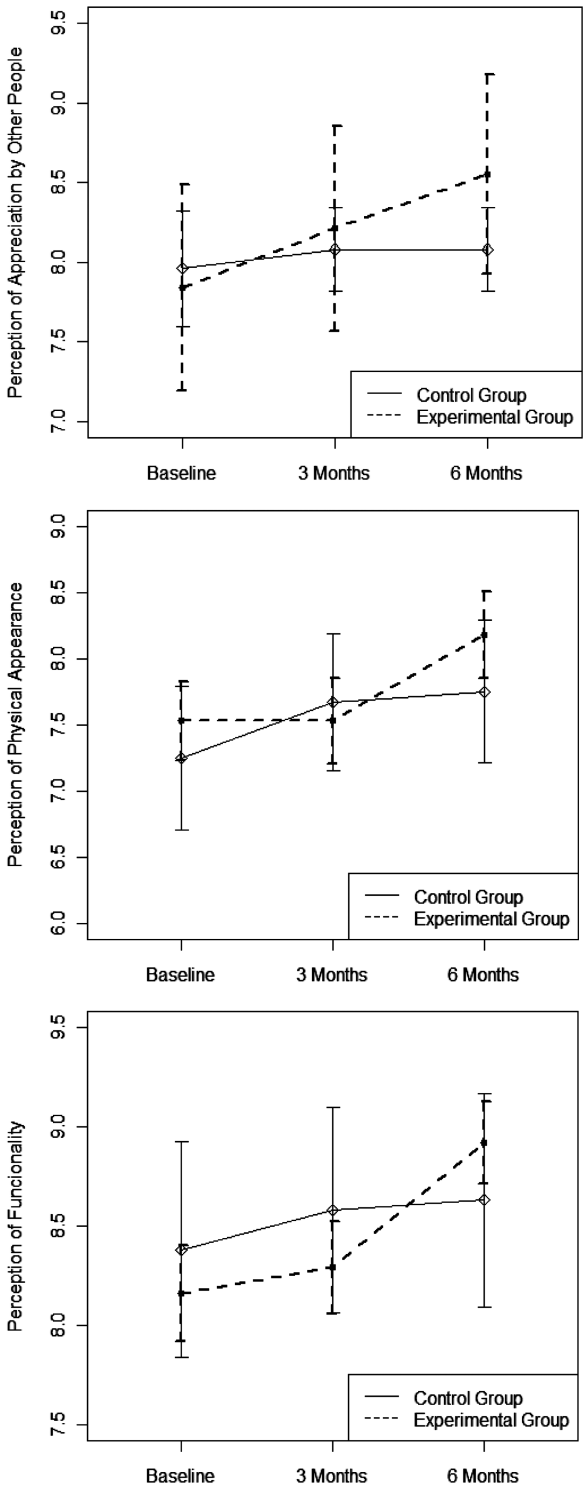

FIGURE 3 Three dimension of physical self-concept and total physical self-concept mean scores for EG and CG. The error bars are expressed as mean ± standard deviation.

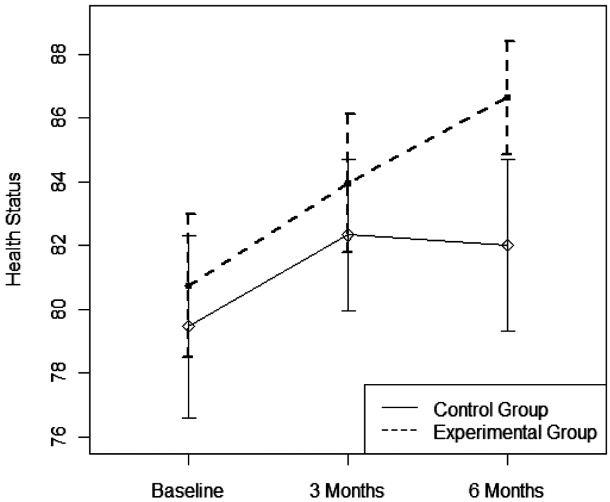

FIGURE 4 Perception of health status mean scores for EG and CG. The error bars are expressed as mean ± standard deviation.

Perception of health status. The results of the repeated measures ANOVA for EQ-VAS showed no significant time × group interaction for the perception of health status ($p = .48$). No significant differences between the EG and CG were observed in perception of health status at baseline ($p = .73$), after 3 months ($p = .63$), and after 6 months ($p = .14$). The main effect for time was significant ($p = .019$). The EG had significant changes between baseline and at 6 months ($p = .013$), with a treatment effect of 4.1% compared with CG. No significant differences were observed in CG for the 3 point measures, with a p values greater than 0.6 (Figure 4).

DISCUSSION

It is estimated that over 10 million people are now practicing Pilates in the United States alone, and the numbers are growing every year (Balanced Body University, 2010). Practitioners claim that Pilates-based training has overall health benefits, including enhanced physiological functioning, improved psychological functioning, and learning or re-learning of functionally-effective postural set and motor patterns (Lange et al., 2000). To date, however, little research has supported these claims.

The results of this study provide evidence to support the effectiveness of Pilates-based exercise as a means of improving life satisfaction, physical self-concept, and perception of health status in healthy women when practiced 2 hours a week for 6 months. The findings corroborate those of

Caldwell et al. (2009), who demonstrated that Pilates-based exercise can be an effective training tool to enhance these psychological parameters. Rodrigues et al. (2010) found similar improvements in the quality of life index of healthy elderly females after 8 weeks of twice weekly Pilates-based exercise performed on the apparatus. In addition, these results support other published accounts that the Pilates-based method has positive benefits on psychological functioning (Pilates & Miller, 1945; Lange et al., 2000).

Rejeski and Mihalko (2001) stated that physical exercise improves a diversity of variables concerning with health-related quality of life. The enhancement of life satisfaction is important in social policy and health care perspective (Daig et al., 2009). Subjective outcomes, such as life satisfaction, are deeply influenced by social cognitive variables, which depend, in some way, on the social environmental context of physical activity (Turner et al., 2004). Furthermore, among other factors, the companionship provided by a social network of a group-based exercise class has been connected consistently to enhanced life satisfaction (Daig et al., 2009). Following these lines of thought, it is plausible that perhaps the social environment context created in the Pilates-based exercise intervention, i.e., the companionship from a social network, may explain the improvement of the subjective outcomes, such as life satisfaction. Such companionship did not develop in the control group because they never met as a group.

The media attention focused on any physical exercise, activity, or sport, along with the activity's high social acceptance, contributes decisively to the enhancement of one's physical self-concept. Furthermore, challenge, relaxation, and cooperation inherent of physical activity, contributes to the development of psychological well-being and physical self-concept (Faria & Silva, 2000).

It is reasonable to assume that the current popularity and social recognition of the Pilates-based method are factors in the improvement of the participants' physical self-concept. Physical activity contributes to the development of the physical self-concept (Marsh, 1993), subsequently increasing one's possibility of success, learning to cope with failures, deepening self-knowledge, and recognizing potentials and limits (Faria & Silva, 2000).

A previous study conducted by Segal et al. (2004) concluded that the effects of a 6-month, weekly Pilates-based program on participants' health status did not result in any significant changes. The authors suggested that health perception might depend more on the training hours per week than the period of intervention. They also concluded that the absence of significant changes may be more accurately attributable to both a lack of accuracy of the evaluation instrument and the high levels of perception of health status at baseline. Based on the findings and suggestions of this study, the design of the present research study consisted of repeated Pilates-based exercise sessions over 6 months for 2 hours per week, and the EQ-5D was used as a reliable evaluation instrument. The findings of this study, which indicated

an improvement in the self-assessment of health status after 6 months of a twice-weekly Pilates-based program, when compared with those of Segal et al. (2004), were probably due to both an increase in the periodicity of the training hours per week and an increase in the period of intervention. Furthermore, despite the high levels of self-assessment of the health status at baseline (mean 80.74 ± 13.81), improvement occurred in this variable, suggesting that the EQ VAS may be an effective instrument for use in healthy adults.

From a public health perspective, these findings suggest the potential for Pilates-based exercise programs may slightly improve psychological well-being and quality of life in healthy women.

The limitations of this study included the small sample size, which limited the ability to detect significant meaningful differences when controlling for confounding and examining effect moderation. Further, a non-Pilates-based exercise group was not included, so that it is unknown if similar improvements would be found in an exercise group, as only a non-exercise control group was used. Similar improvements in psychological well-being may have been found in both Pilates-based and non-Pilates-based exercise groups. Also, the Body Control Pilates method may not be similar to the Pilates-based methods taught in other published research studies. Finally, the non-representative nature of the study sample limits the generalizability of the study results.

CONCLUSIONS

The present study demonstrated that Pilates-based exercise may slightly enhance the psychological well-being of healthy women, measured by life satisfaction, physical self-concept, and perception of health status. Pilates-based exercise among healthy women during the initial 3-month period (60-minute sessions twice per week) may not have been of sufficient duration to promote significant increases in the health outcome variables studied. However, after 6 months, the women in the experimental group did exhibit a slight significant improvement in life satisfaction, as well as in the three dimensions of physical self-concept, the total physical self-concept, and the perception of health status, when compared with those who participated in the CG.

Because the Pilates-based mat exercises may have positive benefits on life satisfaction, physical self-concept, and perception of health status, future research may focus on precisely which aspects of the exercise program serve as valid predictors of physical and psychological health. Further investigations should explore the influence of differences in variables, such as age and gender, as well as personality traits, that may affect the relationship between exercise and health.

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