ORIGINAL RESEARCH

Influence of habitual physical activity on the symptoms of climacterium/menopause and the quality of life of middle-aged women

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Aim: To analyze the influence of the duration of habitual physical activity (PA) on the symptoms of climacterium/menopause and on several domains of the health-related quality of life (QOL) in middle-aged women.

Methods: One hundred and four 45- to 59-year-old women were placed into three groups: group A, subjects who maintained PA less than 30 minutes/day; group B, subjects who maintained or began to perform PA 30–60 minutes/day; and group C, subjects who maintained or increased PA to more than 60 minutes/day. Symptoms of menopause, QOL (physical, psychological, and social), and PA were assessed through the Kupperman Menopausal Index, World Health Organization Quality of Life Brief Version questionnaire, and International Physical Activity Questionnaire, respectively.

Results: The analysis of covariance (ANCOVA) results, adjusted for age, initial body mass index, schooling years, hormonal replacement therapy, and the number of diseases, indicated that the women who maintained or increased their total habitual PA to more than 60 minutes/day had reduced symptoms of climacterium/menopause (-5.4 ± 0.5; $P = 0.001$) and improved QOL in the psychological ($4.4\% \pm 0.8\%$; $P = 0.001$) and social domains ($2.0\% \pm 0.9\%$; $P = 0.035$). ANCOVA revealed a further improvement of approximately 5% in the psychological domain of QOL in group C, who also experienced decreased menopause symptoms ($P = 0.001$) and lost weight ($P = 0.009$).

Conclusion: The habitual practice of at least moderate-intensity PA for 60 minutes/day has a favorable effect on climacterium/menopause symptoms and on QOL, particularly on its psychological and social domains. The influence of habitual PA at the psychological level seems to be at least partially associated with a decrease in menopause symptoms and/or weight loss.

Keywords: physical activity, quality of life, menopause

Introduction

Menopause is a biological event rising from ovary failure, for which a diagnosis is retrospectively made after 12 consecutive months of amenorrhea that is not explainable through pathological causes and is associated with plasma values of follicle-stimulating hormone higher than 40 IU/L.[1] It is preceded by a transitory shift from the reproductive to the nonreproductive stage, which lasts approximately 2–8 years in 95% of women.[2] This transitory phase is usually characterized by specific vasomotor, psychological, and urogenital signs and symptoms, as well as more generalized physical complaints, such as weight gain, changes in the thickness of the skin and hair, and the appearance of fatigue, vertigo, and joint pain.[3,4] The intensity of menopause-related complaints ranges from mild to severe in 96% of the women, affecting their quality of life (QOL)

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not only from the physical and psychological point of view but also at the social level. The QOL scores of middle-aged women are usually lower than those of middle-aged men, young adults, and elderly women.[5–7]

Despite the general observation of a negative association between menopause and/or the symptoms of menopause and QOL scores,[6,8,9] especially at the psychological level,[10] some researchers have investigated the influence of lifestyle and, more specifically, physical activity (PA) on menopause symptoms and/or QOL scores in middle-aged women, independent of their menopausal stage.[11,12] High levels of PA have been associated with a better QOL, mainly in the physical domain,[13] as well as with a decrease in psychological[14,15] and physical[11] menopause-related complaints. Conversely, low levels of PA seem to correlate with weight gain and obesity during menopause.[16]

Evidence for the influence of PA on the symptoms of climacterium/menopause and on QOL rises from intervention studies which apply exercise (targeted PA).[17–19] Exercise programs with a fundamentally aerobic component, of moderate or higher intensity, an approximate duration of 30 minutes per session, three or four sessions per week, and lasting at least 6 months, have shown positive effects on QOL.[18,19] Other studies on the influence of habitual PA (nontargeted PA) performed in different contexts (leisure, household chores, occupation, and transportation) have not yet quantified the exact level of PA necessary to achieve favorable effects on QOL or on the menopause symptoms in middle-aged women;[13,14,20] these data would be highly relevant for establishing recommendations regarding habitual PA in the promotion of health. However, these studies indicate a decrease in the overall frequency of symptoms,[14] especially psychological symptoms,[14,20] in addition to an increase in QOL, mainly in the physical domain.[13] Thus, the main aim of this study was to analyze the influence of the duration of habitual PA on the symptoms of climacterium/menopause and on the various domains of health-related QOL scores in middle-aged women.

Materials and methods
Study participants
One hundred and twenty 45- to 59-year-old women voluntarily entered the study; participants were recruited through work or institutions associated with educational, health, sport, religious, or insurance services. The study excluded participants who had serious reproductive or hormonal illnesses such as breast, ovarian or endometrial cancer, diabetes, liver disease, current use of psychotropic drugs, or any clinical condition that prevented women from adhering to the PA recommendations for public health – that is the accumulation of at least 30 minutes activity of moderate or greater intensity per day. Only 104 women completed the full 12 weeks of the study. Participants were divided into three groups at the end of the study according to the characteristics of the habitual PA they performed during the period of observation. Group A maintained habitual PA to less than 30 minutes/day (n = 42); group B continued or began to engage in habitual PA for 30–60 minutes/day (n = 16, of which ~56% maintained the same level of initial habitual PA); and group C continued or began to engage in habitual PA for more than 60 minutes/day (n = 46, of which ~65% maintained the same level of the initial PA) (Figure 1). At the beginning of the study, all participants were informed of the health benefits of PA and were advised to be more active in tasks of daily living and to accumulate at least 30 minutes/day PA of moderate or greater intensity (great if ≥60 minutes/day), eg, using stairs instead of elevators or escalators, moving by foot, bicycle, or public transport instead of using the car, and doing active breaks or leisure activities rather than passive activities. Contact was maintained with participants by telephone once a week to encourage them to maintain or increase habitual PA. Three sessions per week of walking was organized during the 12 weeks in one place (park) for participants who wished to do this activity together, but without supervision. It was explained that moderate-intensity physical exertion corresponded to five or six points on a 0–10 scale, where zero represents the absence of exertion and 10 represents maximum exertion.[21] A five or six on a 0–10 scale is essentially 45% to 64% of aerobic capacity reserve for moderate intensity. Similarly, a seven or eight on a 0–10 scale means 65% to 84% of reserve is the range for relatively vigorous-intensity activity.

Data were collected at the beginning and at the end of the study period by the same evaluator. At the beginning of the study, the participants were informed of the aims and

Start of study	Follow-up (12 weeks)	End of study
Group A = 49	7	**Group A** = 42
Group B = 25	16	**Group B** = 16
Group C = 30		**Group C** = 46

Figure 1 Flow of participants through study.

procedures of the study and signed an informed consent form according to resolution 196/96 of Conselho Nacional de Saúde, Brazil. This observational study was carried out between September and December 2010, after approval from the Research Ethics Committee of the State University of Santa Catarina, Brazil.

Procedures
PA
Habitual PA was assessed through the short form of the International PA Questionnaire (IPAQ), which was developed by researchers from several countries and has been used by the World Health Organization (WHO) within a multicentric study embracing several countries. This questionnaire was validated by the Studies Center of the Laboratory of Physical Aptitude of São Caetano do Sul, which is an IPAQ coordination center in Brazil.[22] The evaluation of habitual PA through IPAQ quantified the number of times each participant walked for at least 10 consecutive minutes (3.3 metabolic equivalents [METs]) and engaged in moderate- (4.0 METs) and vigorous-intensity PA (8.0 METs) during the previous week in various settings: leisure, household chores, occupation, and transportation. Because walking is assigned a level of exertion of 3.3 METs, which is higher than the lower limit for moderate activity (3 METs), the total PA resulting from adding walking, moderate activity, and strong activity corresponds to at least moderate-intensity activity.

Reproductive state (perimenopause vs postmenopause)
The reproductive state of the participants was evaluated through a questionnaire that included age of menarche, regularity of menstrual cycles, and nature of menopause (ie, natural or surgical). Participants who reported 1–11 months of amenorrhea were rated as perimenopausal (45.2% of the women), and those with 12 or more months of amenorrhea were rated as postmenopausal (54.8% of the women).[23] The age of menopause was calculated only for the women with natural menopause (79% of the women; 21% reported surgical menopause). The use of hormonal replacement therapy (19.2% of the women) was also included in the questionnaire.

Symptoms of menopause
The symptoms of menopause were assessed through the Kupperman Menopausal Index, comprising ten symptoms or complaints (vasomotor symptoms, insomnia, paresthesia, nervousness, vertigo, weakness, joint/muscular pain, headache,

palpitations, and tinnitus). An addition of six menopause symptoms was included: decreased memory, decreased sexuality (libido, sexual activity, and satisfaction), urinary complaints (exertion-induced urinary incontinence or difficult micturition), vaginal dryness (feeling of dryness and difficulties with sexual intercourse), anxiety, and weight gain.[24]

The occurrence/frequency of each symptom was assessed on a four-point Likert scale, in which 0 = absence, 1 = mild (occasionally), 2 = moderate (repeatedly), and 3 = intense (constantly). After adding the scores for all of the symptoms, participants were classified either as asymptomatic or as having mild (up to 19 points), moderate (20 to 35 points), or intense (higher than 35 points) symptoms.[25,26] This questionnaire was previously validated in Brazil.[26]

QOL
The QOL was assessed by means of the WHO QOL Brief Version (WHOQOL-BREF) questionnaire, which has been validated for Brazilian Portuguese.[27] This questionnaire comprises 26 questions (out of the original 100), 24 questions examining physical (physical pain, energy, locomotion, everyday life activities, medical treatments, and work), psychological (positive feelings, concentration, self-esteem, self-image, negative feelings, and spirituality), social (personal relationships, social support, and sexual activity), and environmental (physical safety, housing, financial resources, health-care facilities, information, leisure, physical environment, and transportation) domains and the remaining two are general questions on QOL.

The questions refer to the previous 2 weeks, and the participants answer them according to a Likert scale for intensity (none/extremely), ability (none/completely), frequency (never/always), or evaluation (very unsatisfied/very satisfied; very bad/very good), in which values are calculated from scores ranging from zero (very bad) to 25 (fair), 50 (good), 75 (very good), and 100% (excellent).

Body composition, health status, and educational level
Body weight and height were reported by the participants themselves. Such values were used to calculate body mass index (weight [kg]/height [m]^2). Years of schooling and the number of diseases were calculated from a self-reported questionnaire.

Analysis of data
Data were analyzed using SPSS software (v 16.0; SPSS Inc, Chicago, IL). Descriptive statistics were applied

(mean, standard deviation, and amplitude) to characterize the age, age of menarche, age of menopause, body mass index, education, number of diseases, habitual PA variables, QOL domain scores, and symptoms of menopause. Comparisons of the QOL scores and symptoms of menopause in middle-aged women between groups (A vs B vs C) after 12 weeks were performed using analysis of covariance (ANCOVA), adjusted for the baseline values of each dependent variable. The levels of significance were determined through Bonferroni post hoc analyses. Intragroup comparisons between the QOL scores and symptoms of menopause at the beginning and end of the study were made through paired t-tests (in groups A and C) and Wilcoxon signed-rank test (group B). The dose-response relationships between habitual PA and the variations in QOL scores in the physical, psychological, and social domains, the variations in weight, and the variation in the symptoms of menopause were analyzed through ANCOVA adjusted for age, initial body mass index, years of schooling, hormonal replacement therapy, and number of diseases. Significant differences in ANCOVA were tested through simple contrast. The level of statistical significance was established at $P < 0.05$.

Results

Table 1 describes the mean characteristics of the participants who were chronologically 50 years of age (45–59 years), age of menarche at 13 years, and age of menopause at 49 years (excluding surgical menopause). Participants had attended school for an average of 11 years, which corresponds to secondary education. Most of the women had a body mass

index between 18.5–24.9 kg/m^2 (average 21 kg/m^2). Most of the participants (56%) did not report any disease. The clinical conditions most often reported were migraine (12%), osteoporosis (11%), high total cholesterol (10%), hypertension (9%), and asthma (2%), with no differences between groups. The duration of total daily habitual PA ranged from 0–200 minutes. The average was 24 minutes/day of moderate- to high-intensity activity (excluding walking) and 23 minutes/day of walking. The best score in the QOL assessment was observed in the social domain (65%), although it also exhibited the widest variation (0%–100%), followed by the psychological (60%) and the physical (57%) domains; the latter exhibited the lowest variation (21%–78%).

Only 11% of participants did not report any symptoms of menopause. Among those who did report symptoms, 41% rated them as moderate in intensity (Table 2).

Tables 3 and 4 describe the initial and final scores of QOL and of the symptoms of menopause, set into the three groups according to the amount of habitual PA practiced during the 12 weeks of the study. ANCOVA adjusted for baseline values indicated that the participants who engaged in habitual PA for more than 60 minutes/day had improved physical domain QOL scores compared with participants who engaged in habitual PA for less than 30 minutes/day. The most

Table 1 Characteristics of the study participants (n = 104)

	Mean ± SD	Range
Chronological age (years)	50.0 ± 4.1	45–59
Age at menarche (years)	12.9 ± 1.5	10–17
Age at menopause (years)	48.8 ± 2.8	43–55
Body mass index (kg/m²)	21.0 ± 3.6	16–34
Education (years)	11.0 ± 2.8	1–13
Illnesses (n)	1.0 ± 0.9	0–3
Physical activity		
Walking (minutes/day)	23.4 ± 21.2	0–80
Moderate PA (minutes/day)	14.7 ± 18.8	0–80
Vigorous PA (minutes/day)	9.3 ± 12.9	0–60
Moderate + vigorous PA (minutes/day)	24.0 ± 28.9	0–110
Total PA (minutes/day)	52.2 ± 48.1	0–200
Quality of life		
Physical domain (%)	57.3 ± 11.8	21–78
Psychological domain (%)	60.3 ± 12.5	29–87
Social domain (%)	65.0 ± 23.2	0–100

Abbreviations: PA, physical activity; SD, standard deviation.

Table 2 Characteristics of the sample according to the symptoms of menopause (n = 104)

	Mean ± SD	Range
Hot flashes	1.4 ± 1.0	0–3
Palpitations	1.4 ± 0.9	0–3
Sleeping trouble	1.3 ± 0.9	0–3
Muscle/joint pain	1.4 ± 0.8	0–3
Fatigue	1.4 ± 1.0	0–3
Headache	1.5 ± 0.9	0–3
Irritability	1.5 ± 0.9	0–3
Vertigo	1.4 ± 0.9	0–3
Anxiety	1.4 ± 1.0	0–3
Sadness	1.6 ± 0.9	0–3
Memory problem	1.3 ± 0.9	0–3
Decreasing sex	1.4 ± 1.0	0–3
Leaking urine	1.6 ± 1.0	0–3
Vaginal dryness	1.6 ± 0.9	0–3
Weight gain	1.5 ± 0.9	0–3
Skin alteration	1.8 ± 1.0	0–3
Humming in the ear	1.5 ± 0.9	0–3
Prevalence of menopausal symptoms		0.001
Absence (%)	10.6	
Light (%)	33.7	
Moderate (%)	41.3	
Intense (%)	14.4	

Abbreviation: SD, standard deviation.

Table 3 Comparison of quality of life scores among middle-aged women who maintained their total habitual physical activity less than 30 minutes/day (group A), continued or began to engage in physical activity 30–60 minutes/day (group B), or continued or began to engage in physical activity for more than 60 minutes/day (group C), as assessed retrospectively after 12 weeks

	A (n = 42) <30 minutes/day mean ± SD			B (n = 16) 30–60 minutes/day mean ± SD			C (n = 46) >60 minutes/day mean ± SD			A vs B vs C	
	Initial	Final	P	Initial	Final	P	Initial	Final	P	P	Post hoc
Physical (%)	51 ± 14	52 ± 13	0.289	54 ± 15	54 ± 11	0.944	63 ± 12	63 ± 7	1.000	0.001	C > A
Psychological (%)	53 ± 10	51 ± 12	0.031	58 ± 9	59 ± 10	0.715	65 ± 12	69 ± 8	0.001	0.001	C > A, B
Social (%)	54 ± 25	51 ± 21	0.001	67 ± 21	62 ± 19	0.056	77 ± 21	79 ± 17	0.017	0.001	C > A, B

Notes: Intragroup comparison between initial and final values through a paired *t*-test (groups A and C) and Wilcoxon signed-rank test (group B). Comparison of final values among all three groups (A vs B vs C) through analysis of covariance adjusted for the initial values of the corresponding variable.
Abbreviation: SD, standard deviation.

active participants also showed increased QOL scores in the psychological and social domains and a decrease in almost all of the symptoms of menopause compared with the participants who engaged in habitual PA for 60 minutes/day or less.

Figure 2 presents the variations in the QOL scores and in the symptoms of menopause according to total habitual PA adjusted for age, initial body mass index, years of schooling, hormonal replacement therapy, and number of diseases. Improvements in the psychological and social domains and in the symptoms of menopause were observed in women who engaged in habitual PA for more than 60 minutes/day.

The effects of reducing menopause symptoms and body weight on the QOL scores in each habitual PA group are shown in Figures 3 and 4. The results indicate improvement in the psychological domain in participants who engaged in habitual PA for more than 60 minutes/day and had a decrease in menopause symptoms or in body weight.

Discussion

The main aim of this study was to analyze the influence of the duration of habitual PA on the symptoms of climacterium/ menopause and on different domains of health-related QOL

Table 4 Comparison of menopause symptoms among middle-aged women who maintained their total habitual physical activity less than 30 minutes/day (group A), continued or began to engage in physical activity 30–60 minutes/day (group B), or continued or began to engage in physical activity for more than 60 minutes/day (group C), as assessed retrospectively after 12 weeks

	A (n = 42) <30 minutes/day mean ± SD			B (n = 16) 30–60 minutes/day mean ± SD			C (n = 46) >60 minutes/day mean ± SD			A vs B vs C	
	Initial	Final	P	Initial	Final	P	Initial	Final	P	P	Post hoc
Hot flashes	2.0 ± 0.7	2.2 ± 0.5	0.050	1.8 ± 0.9	1.7 ± 1.0	0.655	1.0 ± 0.8	0.5 ± 0.5	0.001	0.001	C < A, B
Palpitations	2.0 ± 0.7	2.0 ± 0.7	1.000	1.7 ± 0.9	1.7 ± 0.9	1.000	0.8 ± 0.8	0.8 ± 0.8	1.000	1.000	–
Sleeping trouble	2.0 ± 0.6	2.1 ± 0.6	0.256	1.9 ± 0.6	1.9 ± 0.6	1.000	0.9 ± 0.9	0.5 ± 0.6	0.001	0.001	C < A, B
Muscle/joint pain	2.0 ± 0.6	2.1 ± 0.6	0.160	1.6 ± 0.7	1.5 ± 0.6	0.180	1.2 ± 0.9	0.8 ± 0.6	0.006	0.001	C < A, B
Fatigue	1.8 ± 0.7	2.1 ± 0.7	0.020	1.9 ± 09	1.8 ± 0.9	0.331	0.9 ± 0.7	0.5 ± 0.6	0.001	0.001	C < A, B
Headache	2.0 ± 0.7	2.1 ± 0.7	0.096	1.7 ± 0.9	1.6 ± 0.9	0.331	1.0 ± 0.8	0.7 ± 0.6	0.003	0.001	C < A, B
Irritability	1.8 ± 0.7	2.0 ± 0.6	0.044	1.8 ± 0.8	1.9 ± 0.8	0.655	1.2 ± 1.0	0.8 ± 0.7	0.001	0.001	C < A, B
Vertigo	1.9 ± 0.6	2.0 ± 0.7	0.290	1.7 ± 0.9	1.8 ± 0.9	0.564	0.8 ± 0.7	0.7 ± 0.6	0.096	0.001	C < A, B
Anxiety	2.0 ± 0.7	2.1 ± 0.6	0.058	2.0 ± 0.8	1.6 ± 0.9	0.025	1.0 ± 0.7	0.6 ± 0.7	0.001	0.001	C < A, B
Sadness	1.8 ± 0.7	2.2 ± 0.7	0.068	2.1 ± 0.6	2.0 ± 0.7	1.000	1.8 ± 1.3	0.7 ± 0.6	0.001	0.001	C < A, B
Memory problem	2.1 ± 0.7	2.1 ± 0.7	1.000	2.0 ± 0.6	1.9 ± 0.7	0.317	0.9 ± 0.7	0.7 ± 0.5	0.002	0.001	C < A, B
Decreasing sex	2.1 ± 0.7	2.1 ± 0.7	1000	2.2 ± 0.8	2.0 ± 0.8	0.160	0.9 ± 0.7	0.6 ± 0.6	0.001	0.001	C < A, B
Leaking urine	1.6 ± 0.7	2.2 ± 0.7	0.006	2.0 ± 0.8	2.2 ± 0.9	0.102	0.8 ± 0.7	0.8 ± 0.7	1.000	0.001	C < A, B
Vaginal dryness	2.0 ± 0.7	2.1 ± 0.7	0.323	1.8 ± 0.9	1.8 ± 0.9	1.000	0.9 ± 0.6	1.0 ± 0.6	0.420	0.055	–
Weight gain	2.1 ± 0.7	2.1 ± 0.7	1.000	2.1 ± 0.8	2.0 ± 0.8	0.157	1.0 ± 0.8	0.7 ± 0.6	0.001	0.001	C < A, B
Skin alteration	2.1 ± 0.7	2.4 ± 0.6	0.049	2.0 ± 0.9	2.0 ± 0.9	1.000	1.1 ± 0.8	1.0 ± 0.8	0.323	0.001	C < A, B
Humming in the ear	2.3 ± 0.6	2.3 ± 0.6	1.000	1.9 ± 0.8	1.8 ± 0.8	0.157	0.8 ± 0.6	0.6 ± 0.5	0.018	0.001	C < A, B
Total score of symptoms	31 ± 7.4	33 ± 6.2	0.003	28 ± 9.1	27 ± 2.6	0.805	16 ± 10	10 ± 6.6	0.001	0.001	C < A, B

Notes: Intragroup comparison between initial and final values through a paired *t*-test (groups A and C) and Wilcoxon signed-rank test (group B). Comparison of final values among all three groups through analysis of covariance adjusted for the initial values of the corresponding variable.
Abbreviation: SD, standard deviation.
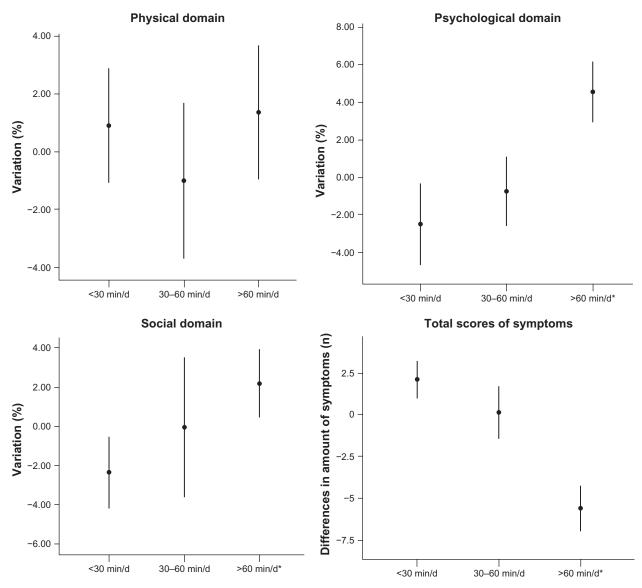
Figure 2 Average variation in quality of life and symptoms of menopause according to the habitual practice of total physical activity (<30 minutes/day; between 30 and 60 minutes/day; >60 minutes/day) over 12 weeks. Dose-response relationship between the amount of physical activity and variations in the quality of life in the physical, psychological, and social domains and the variation in the symptoms of menopause evaluated by analysis of covariance (ANCOVA) adjusted for age, baseline body mass index, years of schooling, hormonal replacement therapy, and number of diseases, with 95% confidence intervals (physical domain $P = 0.062$; psychological domain $P = 0.001$; social domain $P = 0.035$; and total score of symptoms $P = 0.001$). Significant differences in ANCOVA tested through simple contrast.
Note: *Significant differences ($P < 0.05$) between the group that maintained or increased total physical activity to more than 60 minutes/day and the other two physical activity groups.
Abbreviation: min/d, minutes per day.

in middle-aged women. The results indicate a positive dose-response relationship between the amount of total habitual PA assessed through IPAC (ie, the addition of walking, and moderate or vigorous activity lasting at least 10 minutes per session) and improvement in the symptoms of menopause and in QOL scores. At the end of 12 weeks, there were improvements in the psychological (approximately 5%) and social (approximately 2.5%) domains of QOL in middle-aged women who engaged in PA for at least 60 minutes/day. Engaging in habitual PA for at least 60 minutes/day showed

more favorable effects on the psychological QOL (as well as a positive trend in the social domain, as the levels of significance were borderline) of the women who lost weight and/or had eased symptoms of menopause.

Weight loss in overweight women has been associated with a better QOL,[28,29] and weight gain has been associated with both a worse QOL[30–33] and an increase in menopause-related physical complaints (vertigo, joint pain, abdominal pain, fatigue, and alterations of the skin), particularly when weight gain is over 5 kg.[32] In this study, the average weight

With decrease in symptoms
Physical domain

Without decrease in symptoms
Physical domain

Psychological domain

Psychological domain

Social domain

Social domain
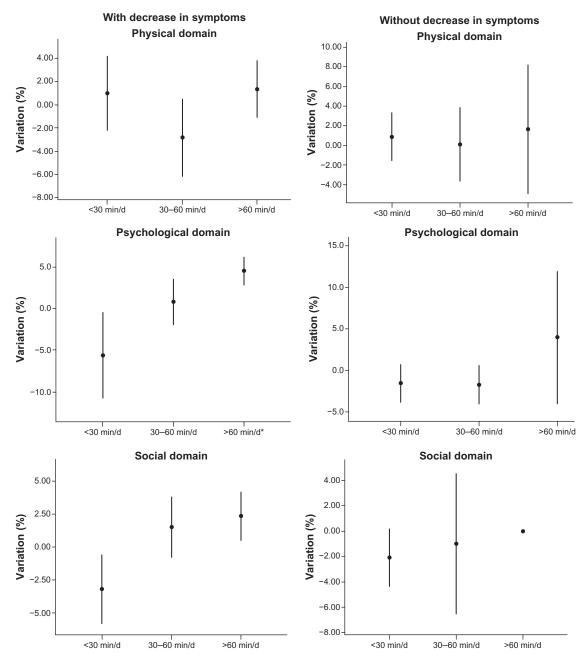
Figure 3 Average variation in the quality of life according to habitual practice of total physical activity (<30 minutes/day; between 30 and 60 minutes/day; >60 minutes/day) over 12 weeks, analyzed separately for two groups of participants: (**A**) those who had a decrease in menopause symptoms and (**B**) those whose symptoms remained constant or increased. Dose-response relationship between the amount of physical activity and variations in the quality of life in the physical, psychological, and social domains and the variation in the symptoms of menopause evaluated by analysis of covariance (ANCOVA) adjusted for age, baseline body mass index, years of schooling, hormonal replacement therapy, and number of diseases, with 95% confidence intervals. Among the women with decreased symptoms: physical domain $P = 0.623$; psychological domain $P = 0.001$; and social domain $P = 0.073$. Among the women without decreased symptoms: physical domain $P = 0.545$; psychological domain $P = 0.761$; and social domain $P = 0.584$. Significant differences in ANCOVA tested through simple contrast.
Note: *Significant differences ($P < 0.05$) between the group that maintained or increased total physical activity to more than 60 minutes/day and the other two physical activity groups.
Abbreviation: min/d, minutes per day.

loss associated with improvement in the psychological domain scores of middle-aged women who engaged in habitual PA for more than 60 minutes/day was close to 5% (approximately 3 kg). This level of habitual PA is usually recommended to lose weight or to prevent weight gain.[34]

Other studies conducted with shorter durations/amounts of PA/exercise (30 minutes/day) but over a longer period of time (6 months) also indicated positive effects on QOL; these effects were mainly in the psychological domain[18,19] but were also observed in the physical domain.[12,18,19]

Among those who lost weight
Physical domain

Among those who did not lose weight
Physical domain

Psychological domain

Psychological domain

Social domain

Social domain
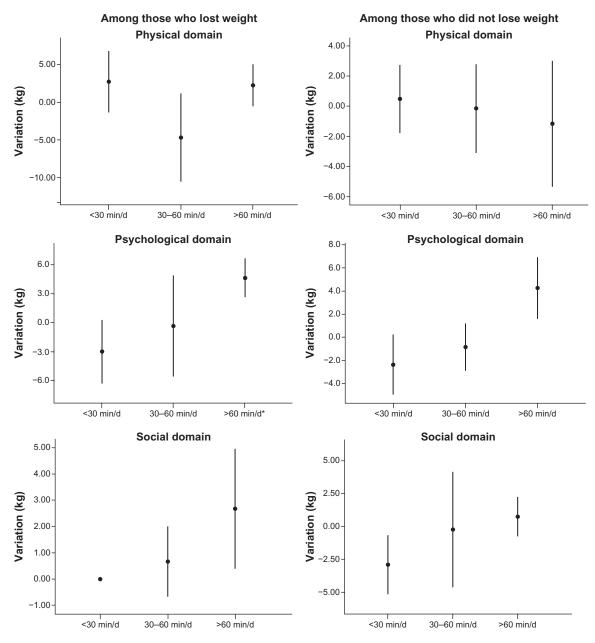
Figure 4 Average variation in quality of life according to habitual practice of total physical activity (<30 minutes/day; between 30 and 60 minutes/day; >60 minutes/day) over 12 weeks, analyzed separately for two groups of participants: (**A**) those who lost weight and (**B**) those who maintained or gained weight. Dose-response relationships between the amount of physical activity and variations in the quality of life in the physical, psychological, and social domains and variations in the symptoms of menopause evaluated by analysis of covariance (ANCOVA) adjusted for age, baseline body mass index, years of schooling, hormonal replacement therapy, and number of diseases, with 95% confidence intervals. Among those who lost weight: physical domain $P = 0.698$ and psychological domain $P = 0.009$; (**B**) <30 minutes/day $= -3 \pm 1$; 30–60 minutes/day $= 0.7 \pm 2$; >60 minutes/day $= 0.1 \pm 2$; $P = 0.082$; social domain $P = 0.051$. Among those who did not lose weight: physical domain $P = 0.960$; psychological domain $P = 0.082$; and social domain $P = 0.212$. Significant differences in ANCOVA tested through simple contrast.
Note: *Significant differences ($P < 0.05$) between the group that maintained or increased their total physical activity to more than 60 minutes/day and the other two physical activity groups.
Abbreviation: min/d, minutes per day.

The physical domain, as assessed by WHOQOL-BREF, includes physical pain, energy, locomotion, performance of everyday activities, medical treatments, and work. In this study, no influence of duration or intensity of habitual PA on physical domain scores was observed. Approximately 41% of women report/exhibit a moderate frequency of physical complaints that can cause limitations or reductions in their physical health.[8] However, the decrease in symptoms of the women who engaged in moderate- or high-intensity habitual PA for at least 60 minutes/day in this study did not favorably influence their physical domain scores.

Overall, almost all of the symptoms of menopause decreased in the women who engaged in habitual PA for 60 minutes/day or more. This result agrees with previous findings that PA contributes to a decreased occurrence of several symptoms of menopause.[11,35,36] However, these results also indicate that engaging in at least moderate-intensity habitual PA for 30 minutes/day in sessions of 10 or more successive minutes can be insufficient for the purposes of promoting QOL and decreasing the frequency of menopause symptoms in middle-aged women.[37]

This was not a randomized controlled trial. At baseline, it was not possible to recruit a significant number of women with insufficient habitual PA (accumulation <30 minutes/day activity of moderate or greater intensity) and consequently habitual PA of participants was not similar. On the other hand, about 85% of participants who were not sufficiently active at the start remained insufficiently active during the study. Since typically less active people are generally those who benefit most from habitual PA, it is likely that the size of the effects on symptoms and QOL could have been larger if a greater number of insufficiently active women had increased their habitual PA.

Conclusion

The habitual practice of at least moderate-intensity PA for 60 minutes/day has a favorable influence on the prevention of symptoms of climacterium/menopause and on QOL, particularly in the psychological and social domains in middle-aged women. The influence of habitual PA at the psychological level seems partially associated with a decrease in the symptoms of menopause and/or with weight loss.

Disclosure

The authors report no conflicts of interest in this work.

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