
COMPARISON OF 2 VERSUS 3 WEEKLY MULTICOMPONENT TRAINING SESSIONS ON SYMPTOMS OF DEPRESSION AND ANXIETY IN OLDER WOMEN: A PILOT RANDOMIZED CLINICAL TRIAL**COMPARAÇÃO ENTRE 2 E 3 SESSÕES SEMANAIS DE TREINAMENTO MULTICOMPONENTES SOBRE SINTOMAS DEPRESSIVOS E ANSIOSOS EM MULHERES IDOSAS: ENSAIO CLÍNICO RANDOMIZADO PILOTO**

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RESUMO

A projeção global para a população com 65 anos ou mais indica que esse número deve dobrar, alcançando 1,5 bilhão até 2050, com as mulheres idosas representando 54% dessa população. Este fenômeno é influenciado por variáveis genéticas, comportamentais, ambientais e demográficas, impactando a saúde física e mental. Este estudo teve como objetivo comparar o efeito de um protocolo de treinamento multicomponente em diferentes frequências semanais sobre os sinais e sintomas de depressão e ansiedade em mulheres idosas. Trata-se de um estudo piloto, do tipo ensaio clínico randomizado, no qual a randomização foi realizada por sorteio simples. Participaram 19 mulheres com idade ≥ 60 anos, alocadas em dois grupos: Grupo de Treinamento 2 (GT2), com treino duas vezes por semana, e Grupo de Treinamento 3 (GT3), com treino três vezes por semana, durante 12 semanas. Cada sessão teve duração de 50 minutos. A taxa mínima de adesão estabelecida para inclusão na análise final foi de 75%. Foram utilizados um questionário sociodemográfico, a Short Physical Performance Battery (SPPB), a Geriatric Depression Scale – 15 itens (GDS-15) e o Geriatric Anxiety Inventory – short form (GAI-SF) para coleta de dados. Os resultados apontaram diferenças significativas na GDS-15 após a intervenção no GT2 ($p = 0,009$), indicando melhora nos sintomas depressivos. O GT3 não apresentou diferenças estatísticas significativas, e os níveis de ansiedade permaneceram inalterados em ambos os grupos.

Palavras-chave: Envelhecimento. Treinamento Físico. Saúde Mental.

ABSTRACT

The global projection for the population aged 65 years or older indicates that this number is expected to double, reaching 1.5 billion by 2050, with older women representing 54% of this population. This phenomenon is influenced by genetic, behavioral, environmental, and demographic variables that affect physical and mental health. This study aimed to compare the effect of a multicomponent training protocol, applied at different weekly frequencies, on signs and symptoms of depression and anxiety in older women. This pilot study adopted a randomized clinical trial design, with simple random allocation. Nineteen women aged ≥ 60 years were allocated into two groups: Training Group 2 (TG2), with two sessions per week, and Training Group 3 (TG3), with three sessions per week, for 12 weeks. Each session lasted 50 minutes. A minimum adherence rate of 75% was required for inclusion in the final analysis. A sociodemographic questionnaire, the Short Physical Performance Battery (SPPB), the Geriatric Depression Scale – 15 items (GDS-15), and the Geriatric Anxiety Inventory – short form (GAI-SF) were used for data collection. The results showed significant differences in GDS-15 scores after the intervention in TG2 ($p = 0.009$), indicating an improvement in depressive symptoms. TG3 did not show statistically significant differences, and anxiety levels remained unchanged in both groups.

Keywords: Aging. Exercise. Mental health.

Introduction

Global projections for the population aged 65 years and over indicate that this group will double, reaching 1.5 billion people by 2050. With regard to older women, it is estimated that they will account for 54% of this population worldwide. As a complex phenomenon that involves multiple variables (genetic, behavioral, environmental, and demographic

characteristics), aging presents in different ways and must be understood from a multidirectional perspective.

Older adults are considered more vulnerable to loneliness and social isolation when compared with younger individuals. With aging, body organs undergo functional changes and consequently become more susceptible to morbidity from all causes, including mental disorders such as depression and anxiety.

The prevalence of anxiety symptoms in older adults ranges from 15% to 52%, and these symptoms are more common among those with a diagnosis of specific chronic diseases. Manifestations associated with the clinical presentation include insomnia, behavioral disorders, urinary complaints, and gastrointestinal disturbances. Individuals with mental health problems have a higher risk of developing physical health problems when compared with the general population.

Physical activity is among the most important therapeutic approaches for physical and mental health care, especially in older adults. It is a simple, low-cost, and widely available resource. The practice of physical exercise modulates the immune system, with the release of pro- and anti-inflammatory cytokines during and after training sessions. In addition, exercise promotes interdependent changes in the brain, creating a protective environment against depression. Studies also indicate that individuals participating in supervised exercise programs present significant improvements in mental health when compared with traditional interventions without exercise.

From a physiological perspective, physical exercise positively influences mental health through different mechanisms. Notable among these are the reduction in systemic inflammatory processes, increased expression of brain-derived neurotrophic factor (BDNF), which stimulates neuroplasticity, modulation of monoaminergic neurotransmitters such as serotonin, dopamine, and norepinephrine, and regulation of the hypothalamic–pituitary–adrenal (HPA) axis, contributing to better control of the stress response. These mechanisms reinforce the biological plausibility of the beneficial effects of exercise in the prevention and management of depression and anxiety in older adults.

The effects of chronic exercise interventions or multicomponent exercise programs in very old adults without dementia and who do not require a wheelchair have been described as effective strategies to alleviate depression and anxiety. Given the importance of physical exercise for healthy aging, specialists in exercise for older adults recommend the implementation of multicomponent training (MCT) programs as tools that contribute to prevention, maintenance, and improvement of physical and mental health.

However, no studies were found comparing the effects of an MCT protocol with different weekly frequencies on the mental health of older women. Thus, the objective of this study was to compare the effects of two versus three weekly sessions of multicomponent training on depressive and anxiety symptoms in older women.

Methods

Participants

The sample was obtained by convenience, through announcements in local media and social projects aimed at the older population. A total of 57 volunteers appeared, of whom 30 met the inclusion criteria: a) being a woman; b) aged between 60 and 79 years; c) absence of cognitive impairment, assessed using the Mini-Mental State Examination (MMSE); d) independent gait, without the use of assistive devices or equipment; e) no engagement in physical exercise in the previous three months and/or not being classified as “very active” according to the adapted version of the International Physical Activity Questionnaire; f) absence of uncontrolled chronic noncommunicable diseases or, in the case of confirmed diagnosis,

regular follow-up with a physician and medical clearance to exercise; g) absence of visual and/or hearing impairments that could compromise participation in the protocol; h) availability to attend the training sessions.

The project was approved by the Research Ethics Committee of the State University of Amapá (UEAP) under opinion no. 7.084.034 and complied with Resolution no. 466/2012 of the Brazilian National Health Council.

Study design, groups, and randomization

Participants were allocated into two intervention groups: TG2 and TG3. TG2 functioned as an active comparator, constituting a type of control group within the study design. Randomization was performed in a blinded manner to obtain homogeneous groups. Age and body mass index (BMI) were used as stratification criteria, and allocation within strata was conducted using simple random procedures.

Adherence, dropouts, and eligibility

A minimum adherence rate of 75% was adopted for inclusion in the analyses. Participant dropouts occurred for various practical reasons not related to the intervention. There was no reported use of controlled medications by the older women, and they did not have a clinical diagnosis of depression. Symptoms were identified using the GDS-15.

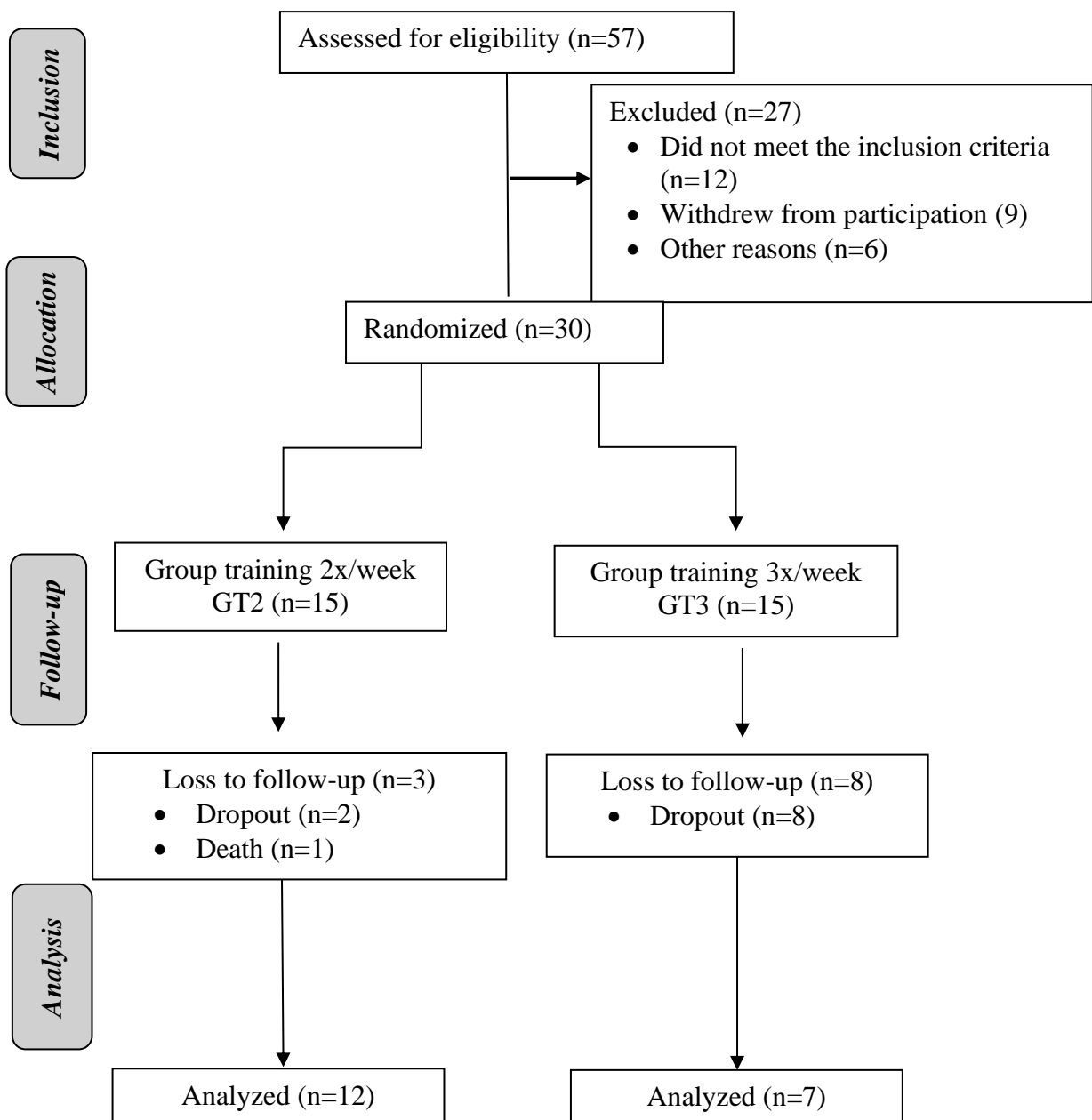


Figure 1. Flowchart of the elderly women participating in the study

Source: The authors

Sample size calculation

An a priori power analysis was carried out using G*Power (t-test for the difference between two independent means, two-tailed), adopting $\alpha = 0.05$, power $(1-\beta) = 0.80$, and an expected effect size $d = 0.75$, classified as moderate to large according to Cohen's conventions and recommended for planning when there is preliminary evidence from pilot studies and interest in clinically relevant effects. This procedure indicated a minimum of 15 participants per group (total $N = 30$). Due to the pilot nature of the study, the achieved sample was guided by feasibility, maintaining a target of approximately 15 participants per group to estimate parameters for use in subsequent larger-scale trials.

Procedures

Before the interventions began, meetings were held with the selected volunteers to present the study objectives, methodology, and assessment instruments. During these meetings, the adapted Borg scale (0 to 10), validated for the assessment of ratings of perceived exertion, was introduced.

The study lasted 12 weeks, with data collection performed one week before the intervention and one week after its completion. A sociodemographic questionnaire, the Short Physical Performance Battery (SPPB), the Geriatric Depression Scale – 15 items (GDS-15), and the Geriatric Anxiety Inventory – short form (GAI-SF) were used to assess depression and anxiety, respectively. All assessments were conducted at the same location and on the same day for all volunteers.

The multicomponent training (MCT) protocol lasted 12 weeks, with sessions of 50 minutes each. Volunteers were assigned to different groups: Training Group 2 (TG2) performed 24 sessions, and Training Group 3 (TG3) performed 36 sessions, with 48 hours between sessions. The protocol structure was based on clinical trials included in a systematic review and on international guidelines, and was organized as follows:

- **Block 1 (mobility, 5 min):** Shoulder flexion in the sagittal plane (12–15 repetitions); Shoulder abduction/adduction (12–15 repetitions); Lateral trunk flexion with shoulder flexion and the opposite hand on the hip (12–15 repetitions per side); Hip, knee, and shoulder flexion at 90° (12–15 repetitions); Unilateral hip flexion/extension (12–15 repetitions per side).
- **Block 2 (aerobic fitness and agility, 15 min):** Walking or light running covering 100 m, lateral cone drills, and agility ladder (1 lap). Exercises were organized in a circuit format, and each volunteer completed three laps of the circuit.
- **Block 3 (strength, 30 min):** Free squat with medicine ball; biceps curl with elastic bands of different tensions; seated triceps extension with dumbbells; unilateral hip abduction/adduction with elastic bands of different tensions; standing wall push-ups; sit-to-stand from a chair with medicine ball; lateral and frontal shoulder raises with elastic bands of different tensions. In this block, volunteers performed three sets of 12–15 repetitions for each exercise.

Statistical Analysis

Descriptive analysis included means and standard deviations for quantitative variables with normal distribution, and medians and interquartile ranges for variables with non-normal distribution. Normality was assessed using the Shapiro–Wilk test.

Between-group comparison of baseline means was performed using the Student's t-test. Within-group comparisons of mean scores on the Geriatric Depression Scale and the Geriatric Anxiety Inventory before and after the intervention were conducted using paired t-tests. Between-group comparisons of post-intervention mean differences were performed using the Student's t-test for independent samples.

In addition to significance testing, effect sizes were calculated to assess the practical magnitude of the differences. For independent-samples tests, Cohen's *d* with Hedges' correction (*g*) and Glass's delta were used, calculated from the pooled standard deviation or from the control group, as appropriate. For paired tests, Cohen's *d_z* was calculated, considering the mean of the differences divided by the standard deviation of those differences. All effect sizes were accompanied by 95% confidence intervals.

The significance level adopted in all analyses was 5%. Analyses were performed using SPSS, version 21.0.

Results

Of the 30 older women who started the study, 11 were excluded from the final analysis due to not meeting the minimum adherence rate of 75% in each group. Table 1 presents the baseline characteristics of the groups for the variables of interest. Statistical analysis indicated no significant differences between groups at baseline for age ($p = 0.550$), body mass ($p = 0.191$), height ($p = 0.707$), body mass index (BMI) ($p = 0.313$), or Short Physical Performance Battery (SPPB) scores ($p = 0.447$).

Table 1- Baseline characteristics of the groups.

Variables	TG2 (12)	TG3 (7)	p – value
	MEAN ± SD	MEAN ± SD	
Age (years)	69,1 ± 5,48	71,7 ± 2,87	0,550
Body mass (kg)	69,2 ± 10,68	69,3 ± 13,25	0,191
Height (cm)	149,9 ± 7,27	149,4 ± 5,16	0,707
BMI (kg/m ²)	31 ± 5,39	30,9 ± 5,24	0,313
SPPB	9,50 ± 2,32	10,29 ± 1,70	0,447

Note: SD: standard deviation; **kg:** kilogram; **cm:** centimeter; **kg/m²:** kilogram per square meter; **TG2:** training group with 2 sessions/week; **TG3:** training group with 3 sessions/week; **SPPB:** Short Physical Performance Battery.
Source: The authors.

In the within-group comparison, the group submitted to two weekly sessions showed a significant reduction in GDS-15 scores after the intervention (pre: 3.33 ± 1.50 vs. post: 1.67 ± 1.72 ; $p = 0.009$), with a small-to-moderate effect size (Hedges' $g = 0.24$; 95% CI: -0.56 to 1.23). The group submitted to three weekly sessions showed a non-significant reduction in the same scale (pre: 1.71 ± 1.38 vs. post: 1.43 ± 0.98 ; $p = 0.102$), but with a moderate effect size ($g = 0.53$; 95% CI: -1.06 to 0.80).

For the GAI-SF, no statistically significant differences were observed in either group. The two-session group maintained stable values (pre: 1.75 ± 1.48 vs. post: 1.75 ± 1.54 ; $p = 1.00$; $g = -0.13$; 95% CI: -1.02 to 0.76). The three-session group presented a non-significant reduction (pre: 2.57 ± 1.90 vs. post: 1.86 ± 1.95 ; $p = 0.269$) with a small effect size ($g = 0.26$; 95% CI: -0.68 to 1.20). These results are presented in Table 2.

Table 2. Comparative analysis of depressive and anxiety symptom scores in older adults before and after a multicomponent training protocol with different weekly frequencies.

Variables	TG2 (n = 12)		TG3 (n=07)		p-value (between groups)	Hedges' g [IC95%]
	Mean ± SD	Min- Max	Mean ± SD	Min- Max		
GDS-15						
PRE	3,33±1,50	1 - 6	1,71±1,38	0 - 3	0,032	0,24 (–0,56; 1,23)
POST	1,67±1,72	0 - 5	1,43 ± 0,98	0 - 3	0,102	0,53 (–1,06; 0,80]
p-value (within group)	0,009		0,664			
GAI-SF						
PRE	1,75±1,48	0 - 4	2,57±1,90	0 - 5	0,308	–0,13 (– 1,02; 0,76)
POST	1,75±1,54	0 - 4	1,86 ± 1,95	0 - 5	0,269	0,26 (–0,68; 1,20)
p-value (within group)	1,00		0,220			

Note: **GDS-15:** Geriatric Depression Scale – 15 items; **GAI-SF:** Geriatric Anxiety Inventory – short form; **SD:** standard deviation; **TG2:** training group with 2 sessions/week; **TG3:** training group with 3 sessions/week; Hedges' g: effect size with 95% confidence interval.

Source: The authors.

Discussion

The results of this study showed that the MCT intervention had a positive impact on depressive symptoms in older adults, particularly in the group submitted to two weekly sessions, as evidenced by a statistically significant reduction in GDS-15 scores ($p = 0.009$). Although the effects on GAI-SF scores did not reach statistical significance, there was a trend toward clinical improvement in both groups, reflected in small-to-moderate effect sizes. These findings reinforce the relevance of physical exercise as a strategy for promoting mental health among older adults, consistent with previous evidence highlighting the benefits of regular physical activity in attenuating depressive and anxiety symptoms and improving quality of life.

The present findings corroborate previous investigations demonstrating the positive effects of multicomponent physical activity on depressive symptoms in older adults. Prior clinical trials have reported significant reductions in GDS-15 scores after MCT programs combining aerobic, strength, and balance exercises, suggesting that the variety of stimuli favors both physical and psychological gains. Systematic reviews have also indicated that regular exercise is associated with lower levels of anxiety and depression in geriatric populations, although the magnitude of these effects may vary depending on frequency, intensity, and session duration. In this study, the group with two weekly sessions showed more evident improvements in depressive symptoms, converging with meta-analyses suggesting that moderate exercise frequency may be more effective for adherence and maintenance among older adults.

From a physiological perspective, physical exercise can reduce depressive and anxiety symptoms via regulation of neurotransmitters such as serotonin, dopamine, and norepinephrine, in addition to the release of endorphins, which promote feelings of well-being. Beyond biological mechanisms, psychosocial effects should also be considered: participation in group activities strengthens social bonds, enhances perceived support, and reduces feelings of isolation, factors that are strongly related to mental health in older adults. The structure of MCT, which demands attention, coordination, and memory, may also indirectly contribute to preserving cognitive function, positively influencing self-perceived health.

Study limitations

This study has limitations that should be acknowledged. The absence of an inactive control group or a wait-list group prevents complete isolation of the specific effects of MCT from potential external factors such as social interaction. The dropout rate (11 of 30 initial participants), due to multiple practical reasons, may introduce selection bias and reduce the generalizability of the findings. Systematic assessment of medication use, particularly antidepressants or anxiolytics, was not conducted, representing a possible confounding factor. Finally, as a pilot study, the sample was defined by feasibility, underscoring the need for subsequent investigations with formal sample size calculation and appropriately designed control groups.

Despite these limitations, the results have relevant implications for clinical practice and public health. MCT performed twice weekly proved effective in reducing depressive symptoms in community-dwelling older adults, representing an accessible, low-cost alternative that can be incorporated into health promotion programs in primary care. Adoption of this type of intervention may help reduce demand for specialized mental health services and support autonomy and quality of life among older adults. It is recommended that health managers and professionals consider the implementation of structured MCT programs as part of healthy aging policies, in line with international World Health Organization guidelines.

Conclusion

This study demonstrated that multicomponent training performed twice weekly significantly reduced depressive symptoms, as assessed by the GDS-15, in community-dwelling older women, with a small-to-moderate effect size, whereas three weekly sessions resulted in a non-significant reduction, although with a moderate effect size. For GAI-SF scores, no statistically significant differences were observed in either group, but there was a trend toward clinical improvement. Despite limitations related to sample size, absence of control over external variables, and short-term follow-up only, the findings support MCT as an accessible and effective intervention for promoting mental health in older adults and highlight the need for future studies with larger samples, different parameters of training volume and intensity, inclusion of objective measures, and longitudinal designs to better understand the effects of this strategy on healthy aging.

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