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Can the Functional Physical Fitness of Older People with Overweight or Obesity Be Improved through a Multicomponent Physical Exercise Program? A Chilean Population Study

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Abstract: The aim of the present study was to understand the effect of a multicomponent physical exercise program on the functional physical fitness of older people with overweight or obesity in Chile, and whether these effects were similar in women and men. For this purpose, a quasi-experimental study was designed with a control group to evaluate the functional physical fitness through the Senior Fitness Test battery for older people [SFT; aerobic endurance (AE), lower body strength (LBS), upper body strength (UBS), upper body flexibility (UBF), lower body flexibility (LBF), dynamic balance (DB), and hand pressure strength right (HPSR) and left (HPSL)]. Seventy older people with overweight or obesity aged between 60 and 86 years participated (M = 73.15; SD = 5.94), and were randomized into a control group (CG, n = 35) and an experimental group (EG, n = 35). The results after the intervention between the CG and EG indicated that there were statistically significant differences in the AE (p = 0.036), in the LBS (p = 0.031), and in the LBF (p = 0.017), which did not exist before the intervention (p > 0.050), except in the HPSR (0.029). Regarding the results of the EG (pre vs. post-intervention), statistically significant differences were found in all of the variables studied: AE (p < 0.001), LBS (p < 0.001), UBS (p < 0.001), LBF (p = 0.017), UBF (p < 0.001), DB (p = 0.002), HPSR (p < 0.001), and HPSL (p = 0.012) in both men and women. These improvements did not exist in any of the CG variables (p > 0.05). Based on the results obtained, we can say that a multicomponent physical exercise program applied for 6 months in older people with overweight or obesity produces improvements in functional physical fitness regardless of sex, except in lower body flexibility and left-hand dynamometry.

Keywords: functional fitness; physical activity; force; balance; strength; endurance; aged

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1. Introduction

Functional physical fitness has been widely recognized as one of the most important components in the quality of life, physical independence, and health status of older people [1,2]. Functional physical fitness, also known as functional aptitude, includes aspects such as aerobic endurance, strength, balance (dynamic and static), and flexibility, which are considered essential for the elderly to be able to carry out their daily activities in a manner that is safe and without excessive physical fatigue [3].

Recent research indicates that the aging process is associated with a decrease in physical functioning [1], which can cause a high level of dependency in the elderly due to the decrease in their physical capabilities [4–6]. Therefore, improving the functional physical fitness in all its components, or each one individually [7], would allow older adults to maintain greater physical independence (i.e., climbing stairs, bathing, standing up of a chair, walking) [8], adopt an active lifestyle, and consequently, improve their quality of life [9,10].

Several recommendations that suggest the prescription of physical activity to improve functional physical fitness through physical exercise have focused on aerobic capacity, strength training, balance, and mobility, improving physical function while, at the same time, preventing falls [11], cognitive decline [12], and morbidity and mortality in older adults [7,13,14]. In this sense, in the scientific evidence, studies appear that have implemented different types of physical exercise, ranging from resistance training [15–18], combining training (i.e., aerobic endurance exercises, balance, and/or stretching) [19–21], aerobic exercise training [22], training with progressive interval exercises [23], high intensity interval training (HIIT) [24,25], or aerobic dance [26].

Previous studies related to improvements through multicomponent or combined exercise analyzed the improvements in BMI and anthropometric values [27,28] or in functional or physical capacity [29], among others. Furthermore, scientific evidence that used the Senior Fitness Test and multicomponent physical exercise to evaluate functional physical fitness in older adults is, to date, scarce [7], and the training methods found are heterogeneous [7], so there is a lack of more specific protocols that combine aerobic and resistance components, and greater homogeneity in the data collection instruments [30], to impact the health of this population safely [7]. Therefore, this study is considered relevant.

In this regard, there is a lack of sufficient evidence on the effectiveness of multicomponent physical exercise programs on the functional physical fitness in older adults [7,31]. In addition, the World Health Organization (WHO) guidelines [32] for adults over 65 years of age stipulate two sessions per week of multicomponent physical activity [33]. This multicomponent exercise should include strength, endurance, balance, gait, and physical function training, and one of the standardized tools of great reliability and easy application for the evaluation of functional physical fitness in the elderly [34] is the Senior Fitness Test [35].

In this context, taking into account the research on the possibilities offered by multicomponent training as a structured program for improving functional physical fitness in older adults, the aim of the present study was to understand the effect of a multicomponent physical exercise program on the functional physical fitness of older people with overweight or obesity in Chile, and whether these effects were similar in women and men. Thus, the starting hypothesis proposed is that participating in a multicomponent physical exercise program will significantly improve the functional fitness levels, regardless of sex.

2. Materials and Methods

2.1. Study Design

This was a quasi-experimental design research with a control group with pre- and post-test measures [36], establishing as dependent variables the different tests of the Senior Fitness Test (SFT [35]) and then comparing them based on group (control vs. experimental) and sex (man vs. woman).

2.2. Participants

The selection of the study sample was non-probabilistic, for convenience, of an intentional nature, which allows subjects to be selected with a reduced sample and who agree to be included according to their accessibility and circumstances [37]. When accessing a sample of volunteer subjects, the assignment was made to ensure that they had similar characteristics in variables such as age, BMI, and physical independence, so the results or effects were a product of the intervention program and not of individual differences [38]. A total of 153 people with overweight or obesity, adults 60 years of age or older—59 men and 94 women—were invited to take part in this study. The participants were members of the clubs of the Regional Federation of Community Unions for the Elderly in Concepción, in Chile's Biobío region. Being 60 years of age or older, being overweight or obese, not having a medical condition that would prohibit participation in the tests or intervention program, being physically independent, signing an informed consent form, and participating in the entire process (i.e., initial data collection, exercise program (80%), final data collection) were the inclusion criteria.

2.3. Instruments

2.3.1. Sociodemographic Questionnaire

Age (years) and sex (men or women) were recognized variables.

2.3.2. Anthropometric and Body Composition Measurements

Body mass and height were measured using the International Society for the Advancement of Kinanthropometry (ISAK) [39] procedure for anthropometric and body composition assessments. These measurements made it possible for us to calculate the body mass index (BMI) using the formula [weight kg/height m^2], in accordance with the WHO measurements [40].

Using the SECA 206 portable stadiometer (Hammer Steindamm, Hamburg, Germany) in the maximum extension position, the height was measured by firmly placing the square on the vertex, compressing the hair as much as possible, and asking the subject to take a deep breath and hold it until the subject exhaled [39].

Body mass was measured with an Omron HBF-514C (Omron Healthcare, Inc., Chicago, IL, USA) apparatus. With the least amount of clothing on, the weight was measured to ensure that the ascent was zero after twelve hours had passed since the last measurement, which was customarily taken in the morning [39].

2.3.3. Senior Fitness Test Battery (SFT)

The SFT battery is a validated and useful field instrument for determining physical fitness and, consequently, for organizing and carrying out physical exercise programs for the senior population [35]. The following tests are part of the SFT battery: (1) Chair sit-up test for lower body strength; (2) arm flexion test for upper body strength; (3) 6-min walk test for aerobic endurance; (4) chair trunk flexion test for lower body flexibility; (5) hands-on-back test for upper body flexibility; and (6) get up, walk, and sit test for dynamic balance, power, and agility [35].

2.3.4. Intervention Program

The experimental group underwent a multicomponent physical exercise program following the International Exercise Recommendations in Older Adults (ICFSR) [10], with two 60-min sessions each week for a total of six months. Every session was set up as illustrated in Figure 1. The primary researcher, a 15-year veteran and physical education graduate, led all of the classes in the multicomponent program. The control group was left to their regular activities without any physical exercise regimen.

2.4. Procedure

First, the aim of the research was communicated to the management of the clubs of the Regional Federation of Community Unions of Elderly People in the Biobío district of Concepción, Chile (Figure 2). Following management clearance, a letter of invitation and informational sessions outlining the study’s objective, design, methodology, confidentiality statement, and voluntary participation were sent to prospective participants.

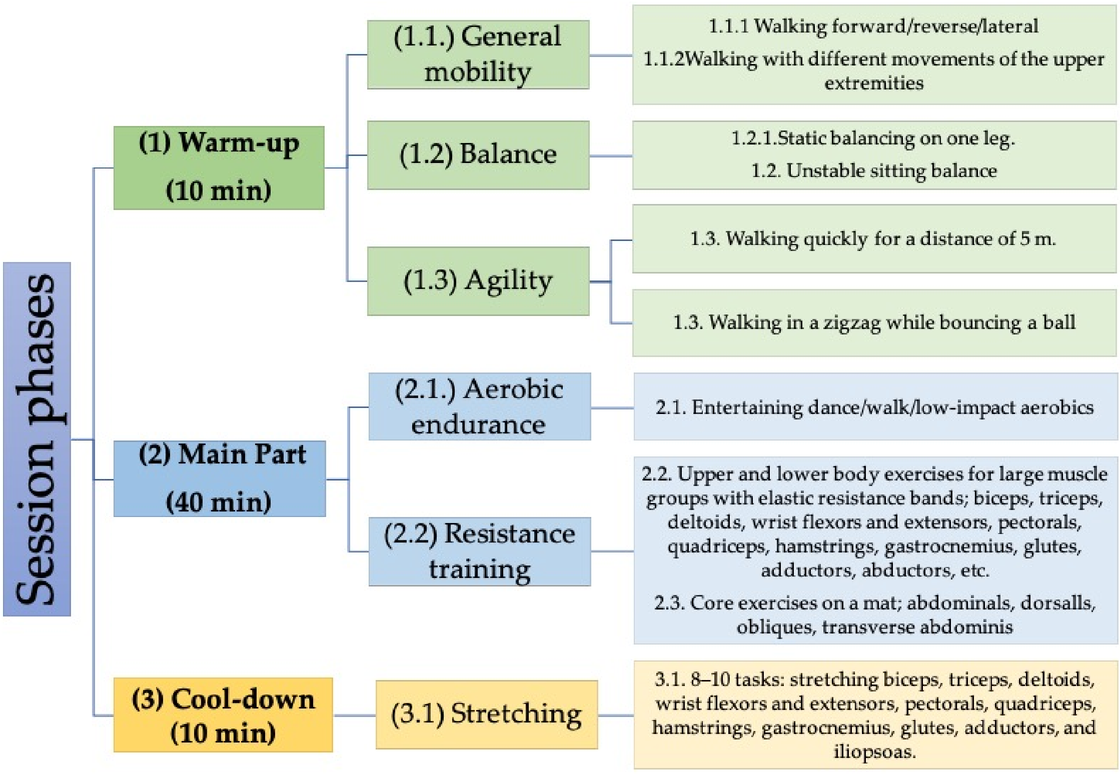

Figure 1. Phases and contents of the sessions and types of exercises of the multicomponent program.

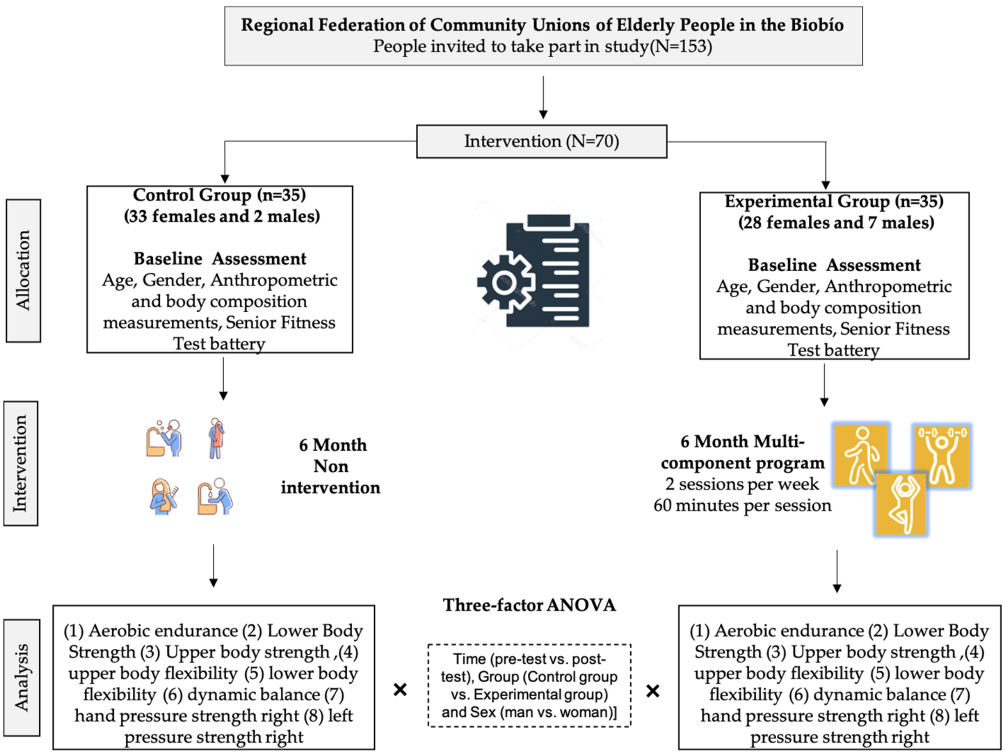

Figure 2. Research flowchart.

The required sociodemographic information (age) was recorded after signed informed consent was obtained, and the individuals were assessed using the SFT battery. Before the physical training program began, anthropometric measurements were taken in the experimental and control groups over the course of two days in the morning, between 9 a.m. and 12 p.m., using standardized equipment and applied by qualified examiners. On the first day, data relating to questionnaires such as sociodemographic background and anthropometric measures were recognized. On the second day, the physical condition was assessed after a 10-min warm-up consisting of general mobility exercises, joint mobility, and muscle activation, led by an expert in physical education. After the initial data collection, the intervention program was applied for 6 months with a weekly frequency of two sessions, at 60 min per session. Once the intervention programs were completed, the data collection was carried out one week after finishing them in both the control and experimental groups. This data collection was carried out over two days, between 9 and 12 h, again using standardized equipment and applied by trained examiners. In the first, anthropometric data were collected. On the second day, physical fitness was assessed under the same conditions as in the pre-test.

The Declaration of Helsinki was followed in conducting of all these studies. On 22 June 2022, the Universidad Internacional Iberoamericana Ethics Committee authorized and transmitted the research protocol, which had code number CR-163.

2.5. Statistical Analysis

The statistical analysis of the data in this research was carried out using the IBM SPSS Statistics program for Windows, version 25.0 (IBM Corp.: Armonk, NY, USA), with a significance level of $p < 0.05$. Results for the quantitative variables (i.e., functional fitness components, anthropometry, age) are presented through measures of central tendency (mean and standard deviation); qualitative variables (i.e., sex; degree of overweight or obesity) are presented using percentages and frequencies. To verify the normality of the data, the Kolmogorov–Smirnov test was used. First, descriptive statistics (mean and its standard deviation) were calculated for each dependent variable examined. Second, the Chi square test was performed to check whether the groups (Experimental group/Control group) were equivalent with respect to the sex and degree of obesity or overweight of the participants, and an independent samples t test to check the equivalence between groups in age and anthropometry. After 6 months of intervention, a three-factor ANOVA was performed (time $\times$ group $\times$ degree of overweight or obesity) using time as a repeated measures factor, [i.e., Time (pre-test vs. post-test), Group (Control group vs. Experimental group) and Sex (man vs. woman)] to analyze the possible main effect of these factors on the functional physical fitness variables and their interaction using the Bonferroni statistic. The effect size was calculated in terms of eta squared (η^2).

3. Results

The sample was divided into two analysis groups, the CG (n = 35) and the EG (n = 35), with a total of 70 participants. Regarding the sex variable, 87% of the participants were women (n = 61) and 13% were men (n = 9), distributing 33 women and 2 men in the CG and 28 women and 7 men in the EG.

The normality test revealed that the data followed a normal distribution [i.e., aerobic endurance ($p = 0.621$), lower body strength ($p = 0.243$), upper body strength ($p = 0.161$), lower body flexibility ($p = 0.053$), upper body flexibility ($p = 0.910$), dynamic balance ($p = 0.068$), right ($p = 0.370$) and left ($p = 0.356$) handgrip strength].

3.1. Baseline Characteristics

The baseline characteristics of the sample are shown in Table 1. Participants in the CG and EG were similar at the baseline in all variables.

Table 1. Basic characteristics of the participants.

	Control Group	Experimental Group	p-Value
Variables			
Average age (years)	72.54 ± 5.55	73.77 ± 6.32	0.391
Sex			
Man	2 (72.2%)	7 (27.8%)	0.075
Woman	33 (27.8%)	28 (72.2%)	
Average height (m)	1.538 ± 7.16	1.530 ± 9.16	0.685
Average weight (kg)	72.51 ± 11.99	74.80 ± 12.75	0.443
Average BMI (kg/m^2)	30.71 ± 4.075	31.88 ± 3.73	0.215
Degree of overweight-obesity			
Overweight	17 (24.3%)	11 (15.7%)	
Type I Obesity	13 (18.6%)	17 (24.3%)	0.528
Type II Obesity	4 (5.7%)	6 (8.6%)	
Type III Obesity	1 (1.4%)	1 (1.4%)	

Note: Quantitative variables are expressed as the mean and standard deviation, and qualitative variables are expressed as frequencies and percentages.

3.2. CG and EG Pre-Intervention Comparison

The results before the intervention between the CG and the EG (Table 2) indicated that there were no statistically significant differences in any of the variables studied.

Table 2. Pre-intervention results on the Senior Fitness Test battery variables of the control and experimental groups.

Variable	CG Pre (n = 35)	EG Pre (n = 35)	p-Value
Aerobic endurance (m)	399.94 ± 84.95	439.48 ± 64.79	0.675
Lower body strength (Number of repetitions)	11.97 ± 3.20	13.54 ± 2.36	0.346
Upper body strength (Number of repetitions)	15.20 ± 4.05	15.62 ± 5.57	0.786
Lower body flexibility (cm)	−4.42 ± 10.11	−0.74 ± 6.69	0.160
Upper body flexibility (cm)	−10.45 ± 9.33	−12.91 ± 10.54	0.944
Dynamic balance (seconds)	7.02 ± 2.02	6.82 ± 1.50	0.782
Hand pressure strength right (kg)	55.65 ± 14.35	52.11 ± 17.71	0.029 *
Hand pressure strength left (kg)	52.80 ± 13.18	51.31 ± 16.54	0.370

Note: * $p < 0.05$.

Depending on sex (Table 3), the results indicated that there were statistically significant differences in aerobic endurance between women in both the CG and EG [F (1, 66) = 4.187, $p = 0.045$, $\eta^2 = 0.060$, 95% CI −78.391, −0.962], but not among men ($p = 0.831$). Regarding lower body strength, there were previous differences in women between the CG and the EG [F (1, 66) = 4.124, $p = 0.046$, $\eta^2 = 0.059$, 95% CI −2.932, −0.025], but not among men ($p = 0.731$). Regarding upper body strength before the intervention, no statistically significant differences were detected between women ($p = 0.688$) or men ($p = 0.679$). In the analysis of the results of lower body flexibility, statistically significant differences were found in women between the CG and the EG [F (1, 66) = 4.136, $p = 0.046$, $\eta^2 = 0.059$, 95% CI −8.766, −0.081], but not among men ($p = 0.403$). Regarding upper body flexibility, no differences were found between women ($p = 0.547$) or between men of both groups ($p = 0.789$), nor in dynamic balance in women ($p = 0.896$), nor in men ($p = 0.804$), as occurred with hand pressure strength left in women ($p = 0.067$) and in men ($p = 0.726$). Regarding hand pressure strength right, statistically significant differences were found in women between the CG and the EG [F (1, 66) = 4.136, p = 0.046, η^2 = 0.059, 95% CI 1.533, 13.733], in favor of the CG. These differences were not found in men (p = 0.128).

Table 3. Pre-intervention comparison on the Senior Fitness Test battery variables of the CG and the EG according to sex.

Variable		CG Pre (n = 35)	EG Pre (n = 35)	*p*-Value
Aerobic endurance (m)	women	395.78 ± 84.97	435.46 ± 64.01	0.045 *
	men	468.50 ± 65.76	455.57 ± 70.51	0.831
Lower body strength (Number of repetitions)	women	11.87 ± 3.27	13.35 ± 2.43	0.046 *
	men	13.50 ± 0.70	14.28 ± 2.05	0.731
Upper body strength (Number of repetitions)	women	15.06 ± 4.04	15.57 ± 5.30	0.688
	men	17.50 ± 4.94	15.85 ± 7.03	0.679
Lower body flexibility (cm)	women	−4.03 ± 10.20	0.39 ± 5.82	0.046
	men	−11.00 ± 7.07	−5.28 ± 8.45	0.403
Upper body flexibility (cm)	women	−9.78 ± 9.18	−11.28 ± 10.65	0.547
	men	−21.50 ± 2.12	−19.42 ± 7.54	0.789
Dynamic balance (seconds)	women	7.06 ± 2.04	7.00 ± 1.49	0.896
	men	6.50 ± 2.12	6.14 ± 1.46	0.804
Hand pressure strength right (kg)	women	53.45 ± 11.46	45.82 ± 10.50	0.046
	men	92.00 ± 1.41	77.28 ± 18.91	0.128
Hand pressure strength left (kg)	women	51.30 ± 11.99	45.60 ± 8.63	0.067
	men	77.50 ± 3.53	74.14 ± 21.33	0.726

Note: * $p < 0.05$.

3.3. Control Group Results

The results before and after the intervention in the CG indicated that there were statistically significant differences only in upper body flexibility [F (1, 66) = 7.163, p = 0.009, η^2 = 0.098, 95% CI 0.801, 5.502]. No statistically significant differences were found in the rest of the variables studied.

Depending on sex (Table 4), in the comparison before and after the intervention in the CG, the results indicated that there were no statistically significant differences between women or men in aerobic endurance (women p = 0.906; men p = 0.614), lower body strength (women p = 0.671; men p = 0.565), upper body strength (women p = 0.090; men p = 0.789), or lower body flexibility in men (p = 0.357), but there were among women [F (1, 66) = 4.537, p = 0.037, η^2 = 0.069, 95% CI 0.106, 3.388]. Regarding upper body flexibility, significant differences were found between women [F (1, 66) = 5.357, p = 0.024, η^2 = 0.075, 95% CI 0.179, 2.427] and between men [F (1, 66) = 4.781, p = 0.009, η^2 = 0.068, 95% CI: 0.434, 9.566]. In the dynamic balance variable, statistically significant differences were found in women [F (1, 66) = 4.781, p = 0.019, η^2 = 0.068, 95% CI −0.555, −0.051], who took longer after than before, but these differences were not found in men (p = 0.332). No differences were found in either women or men in hand pressure strength right (women p = 0.308; men p = 0.489) or hand pressure strength left (women p = 0.159; men p = 1.000).

3.4. Experimental Group Results

The results before and after the intervention in the EG indicated that there were statistically significant differences in all the variables studied: aerobic endurance [F (1, 66) = 60.095, p < 0.001, η^2 = 0.477, 95% CI −63.214, −37.321], lower body strength [F (1, 66) = 20.785, p < 0.001, η^2 = 0.240, 95% CI −1.695, −0.662], upper body strength [F (1, 66) = 31.574, p < 0.001, η^2 = 0.324, 95% CI −4.235, −2.015], upper body flexibility [F (1, 66) = 5.942, p = 0.017, η^2 = 0.083, 95% CI −4.288, −0.426], lower body flexibility [F (1, 66) = 21.639, p < 0.001, η^2 = 0.247, 95% CI −4.5543, −1.814], dynamic balance [F (1, 66) = 10.678, p = 0.002, η^2 = 0.139, 95% CI 0.195, 0.805], hand pressure strength right [F (1, 66) = 20.520, p < 0.001,

$\eta^2 = 0.237$, 95% CI −5.609, −2.177] and hand pressure strength left [F (1, 66) = 6.692, $p = 0.012$, $\eta^2 = 0.092$, 95% CI −4.493, −0.579].

Table 4. Pre-post-intervention comparison on the Senior Fitness Test battery variables of the CG according to sex.

Variable		CG Pre (n = 35)	CG Post (n = 35)	*p*-Value
Aerobic endurance (m)	women	395.78 ± 84.97	395.15 ± 82.60	0.906
	men	468.50 ± 65.76	457.50 ± 53.03	0.614
Lower body strength (Number of repetitions)	women	11.87 ± 3.27	11.78 ± 3.00	0.671
	men	13.50 ± 0.70	13.00 ± 0.00	0.565
Upper body strength (Number of repetitions)	women	15.06 ± 4.04	14.27 ± 3.48	0.090
	men	17.50 ± 4.94	17.00 ± 4.24	0.789
Lower body flexibility (cm)	women	−4.03 ± 10.20	−5.72 ± 12.26	0.037 *
	men	−11.00 ± 7.07	−14.00 ± 5.65	0.357
Upper body flexibility (cm)	women	−9.78 ± 9.18	−11.09 ± 9.55	0.024 *
	men	−21.50 ± 2.12	−26.50 ± 4.94	0.009 *
Dynamic balance (seconds)	women	7.06 ± 2.04	7.36 ± 2.16	0.019 *
	men	6.50 ± 2.12	7.00 ± 1.41	0.332
Hand pressure strength right (kg)	women	53.45 ± 11.46	52.72 ± 11.18	0.308
	men	92.00 ± 1.41	90.00 ± 0.00	0.489
Hand pressure strength left (kg)	women	51.30 ± 11.99	50.15 ± 11.69	0.159
	men	77.50 ± 3.53	77.50 ± 3.53	1.00

Note: * $p < 0.05$.

Depending on sex (Table 5), in the comparison before and after the intervention in the EG, the results indicated that there were statistically significant differences between women and men in aerobic endurance (women [F (1, 66) = 37.239, $p < 0.001$, $\eta^2 = 0.361$, 95% CI −46.973, −23.813]; men [F (1, 66) = 31.539, $p < 0.001$, $\eta^2 = 0.312$, 95% CI −88.302, −41.983]), lower body strength (women [F (1, 66) = 27.580, $p < 0.001$, $\eta^2 = 0.295$, 95% CI −1.672, −0.753]; men [F (1, 66) = 6.108, $p = 0.016$, $\eta^2 = 0.085$, 95% CI −2.066, −0.220]), upper body strength (women [F (1, 66) = 42.687, $p < 0.001$, $\eta^2 = 0.393$, 95% CI −4.243, −2.257]; men [F (1, 66) = 9.093, $p = 0.004$, $\eta^2 = 0.121$, 95% CI −4.986, −1.014]), upper body flexibility (women [F (1, 66) = 25.256, $p < 0.001$, $\eta^2 = 0.277$, 95% CI −4.292, −1.851]; men [F (1, 66) = 7.226, $p = 0.009$, $\eta^2 = 0.099$, 95% CI −5.726, −0.845]), dynamic balance (women [F (1, 66) = 4.358, $p = 0.041$, $\eta^2 = 0.062$, 95% CI 0.01, 0.0.559]; men [F (1, 66) = 6.810, $p = 0.011$, $\eta^2 = 0.094$, 95% CI 0.168, 1.261]), hand pressure strength right (women [F (1, 66) = 22.461, $p < 0.001$, $\eta^2 = 0.254$, 95% CI −5.178, −2.108]; men [F (1, 66) = 7.263, $p = 0.009$, $\eta^2 = 0.099$, 95% CI −7.212, −1.074]). In the lower body flexibility and hand pressure strength left variables, statistically significant differences were found in women but not in men (lower body flexibility women [F (1, 66) = 6.984, $p = 0.010$, $\eta^2 = 0.096$, 95% CI −4.013, −0.559]; men ($p = 0.165$); hand pressure strength left women [F (1, 66) = 10.096, $p = 0.002$, $\eta^2 = 0.133$, 95% CI −4.536, −1.035]; men ($p = 0.197$)).

3.5. CG vs. EG Post-Intervention Results

The results after the intervention between the CG and the EG (Table 6) indicated that there were statistically significant differences in EA [F (1, 66) = 4.579, $p = 0.036$, $\eta^2 = 0.065$, 95% CI −134.268, −4.652], lower body strength [F (1, 66) = 4.845, $p = 0.031$, $\eta^2 = 0.068$, 95% CI: −4.970, −0.242], and lower body flexibility [F (1, 66) = 6.043, $p = 0.017$, $\eta^2 = 0.084$, 95% CI: −17.713, −1.836]. However, there were no statistically significant differences in upper body strength ($p = 0.068$), upper body flexibility ($p = 0.094$), dynamic balance ($p = 0.158$), hand pressure strength right ($p = 0.237$), nor hand pressure strength left ($p = 0.779$).

Table 5. Pre-post-intervention comparison on the Senior Fitness Test battery variables of the EG according to sex.

Variable		EG Pre (n = 35)	EG Post (n = 35)	*p*-Value
Aerobic endurance (m)	women	435.46 ± 64.01	470.85 ± 68.75	<0.001 **
	men	455.57 ± 70.51	520.71 ± 85.21	<0.001 **
Lower body strength (Number of repetitions)	women	13.35 ± 2.43	14.57 ± 2.79	<0.001 **
	men	14.28 ± 2.05	15.42 ± 1.90	0.016 *
Upper body strength (Number of repetitions)	women	15.57 ± 5.30	18.82 ± 4.70	<0.001 **
	men	15.85 ± 7.03	18.85 ± 4.25	0.004 *
Lower body flexibility (cm)	women	0.39 ± 5.82	2.67 ± 5.72	0.010 *
	men	−5.28 ± 8.45	−2.85 ± 5.14	0.165
Upper body flexibility (cm)	women	−11.28 ± 10.65	−8.21 ± 9.60	<0.001 **
	men	−19.42 ± 7.54	−16.14 ± 7.24	0.009 *
Dynamic balance (seconds)	women	7.00 ± 1.49	6.71 ± 1.51	0.041 *
	men	6.14 ± 1.46	5.42 ± 1.39	0.011 *
Hand pressure strength right (kg)	women	45.82 ± 10.50	49.46 ± 9.26	<0.001 **
	men	77.28 ± 18.91	81.42 ± 21.73	0.009 *
Hand pressure strength left (kg)	women	45.60 ± 8.63	48.39 ± 8.92	0.002 *
	men	74.14 ± 21.33	76.42 ± 21.93	0.197

Note: * $p < 0.05$; ** $p < 0.001$.

Table 6. Post-intervention results on the Senior Fitness Test battery variables of the control and experimental groups.

Variable	CG Post (n = 35)	EG Post (n = 35)	*p*-Value
Aerobic endurance (m)	398.71 ± 81.98	480.82 ± 73.78	0.036 *
Lower body strength (Number of repetitions)	11.85 ± 2.93	14.74 ± 2.63	0.031 *
Upper body strength (Number of repetitions)	14.42 ± 3.52	18.82 ± 4.55	0.068
Lower body flexibility (cm)	−6.20 ± 12.09	1.57 ± 5.98	0.017 *
Upper body flexibility (cm)	−11.97 ± 9.99	−9.80 ± 9.63	0.094
Dynamic balance (seconds)	7.34 ± 2.11	6.45 ± 1.55	0.158
Hand pressure strength right (kg)	54.85 ± 13.95	55.85 ± 17.88	0.237
Hand pressure strength left (kg)	51.71 ± 13.05	54.00 ± 16.66	0.779

Note: * $p < 0.05$.

Depending on sex (Table 7), in the comparison after the intervention between the CG and the EG, the results indicated that there were statistically significant differences between women in aerobic endurance [F (1, 66) = 14.602, $p < 0.001$, $\eta^2 = 0.181$, 95% CI −115,261, −36,151], but not between men ($p = 0.310$); lower body strength [F (1, 66) = 14.837, $p < 0.001$, $\eta^2 = 0.184$, 95% CI −4.226, −1.341], but not between men ($p = 0.285$); upper body strength [F (1, 66) = 18.577, $p < 0.001$, $\eta^2 = 0.220$, 95% CI −6.656, −2.442], but not between men ($p = 0.575$); lower body flexibility [F (1, 66) = 11.998, $p = 0.001$, $\eta^2 = 0.154$, 95% CI −13.251, −3.561], but not between men ($p = 0.146$). No statistically significant differences were found between women or men in upper body flexibility (women ($p = 0.235$); men ($p = 0.171$)), dynamic balance (women ($p = 0.176$); men ($p = 0.292$)); hand pressure strength right (women ($p = 0.285$); men ($p = 0.367$)), and hand pressure strength left (women ($p = 0.569$); men ($p = 0.911$)).

Table 7. Post-intervention comparison on the Senior Fitness Test battery variables of the CG and the EG according to sex.

Variable		CG Post (n = 35)	EG Post (n = 35)	*p*-Value
Aerobic endurance (m)	women	395.15 ± 82.60	470.85 ± 68.75	<0.001 **
	men	457.50 ± 53.03	520.71 ± 85.21	0.310
Lower body strength (Number of repetitions)	women	11.78 ± 3.00	14.57 ± 2.79	<0.001 **
	men	13.00 ± 0.00	15.42 ± 1.90	0.285
Upper body strength (Number of repetitions)	women	14.27 ± 3.48	18.82 ± 4.70	<0.001 **
	men	17.00 ± 4.24	18.85 ± 4.25	0.575
Lower body flexibility (cm)	women	−5.72 ± 12.26	2.67 ± 5.72	0.001 *
	men	−14.00 ± 5.65	−2.85 ± 5.14	0.146
Upper body flexibility (cm)	women	−9.78 ± 9.18	−11.28 ± 10.65	0.235
	men	−21.50 ± 2.12	−19.42 ± 7.54	0.171
Dynamic balance (seconds)	women	7.36 ± 2.16	6.71 ± 1.51	0.176
	men	7.00 ± 1.41	5.42 ±1.39	0.292
Hand pressure strength right (kg)	women	52.72 ± 11.18	49.46 ± 9.26	0.285
	men	90.00 ± 0.00	81.42 ± 21.73	0.367
Hand pressure strength left (kg)	women	50.15 ± 11.69	48.39 ± 8.92	0.569
	men	77.50 ± 3.53	76.42 ± 21.93	0.911

Note: * $p < 0.05$; ** $p < 0.001$.

4. Discussion

The aim of the present study was to determine the effect of a multicomponent physical exercise program on the functional physical fitness of older people with overweight or obesity from Chile, and whether these effects were similar in women and men. At a general level, the results indicate that the program has beneficial effects of practicing physical exercise in older people [41], specifically highlighting that a multicomponent physical exercise program produced improvements in the functional physical fitness in Chilean older adults with overweight or obesity [10,31,42].

Before the intervention, the CG and the EG had similar functional physical fitness, since there were no statistically significant differences in any of their components (i.e., aerobic endurance; lower body strength; upper body strength; upper body flexibility; lower body flexibility; dynamic balance and hand pressure strength left), except in hand pressure strength right, in favor of the CG [43–45]. Depending on sex, no significant differences were found between men in the two groups in any of the components of functional physical fitness, but there were differences between women in aerobic endurance, lower body strength, and lower body flexibility, favorable to women in the EG, and in hand pressure strength right, which was favorable to those in the CG. These results could be related to and associated with the lack of physical activity or sedentary lifestyle prior to each of the intervention groups [31]. Regarding sex, only the EG women travelled more meters in the aerobic endurance test and carried out more repetitions in the lower body strength test than the CG women before the multicomponent exercise program.

After the application of the multicomponent physical exercise program, although the EG participants were already able to cover more meters in the 6-min walk test than those in the CG before the intervention, the difference in meters travelled increased once the multicomponent program was applied in favor of the EG participants, indicating that they were capable of walking faster for the same time [46]. These results could be due to the multicomponent exercise program, which could reduce the decline in walking performance [47] and speed [48] associated with aging.

In the lower body strength analysis, before the multicomponent exercise intervention, the EG participants performed a greater number of repetitions than those in the CG, but not significantly so. These differences increased once the program was applied, but remained non-significant. With this increase, we could be contributing to reducing the risk of falls in older adults [49,50]. The results obtained in upper body strength, once the multicomponent exercise program was completed, show that the EG participants performed significantly more repetitions in the upper body strength test. These results are in line with previous studies [46] that indicate that, with directed strength work, strength in the upper body increases significantly.

Regarding lower body flexibility, EG participants achieved better results in this test after the multicomponent intervention program than before, results that are consistent with similar previous studies [46,51]. In upper body flexibility, as in upper body strength, there were no statistically significant differences. This may be due to the fact that some body areas and their muscles are negatively affected compared to others that remain relatively preserved with age [52]. It could also be because when strength training was incorporated, the changes in flexibility did not reach significant changes, in this case, in the upper part of the body [53].

On the other hand, the results regarding dynamic balance indicate that the EG participants performed this test in less time than those in the CG, both before and after the multicomponent intervention program, but not significantly. Our results were not consistent with those obtained by Papalia et al. [49] and Font-Jutglà et al. [54], who indicated that interventions that contained strength exercises such as the applied multicomponent program had positive effects on dynamic balance (i.e., balance and movement speed) mainly due to the stimulation of the proprioceptors of the knee or the improvement in lower body strength [55], which was expected in this research.

Regarding right and left manual dynamometry, neither before nor after the intervention with the multicomponent exercise program were there significant differences between both groups. These results are consistent with studies such as those by Arrieta et al. [56] or Wang et al. [57], since these values decrease with advancing age and lack of exercise. However, in the EG, an increase in manual dynamometry was expected since the results of Cadore et al. [58] or Ramsey et al. [59] found significant improvements in grip strength that were related to high levels of activity and physical exercise. Depending on sex, differences after the intervention occurred between the group of women with better results in all of the variables studied in the EG participants, as shown in other studies in aerobic endurance, lower and upper body strength, and flexibility of the lower body [46,60].

Once the intervention period was over, in the CG, the scores of the functional physical fitness components studied remained similar and even worsened, but not significantly, except for upper body flexibility, which was significant. According to sex, after the intervention, similarities were maintained in the components of functional physical fitness, without differences, since in general, they remained the same, except for upper body flexibility, lower body flexibility, and dynamic balance, which decreased in women, and upper body flexibility, which decreased in men, probably due to the lack of physical exercise [61].

Finally, once the intervention in the EG was completed, all participants who met the inclusion criteria for this group showed a significant improvement in physical function. This was reflected, for example, in the 6-min walk test, where members of this group were able to walk faster for the same time and therefore travel more meters [46], or in lower body strength and upper body strength, since they were capable of performing a greater number of repetitions. These improvements in lower body strength could contribute to reducing the risk of falls [49]. Furthermore, if associated with the improvement in movement speed observed in the dynamic balance test, these improvements could protect them from adverse events such as fractures caused by osteoporosis [62] or falls [49,54]. Considering that three of the above components of functional fitness (aerobic endurance, lower body strength, and upper body strength) in older adults are associated with major non-traumatic fractures, a multicomponent exercise program could contribute to their decrease [63]. Upper body flexibility and lower body flexibility also improved after the multicomponent physical exercise program, as has been shown in previous studies [46,64]. Finally, the hand pressure strength right and hand pressure strength left also improved, so the EG participants were able to apply a greater handgrip force after the physical exercise period [59], since greater handgrip strength is associated with higher values of physical exercise [57]. These improvements in the EG are directly related to a lower future risk of falls and mobility problems in older adults as well as lower dependency, caregiving, and mortality [62,65,66]. Depending on sex, all components of the functional physical fitness improved significantly, both in women and men, but in the latter, lower body flexibility and hand pressure strength right did not improve.

This research has some limitations such as the sample size, due to its limited number, and its selection, for convenience (belonging to the clubs of the Regional Federation of Communal Unions of older people in the Biobío region of the city of Concepción, Chile), and the possibility of access. Therefore, the results of this study should be taken with caution. Furthermore, the number of male participants was very limited due to the characteristics of participation in physical activity programs; therefore, we cannot extrapolate the results to this group, and more studies that include a larger number of male participants are necessary.

On the other hand, no long-term follow-up was carried out to verify whether this multicomponent physical exercise program maintained its long-term effect, which would allow us to understand how the improvements produced by the multicomponent physical exercise program are maintained over time and how they are lost. Finally, the multiple personal and environmental factors related to functional physical fitness that may affect performance were not taken into account.

5. Conclusions

The results obtained support the initial hypothesis of this study, which stated that participating in a physical exercise program would significantly improve the levels of functional physical fitness in the older adults who participated in it, regardless of sex. Despite this, we must clarify that statistically significant improvements in all components (i.e., aerobic endurance, lower body strength, upper body strength, upper body flexibility, lower body flexibility, dynamic balance, hand pressure strength right and hand pressure strength left) occurred in women, while although there was an improvement in all components, it did not do so in lower body flexibility or hand pressure strength left in men.

The importance of this study lies in the fact that it provides evidence of the benefits of multicomponent exercise programs (following the indications of the International Recommendations for Exercise in Older Adults) on the functional physical fitness of older people with overweight or obesity, in the absence of specific protocols that combine aerobic and resistance components. In addition, evidence is provided on the use of a globally standardized battery that allows this study to be replicated anywhere in the world. In this way, the health of this population is being impacted safely.

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References

1. Langhammer, B.; Bergland, A.; Rydwik, E. The Importance of Physical Activity Exercise among Older People. *Biomed. Res. Int.* **2018**, *2018*, 7856823. [CrossRef]
2. Olivares, P.R.; Merellano-Navarro, E.; Perez-Sousa, M.; Collado-Mateo, D. Fitness, Physical Functionality and Quality of Life in Elderly: A Mediation Analysis. *Rev. Int. Med. Cienc. Act. Fis. Deporte* **2021**, *21*, 307–318. [CrossRef]
3. Martínez-Hernández, B.M.; Rosas-Carrasco, O.; López-Teros, M.; González-Rocha, A.; Muñoz-Aguirre, P.; Palazuelos-González, R.; Ortíz-Rodríguez, A.; Luna-López, A.; Denova-Gutiérrez, E. Association between Physical Activity and Physical and Functional Performance in Non-Institutionalized Mexican Older Adults: A Cohort Study. *BMC Geriatr.* **2022**, *22*, 388. [CrossRef]
4. Benavides-Rodríguez, C.L.; García-García, J.A.; Fernandez, J.A. Condición Física Funcional En Adultos Mayores Institucionalizados. *Univ. Salud* **2020**, *22*, 238–245. [CrossRef]
5. Andrade Farfán, P.; Balda Zambrano, H. Actividad Física Para Mejorar el Equilibrio de los Adultos Mayores del Programa de Envejecimiento Activo del Cantón Chone. *Rev. Científica Sinapsis* **2022**, *21*. [CrossRef]
6. González-González, C.; Cafagna, G.; Hernández Ruiz, M.D.C.; Ibarrarán, P.; Stampini, M. Functional dependence and support for the older persons in Mexico, 2001-2026Dependência funcional e apoio em idosos no México, 2001–2026. *Rev. Panam. Salud Publica* **2021**, *45*, e71. [CrossRef]
7. Pleticosic-Ramírez, Y.; Mecías Calvo, M.; Navarro-Patón, R. Efectos de Programas de Ejercicio Físico en la Composición Corporal, Condición Física y Calidad de Vida de Personas Mayores Con Sobrepeso u Obesidad: Una Revisión Sistemática (Effects of Physical Exercise Programs on Body Composition, Physical Fitness and quality of life in older people with overweight or obesity: A systematic review). *Retos* **2024**, *56*, 47–62. [CrossRef]
8. Chaabene, H.; Prieske, O.; Herz, M.; Moran, J.; Höhne, J.; Kliegl, R.; Ramirez-Campillo, R.; Behm, D.G.; Hortobágyi, T.; Granacher, U. Home-Based Exercise Programmes Improve Physical Fitness of Healthy Older Adults: A PRISMA-Compliant Systematic Review and Meta-Analysis with Relevance for COVID-19. *Ageing Res. Rev.* **2021**, *67*, 101265. [CrossRef]
9. Gonzalez-Murillo, R.; Afanador, D.F.; García-Garro, P.A. Efectos Del Hilit Sobre El Riesgo de Caída y Las Habilidades Funcionales en el Adulto Mayor. *Rev. Sapientía* **2022**, *14*, 6–23. [CrossRef]
10. Izquierdo, M.; Merchant, R.A.; Morley, J.E.; Anker, S.D.; Aprahamian, I.; Arai, H.; Aubertin-Leheudre, M.; Bernabei, R.; Cadore, E.L.; Cesari, M.; et al. International Exercise Recommendations in Older Adults (ICFSR): Expert Consensus Guidelines. *J. Nutr. Health Aging* **2021**, *25*, 824–853. [CrossRef]
11. Sherrington, C.; Michaleff, Z.A.; Fairhall, N.; Paul, S.S.; Tiedemann, A.; Whitney, J.; Cumming, R.G.; Herbert, R.D.; Close, J.C.T.; Lord, S.R. Exercise to Prevent Falls in Older Adults: An Updated Systematic Review and Meta-Analysis. *Br. J. Sports Med.* **2017**, *51*, 1750–1758. [CrossRef] [PubMed]
12. Andersen, M.H.; Ottesen, L.; Thing, L.F. The Social and Psychological Health Outcomes of Team Sport Participation in Adults: An Integrative Review of Research. *Scand. J. Public Health* **2018**, *47*, 832–850. [CrossRef] [PubMed]
13. Bennie, J.A.; Pedisic, Z.; van Uffelen, J.G.Z.; Gale, J.; Banting, L.K.; Vergeer, I.; Stamatakis, E.; Bauman, A.E.; Biddle, S.J.H. The Descriptive Epidemiology of Total Physical Activity, Muscle-Strengthening Exercises and Sedentary Behaviour among Australian Adults—Results from the National Nutrition and Physical Activity Survey. *BMC Public Health* **2016**, *16*, 73. [CrossRef] [PubMed]
14. Roberts, C.E.; Phillips, L.H.; Cooper, C.L.; Gray, S.; Allan, J.L. Effect of Different Types of Physical Activity on Activities of Daily Living in Older Adults: Systematic Review and Meta-Analysis. *J. Aging Phys. Act.* **2017**, *25*, 653–670. [CrossRef] [PubMed]
15. Silva, P.R.; Nascimento, D.D.A.C.; DE Sousa Neto, I.V.; Funghetto, S.S.; Tibana, R.A.; Navalta, J.W.; Beal, F.L.R.; Prestes, J. Effects of Resistance Training on Muscle Quality Index, Muscle Strength, Functional Capacity, and Serum Immunoglobulin Levels between Obese and Non-Obese Older Women. *Int. J. Exerc. Sci.* **2021**, *14*, 707–726. [PubMed]
16. Fritz Silva, N.B. Efectos Del Entrenamiento En Intervalos de Alta Intensidad En Adultos Mayores: Una Revisión Sistemática (Effects of High-Intensity Interval Training in Older Adults: A Systematic Review). *Cult. Cienc. Deporte* **2021**, *16*, 187–198. [CrossRef]
17. Azamian Jazi, A.; Moradi Sarteshnizi, E.; Fathi, M.; Azamian Jazi, Z. Elastic Band Resistance Training Increases Adropin and Ameliorates Some Cardiometabolic Risk Factors in Elderly Women: A Quasi-Experimental Study. *BMC Sports Sci. Med. Rehabil.* **2022**, *14*, 178. [CrossRef] [PubMed]
18. Kim, S.-W.; Park, H.-Y.; Jung, W.-S.; Lim, K. Effects of Twenty-Four Weeks of Resistance Exercise Training on Body Composition, Bone Mineral Density, Functional Fitness and Isokinetic Muscle Strength in Obese Older Women: A Randomized Controlled Trial. *Int. J. Environ. Res. Public Health* **2022**, *19*, 14554. [CrossRef] [PubMed]
19. Marcos-Pardo, P.J.; González-Gálvez, N.; Gea-García, G.M.; López-Vivancos, A.; Espeso-García, A.; Gomes de Souza Vale, R. Sarcopenia as a Mediator of the Effect of a Gerontogymnastics Program on Cardiorespiratory Fitness of Overweight and Obese Older Women: A Randomized Controlled Trial. *Int. J. Environ. Res. Public Health* **2020**, *17*, 7064. [CrossRef] [PubMed]
20. Park, W.; Jung, W.-S.; Hong, K.; Kim, Y.-Y.; Kim, S.-W.; Park, H.-Y. Effects of Moderate Combined Resistance- and Aerobic-Exercise for 12 Weeks on Body Composition, Cardiometabolic Risk Factors, Blood Pressure, Arterial Stiffness, and Physical Functions, among Obese Older Men: A Pilot Study. *Int. J. Environ. Res. Public Health* **2020**, *17*, 7233. [CrossRef]
21. Grajek, M.; Gdańska, A.; Krupa-Kotara, K.; Głogowska-Ligus, J.; Kobza, J. Global Self-Esteem, Physical Activity, and Body Composition Changes Following a 12-Week Dietary and Physical Activity Intervention in Older Women. *Int. J. Environ. Res. Public Health* **2022**, *19*, 13220. [CrossRef]

22. Youssef, L.; Granet, J.; Marcangeli, V.; Dulac, M.; Hajj-Boutros, G.; Reynaud, O.; Buckinx, F.; Gaudreau, P.; Morais, J.A.; Mauriège, P.; et al. Clinical and Biological Adaptations in Obese Older Adults Following 12-Weeks of High-Intensity Interval Training or Moderate-Intensity Continuous Training. *Healthcare* **2022**, *10*, 1346. [CrossRef] [PubMed]
23. Ballin, M.; Lundberg, E.; Sörlén, N.; Nordström, P.; Hult, A.; Nordström, A. Effects of Interval Training on Quality of Life and Cardiometabolic Risk Markers in Older Adults: A Randomized Controlled Trial. *Clin. Interv. Aging* **2019**, *14*, 1589–1599. [CrossRef] [PubMed]
24. Boukabous, I.; Marcotte-Chénard, A.; Amamou, T.; Boulay, P.; Brochu, M.; Tessier, D.; Dionne, I.; Riesco, E. Low-Volume High-Intensity Interval Training Versus Moderate-Intensity Continuous Training on Body Composition, Cardiometabolic Profile, and Physical Capacity in Older Women. *J. Aging Phys. Act.* **2019**, *27*, 879–889. [CrossRef] [PubMed]
25. Buckinx, F.; Gaudreau, P.; Marcangeli, V.; Boutros, G.E.H.; Dulac, M.C.; Morais, J.A.; Aubertin-Leheudre, M. Muscle Adaptation in Response to a High-Intensity Interval Training in Obese Older Adults: Effect of Daily Protein Intake Distribution. *Aging Clin. Exp. Res.* **2019**, *31*, 863–874. [CrossRef] [PubMed]
26. Moreira-Reis, A.; Maté-Muñoz, J.L.; Hernández-Lougedo, J.; Vilches-Sáez, S.; Benet, M.; García-Fernández, P.; Pleguezuelos, E.; Carbonell, T.; Alva, N.; Garnacho-Castaño, M.V. Aerobic Dance on an Air Dissipation Platform Improves Cardiorespiratory, Muscular and Cellular Fitness in the Overweight and Obese Elderly. *Biology* **2022**, *11*, 579. [CrossRef] [PubMed]
27. Pleticosic-Ramírez, Y.; Mecías-Calvo, M.; Arufe-Giráldez, V.; Navarro-Patón, R. Incidence of a Multicomponent Physical Exercise Program on Body Composition in Overweight or Obese People Aged 60 Years or Older from Chile. *J. Funct. Morphol. Kinesiol.* **2024**, *9*, 81. [CrossRef]
28. Rodrigues, F.; Jacinto, M.; Figueiredo, N.; Monteiro, A.M.; Forte, P. Effects of a 24-Week Low-Cost Multicomponent Exercise Program on Health-Related Functional Fitness in the Community-Dwelling Aged and Older Adults. *Medicina* **2023**, *59*, 371. [CrossRef] [PubMed]
29. Jofré-Saldía, E.; Villalobos-Gorigoitía, Á.; Cofré-Bolados, C.; Ferrari, G.; Gea-García, G.M. Multicomponent Training in Progressive Phases Improves Functional Capacity, Physical Capacity, Quality of Life, and Exercise Motivation in Community-Dwelling Older Adults: A Randomized Clinical Trial. *Int. J. Environ. Res. Public Health* **2023**, *20*, 2755. [CrossRef]
30. López-Martí, A.M.; Padilla, I.D.H.; López-Téllez, A.; García Romero, J. Physical Activity, Physical Condition and Quality of Life in Older Adults. Systematic Review. *Arch. Med. Deporte* **2022**, *39*, 168–176. [CrossRef]
31. Labata-Lezaun, N.; Canet-Vintró, M.; López-de-Celis, C.; Rodríguez-Sanz, J.; Aiguadé, R.; Cuadra-Llopart, L.; Jovell-Fernández, E.; Bosch, J.; Pérez-Bellmunt, A. Effectiveness of a Multicomponent Training Program on Physical Performance and Muscle Quality in Older Adults: A Quasi-Experimental Study. *Int. J. Environ. Res. Public Health* **2022**, *20*, 222. [CrossRef] [PubMed]
32. World Health Organization. *UN Decade of Healthy Ageing: Plan of Action 2021–2030*; World Health Organization: Geneva, Switzerland, 2024.
33. World Health Organization. *WHO Guidelines on Physical Activity and Sedentary Behaviour*; World Health Organization: Geneva, Switzerland, 2020; ISBN 978-92-4-001512-8.
34. Chung, P.-K.; Zhao, Y.; Liu, J.-D.; Quach, B. Functional Fitness Norms for Community-Dwelling Older Adults in Hong Kong. *Arch. Gerontol. Geriatr.* **2016**, *65*, 54–62. [CrossRef] [PubMed]
35. Rikli, R.E.; Jones, J.C. *Senior Fitness Test Manual*, 2nd ed.; Human Kinetics: Champaign, IL, USA, 2013; ISBN 9781450411189.
36. Ato, M.; López-García, J.J.; Benavente, A. A Classification System for Research Designs in Psychology. *Ann. Psychol.* **2013**, *29*, 1038–1059. [CrossRef]
37. Otzen, T.; Manterola, C. Técnicas de Muestreo Sobre Una Población a Estudio. *Int. J. Morphol.* **2017**, *35*, 227–232. [CrossRef]
38. Hernández Sampieri, R.; Fernandez-Collado, C.F.; Baptista Lucio, P. *Metodología de la investigación*, 6th ed.; McGraw-Hill Education: Mexico City, Mexico, 2014; ISBN 978-1-4562-2396-0.
39. Sociedad Internacional para el Avance de la Kinantropometría. *Estándares Internacionales Para La Valoración*; Biblioteca Nacional de Australia: Canberra, ACT, Australia, 2001.
40. World Health Organization. Obesity and Overweight. Available online: https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight (accessed on 5 March 2024).
41. Casas-Herrero, Á.; Sáez de Asteasu, M.L.; Antón-Rodrigo, I.; Sánchez-Sánchez, J.L.; Montero-Odasso, M.; Marín-Epelde, I.; Ramón-Espinoza, F.; Zambom-Ferraresi, F.; Petidier-Torregrosa, R.; Elexpuru-Estomba, J.; et al. Effects of Vivifrail Multicomponent Intervention on Functional Capacity: A Multicentre, Randomized Controlled Trial. *J. Cachexia Sarcopenia Muscle* **2022**, *13*, 884–893. [CrossRef] [PubMed]
42. Oh, G.; Lee, H.; Park, C.M.; Jung, H.-W.; Lee, E.; Jang, I.-Y.; Guralnik, J.M.; Kim, D.H. Long-Term Effect of a 24-Week Multicomponent Intervention on Physical Performance and Frailty in Community-Dwelling Older Adults. *Age Ageing* **2021**, *50*, 2157–2166. [CrossRef]
43. Medeiros, I.; Pereira, L.; Pinto, V.; Viana-Gomes, D. Efeito Do Exercício Físico No Envelhecimento: Diferenças Nas Aptidões Físicas Entre Idosos Ativos e Sedentários. *JIM—J. Investig. Méd.* **2022**, *3*, 49–61. [CrossRef]
44. de Pacheco, L.A.; Menezes, E.C.; Cano, F.W.; Mazo, G.Z. Contribuições da Prática de Pilates Na Aptidão Física e Na Força de Preensão Manual de Idosos. *Arq. Ciências Saúde UNIPAR* **2019**, *23*, 189–195. [CrossRef]
45. Matos-Duarte, M.; Martínez de Haro, V.; Sanz Arribas, I.; Berlanga, L.A. El Estilo de Vida Como Condicionante de La Flexibilidad Del Adulto Mayor (Lifestyle as a Determinant of Flexibility in the Elderly). *Retos* **2022**, *43*, 283–289. [CrossRef]

46. Carrasco-Poyatos, M.; Reche-Orene, D. Efectos de un Programa de Acondicionamiento Físico Integrado en el Estado Funcional de Mujeres Mayores. (Effects of an Integrated Physical Training Program in Old Women Functional Condition). *Cult. Cienc. Deporte* **2018**, *13*, 31–38. [CrossRef]
47. Magnani, P.E.; Freire Junior, R.C.; Zanellato, N.F.G.; Genovez, M.B.; Alvarenga, I.C.; Abreu, D.C.C. de The Influence of Aging on the Spatial and Temporal Variables of Gait during Usual and Fast Speeds in Older Adults Aged 60 to 102 years. *Hum. Mov. Sci.* **2019**, *68*, 102540. [CrossRef] [PubMed]
48. Sloot, L.H.; Malheiros, S.; Truijen, S.; Saeys, W.; Mombaur, K.; Hallemans, A.; van Criekinge, T. Decline in Gait Propulsion in Older Adults over Age Decades. *Gait Posture* **2021**, *90*, 475–482. [CrossRef] [PubMed]
49. Papalia, G.F.; Papalia, R.; Diaz Balzani, L.A.; Torre, G.; Zampogna, B.; Vasta, S.; Fossati, C.; Alifano, A.M.; Denaro, V. The Effects of Physical Exercise on Balance and Prevention of Falls in Older People: A Systematic Review and Meta-Analysis. *J. Clin. Med.* **2020**, *9*, 2595. [CrossRef] [PubMed]
50. Chalapud Narváez, L.M.; Escobar Almario, A.E. Actividad Física Para Mejorar Fuerza y Equilibrio en el Adulto Mayor. *Univ. Salud* **2017**, *19*, 94–101. [CrossRef]
51. Chin, A.; Paw, M.J.M.; van Poppel, M.N.M.; van Mechelen, W. Effects of Resistance and Functional-Skills Training on Habitual Activity and Constipation among Older Adults Living in Long-Term Care Facilities: A Randomized Controlled Trial. *BMC Geriatr.* **2006**, *6*, 9. [CrossRef]
52. Gleberzon, B.J.; Annis, R.S. The Necessity of Strength Training for the Older Patient. *J. Can. Chiropr. Assoc.* **2000**, *44*, 98–102.
53. Feland, J.B.; Myrer, J.W.; Schulthies, S.S.; Fellingham, G.W.; Measom, G.W. The Effect of Duration of Stretching of the Hamstring Muscle Group for Increasing Range of Motion in People Aged 65 Years or Older. *Phys. Ther.* **2001**, *81*, 1110–1117. [CrossRef] [PubMed]
54. Font-Jutglà, C.; Mur Gimeno, E.; Bort Roig, J.; Gomes da Silva, M.; Milà Villarroel, R. Efectos de La Actividad Física de Intensidad Suave Sobre Las Condiciones Físicas de Los Adultos Mayores: Revisión Sistemática. *Rev. Esp. Geriatr. Gerontol.* **2020**, *55*, 98–106. [CrossRef] [PubMed]
55. Justine, M.; Ruzali, D.; Hazidin, E.; Said, A.; Bukry, S.A.; Manaf, H. Range of Motion, Muscle Length, and Balance Performance in Older Adults with Normal, Pronated, and Supinated Feet. *J. Phys. Ther. Sci.* **2016**, *28*, 916–922. [CrossRef]
56. Arrieta, H.; Rezola-Pardo, C.; Zarrazquin, I.; Echeverria, I.; Yanguas, J.J.; Iturburu, M.; Gil, S.M.; Rodriguez-Larrad, A.; Irazusta, J. A Multicomponent Exercise Program Improves Physical Function in Long-Term Nursing Home Residents: A Randomized Controlled Trial. *Exp. Gerontol.* **2018**, *103*, 94–100. [CrossRef]
57. Wang, Y.-C.; Bohannon, R.W.; Li, X.; Sindhu, B.; Kapellusch, J. Hand-Grip Strength: Normative Reference Values and Equations for Individuals 18 to 85 Years of Age Residing in the United States. *J. Orthop. Sports Phys. Ther.* **2018**, *48*, 685–693. [CrossRef] [PubMed]
58. Cadore, E.L.; Rodríguez-Mañas, L.; Sinclair, A.; Izquierdo, M. Effects of Different Exercise Interventions on Risk of Falls, Gait Ability, and Balance in Physically Frail Older Adults: A Systematic Review. *Rejuvenation Res.* **2013**, *16*, 105–114. [CrossRef] [PubMed]
59. Amaral Gomes, E.S.; Ramsey, K.A.; Rojer, A.G.M.; Reijnierse, E.M.; Maier, A.B. The Association of Objectively Measured Physical Activity and Sedentary Behavior with (Instrumental) Activities of Daily Living in Community-Dwelling Older Adults: A Systematic Review. *Clin. Interv. Aging* **2021**, *16*, 1877–1915. [CrossRef] [PubMed]
60. Kang, S.; Hwang, S.; Klein, A.B.; Kim, S.H. Multicomponent Exercise for Physical Fitness of Community-Dwelling Elderly Women. *J. Phys. Ther. Sci.* **2015**, *27*, 911–915. [CrossRef] [PubMed]
61. Landinez Parra, N.S.; Contreras Valencia, K.; Castro Villamil, Á. Proceso de Envejecimiento, Ejercicio y Fisioterapia. *Rev. Cuba. Salud Pública* **2012**, *38*, 562–580. [CrossRef]
62. Pavasini, R.; Guralnik, J.; Brown, J.C.; di Bari, M.; Cesari, M.; Landi, F.; Vaes, B.; Legrand, D.; Verghese, J.; Wang, C.; et al. Short Physical Performance Battery and All-Cause Mortality: Systematic Review and Meta-Analysis. *BMC Med.* **2016**, *14*, 215. [CrossRef] [PubMed]
63. Harvey, N.C.; Odén, A.; Orwoll, E.; Lapidus, J.; Kwok, T.; Karlsson, M.K.; Rosengren, B.E.; Ribom, E.; Cooper, C.; Cawthon, P.M.; et al. Measures of Physical Performance and Muscle Strength as Predictors of Fracture Risk Independent of FRAX, Falls, and ABMD: A Meta-Analysis of the Osteoporotic Fractures in Men (MrOS) Study. *J. Bone Min. Res.* **2018**, *33*, 2150–2157. [CrossRef] [PubMed]
64. Rydwik, E.; Frändin, K.; Akner, G. Physical Training in Institutionalized Elderly People with Multiple Diagnoses—A Controlled Pilot Study. *Arch. Gerontol. Geriatr.* **2005**, *40*, 29–44. [CrossRef] [PubMed]
65. Applebaum, E.V.; Breton, D.; Feng, Z.W.; Ta, A.-T.; Walsh, K.; Chassé, K.; Robbins, S.M. Modified 30-Second Sit to Stand Test Predicts Falls in a Cohort of Institutionalized Older Veterans. *PLoS ONE* **2017**, *12*, e0176946. [CrossRef] [PubMed]
66. Beaudart, C.; Rolland, Y.; Cruz-Jentoft, A.J.; Bauer, J.M.; Sieber, C.; Cooper, C.; Al-Daghri, N.; Araujo de Carvalho, I.; Bautmans, I.; Bernabei, R.; et al. Assessment of Muscle Function and Physical Performance in Daily Clinical Practice : A Position Paper Endorsed by the European Society for Clinical and Economic Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal Diseases (ESCEO). *Calcif. Tissue Int.* **2019**, *105*, 1–14. [CrossRef]