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A Short-Term Body Jump® Training Program Improves Physical Fitness and Body Composition in Young Active Women

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Featured Application: Community-based classes with musical support are among the most common forms of physical activity practice for recreational users of fitness centers. Thus, fitness professionals need to know the effects on the body of these activities. For this reason, this study investigated the short-term benefits of practicing the Body Jump® program on physical fitness and body composition in a group of young and healthy active women.

Abstract: (1) Background: Body Jump® is a novel group fitness program with musical support, which is performed rebounding in a minitrampoline. Although the number of practitioners has increased exponentially in recent years, this activity's short-term effects on physical fitness and body composition in women have not yet been studied. (2) Methods: 27 healthy young women were randomly divided into a Body Jump® group (BJ) and a control group (CG). BJ performed three classes per week for one month. The week before and after the intervention, the anthropometric assessments were carried out to estimate the body composition, and different performance tests were performed to assess the jumping capacity (countermovement jump (CMJ) and squat jump (SJ) tests), the muscular strength (1RM test) and the aerobic fitness (UKK test). (3) Results: VO_2 max (p = 0.001), CMJ flight height (p = 0.023), SJ flight height (p = 0.003) and the 1RM value in the half-squat exercise (p = 0.009) were significantly increased in BJ. In CG, there were no statistically significant differences after the intervention period. Regarding the changes in body composition, a significant enhancement in several parameters were found in BJ, such as the sum of skinfolds (p = 0.003) and the percentage of fat mass (p = 0.002), while no changes were found in any of the anthropometric variables in CG. (4) Conclusions: carrying out the Body Jump® program three days per week for one month had positive effects on physical fitness and body composition in a group of healthy young women. This training program can be an effective option for enhancing, in the short term, these fitness parameters and the body composition of these recreational users into the fitness centers.

Keywords: physical activity; health; anthropometry; gym workout; group fitness program

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1. Introduction

There has been an exponential increase in the fitness industry during the last decade [1]. The emergence of low-cost gyms and the greater social awareness about the benefits of the regular practice of physical activity and sport to improve the quality of life and health could be some of the reasons for this expansion [2,3]. Although this growth has been affected by the current COVID-19 crisis, the global gym market generated 84,000 million euros in 2018. These data reported by the International Health, Racquet & Sportsclub Association (IHRSA) are useful to know the magnitude and the importance of the fitness industry not only for people's health but also for the global economy [4]. The rise of fitness also has caused the offer of activities and exercise programs available in the fitness centers, being greater and more varied than ever [5].

Among the novel trends, the community-based activities directed by an instructor and performed under musical support are the option chosen by more than 30% of the fitness facility users [6]. In fact, group training is placed the third position of the Top 20 Worldwide Fitness Trends for 2020 [7]. Further, the female gender has greater participation in most of these physical group activities [6]. Following this trend, international franchises, such as Les Mills® or FITCONCEPTPRO®, are designing new group fitness programs under musical support every three months. Later, certified instructors reproduce these programs in their respective fitness centers. Some examples of these well-known activities are Body Pump®, Body Combat® or Body Balance® by LES MILLS® and PYRO® or Body Jump® by FITCONCEPTPRO®.

In this context, the Body Jump® training program has become one of the most popular programs in recent years [8]. Body Jump® is a novel aerobic-training program rebounding in minitrampolines that are performed with music into community-based classes. The workout session has a duration of about 55 min and is divided into 9 music tracks of 5–7 min' length, each one targeting not only the lower limb musculature but also the core and upper limb musculature. Each track uses various exercises, movements and rebounds variating the range of motion, speed of movement, jump height and body position for providing different workloads to practitioners. The time between tracks is normally used to rest and hydration before immediately beginning the next segment. Body Jump® is currently wide-spreading, with a growing number of practitioners in many countries [8].

The Body Jump® program is intended to provide a full-body workout to increase cardiorespiratory and muscular fitness in practitioners into a group–exercise setting. Additionally, these recreational users are usually seeking to improve their body composition. Both improvements of overall fitness and health and the loss of weight and the enhancement of the body composition are two of the main goals for conducting regular physical activity in the adult population [9]. However, current research investigating the effects of community-based physical activities performed under musical support on body composition and physical fitness is scarce [8,10]. Moreover, to the best of our knowledge, the short-term effects of the Body Jump® program on these parameters, particularly in young women, remain uninvestigated. Therefore, this study aimed to analyze the effects of the Body Jump® program on physical fitness and body composition after a short-term intervention in a group of physically active young women. Our initial hypothesis was that the Body Jump® program would be effective in improving body composition, VO2max, jump ability and strength of the lower body of healthy young women after a short-term period of intervention.

2. Materials and Methods

2.1. General Research Design

The study was conducted in a total of 6 weeks. The fitness assessment tests and the anthropometric measurements were performed at first and the last week as pretest and post-test evaluations. Then, from 2 to 5 weeks, the study intervention consisted of performing 3-weekly Body Jump® classes on nonconsecutive days (Monday, Wednesday and Friday). Therefore, a total of 12 sessions of guided physical exercise were performed, with about 1 h of duration. All sessions were directed by a certified Body Jump® instructor (LF) in a room equipped for the performance of collective activities (sound equipment, microphone and ventilation) of the sports facilities of the University of Alicante.

2.2. Participants

Twenty-seven healthy adult women voluntarily participated in this study, which was divided into two groups: the control group (CG) (n = 13) and the Body Jump® group (BJ) (n = 14). The experimental BJ group received the 12 Body Jump® classes, while the CG did not perform any type of "extra" exercise apart from their usual sports practice. All of the participants were students of the Sports Science Degree, seeking for they were physically active. The study's inclusion criteria included being between 18 and 35 years old; to perform at least 5 h of weekly physical activity, and not having menstruation during the weeks of the tests and anthropometries. The exclusion criteria included reporting any osteoarticular pain or injury during the study intervention and missing more than one Body Jump® session in BJ. All of them signed an informed consent in which the aims of the investigation, as well as the methods and procedures, were exposed. The study protocols were reviewed by the Ethics Committee of the University of Alicante (Expedient UA-2017–04–11). Table 1 summarizes the data of the participants.

Table 1. General data of the participants.

	Age	BMI [1]	VO_{2Max} [2]	PA [3]
BJ (n = 14)	21.14 ± 4.2	22.39 ± 2.2	36.74 ± 2.3	7.43 ± 2.6
CG (n = 13)	22.00 ± 3.6	22.23 ± 2.2	37.43 ± 2.9	7.31 ± 2.2

[1] BMI = body max index; [2] VO_{2Max} = maximum oxygen uptake; [3] PA = weekly physical activity hours.

2.3. Fitness Tests

To establish the level of physical fitness of the participants, different performance tests were performed. These tests evaluated jumping ability, aerobic capacity, and lower limb muscle strength. Countermovement jump (CMJ) and squat jump (SJ) tests were performed to evaluate jumping ability. CMJ assessed explosive force with the reuse of elastic energy [11]. Arms action was not allowed in CMJ since it must always be with the hip. SJ assessed explosive force without reusing elastic energy. Thus, the participants had to maintain a 90° squat position for four seconds before performing the jump [11]. The participants performed three repetitions of each type of jump, recovering three minutes between each repetition. The highest value of the jump was selected to be included in the data analysis. Jump measurements were carried out by two experienced observers using the validated application "My jump®" [12].

A UKK test [13] was carried out to evaluate the aerobic capacity on an approved athletics track. The participants had to cover the distance of 2 km walking at the highest speed possible. Heart rate was monitored using pulsometers (Polar® RCX5). Subsequently, the following equation was applied to indirectly calculate the maximum oxygen uptake (VO_{2Max}): $304 - (\text{age} \times 0.4) - ((\text{time} \times 0.1417) + (\text{average heart rate} \times 0.32) + (\text{body max index} \times 1.1))$ [14]. In addition, a maximum indirect repetition (1RM) test of the multipower squat exercise was performed to evaluate the lower limb muscle strength. The Brzycki [15] equation was applied to obtain the 1RM value. The methodology described by Naclerio et al. [16] was followed to perform this 1 RM test.

The assessment tests were carried out for a week on nonconsecutive days. The first test (Monday) was the jumping test. The second test (Wednesday) was the UKK test. The last test (Friday) was the lower limb muscle strength test. Participants were not allowed to perform any moderate or vigorous physical activity the day before the tests.

2.4. Estimation of Body Composition

An anthropometric methodology was used to estimate the participants' body composition. All measurements were taken in the same laboratory, at ambient temperature (22 ± 1 °C) and by the same researcher, who was a level-2 anthropometrist of the International Society for the Advancement of Kinanthropometry (ISAK). Anthropometric measurements followed the protocols of Ross and Marfell-Jones [17] and were taken three times for each participant. The equipment used included a Holtain skinfold caliper (Holtain Ltd., Crymych, UK), a Holtain bone breadth caliper (Holtain Ltd., UK), scales, a stadiometer and an anthropometric tape (SECA LTD., Hamburg, Germany). Data on physical characteristics were collected in the following order: age, body mass and stature. The following measurements were also taken: biepicondylar humerus, bi-styloid and biepicondylar femur breadths, arm relaxed, arm flexed and tense, mid-thigh and calf girths, subscapular, biceps, triceps, suprailiac, supraspinale, front thigh, medial calf and abdominal skinfolds. The intra-observer technical error of the measurement (TEM) specified by the ISAK (5% for skinfolds and 1% for girths and breadths) was always considered for the measurements.

Muscle mass was calculated using Lee et al.'s equation [18]. Body density (BD) was calculated by the equation of Durnin and Womersley [19]. Once BD was obtained, the Siri equation [20] was applied to obtain the percentage of body fat (% body fat = ((4.95/BD − 450). Bone mass was evaluated with the Döbeln equation, modified by Rocha [21]. A nutritionist (JMM) held a personal interview with each of the participants during the previous week to the tests. This interview aimed to ensure that they had a diet adequate to the requirements of the physical activity practice they performed and to verify that none of them suffered from an eating disorder. After this interview, it was decided that the participants did not change their eating habits during the study.

2.5. Body Jump®

The same structure and content were carried out in all physical exercise sessions. The Body Jump® session consisted of nine different songs. The first and the last songs corresponded to the warmup and cooled down, respectively. The other seven songs made up the main part of the session, during which a nonuniform aerobic exercise was performed. Simpler exercises were performed on two legs in two of these songs (Max Jump) with the aim of reaching higher intensity peaks rather than the rest of the songs. The heart rate of the participants was monitored in all sessions using pulsometers (Polar® RCX5) to ensure that the intensity of effort was appropriate in each of the tracks. Table 2 shows the scheme of the Body Jump® session with the original names that FITCONCEPTPRO® assigns to each track, with the duration and the type of effort of each one of them.

Table 2. Structure of Body Jump® session.

Track	Name	Intensity	Duration
1	Warmup	Progressive	05′13″
2	Cardio jump 1	Medium	05′23″
3	Cardio jump 2	Medium	05′27″
4	Max jump 1	High	06′41″
5	Recovery	Low	04′15″
6	Cardio jump 3	Medium	06′29″
7	Max jump 2	High	08′52″
8	Conditioning	Medium-Low	04′52″
9	Cooldown	Low	03′05″

2.6. Data Analysis

A descriptive analysis was carried out using means and standard deviations of the different variables of the participants. To detect any statistically significant difference between the variables of each of the groups (BJ and CG), the nonparametric test of the Mann–Whitney U was performed. A nonparametric Wilcoxon test was performed to calculate differences between pre- and post- tests. The level of statistical significance established was $p = 0.05$. A post hoc power analysis was conducted assuming a confidence level of 0.95 and a minimum difference to detect 4 units in the estimated VO_{2Max} value. The statistical power of 99% was obtained. The statistical program SPSS 24.0 and a Microsoft Excel spreadsheet were used to record and analyze the data.

3. Results

Figure 1 shows the heart rate average of the participants in each of the tracks. It is observed how the intensity increases progressively in the first four tracks. A decrease in the average heart rate is observed during tracks 5 and 8, which correspond to "recovery" and "conditioning", respectively. The highest average heart rate was recorded on track 7, corresponding to "max jump 2". Finally, the lowest average heart rate values were recorded on the last track, where the cooldown was performed.

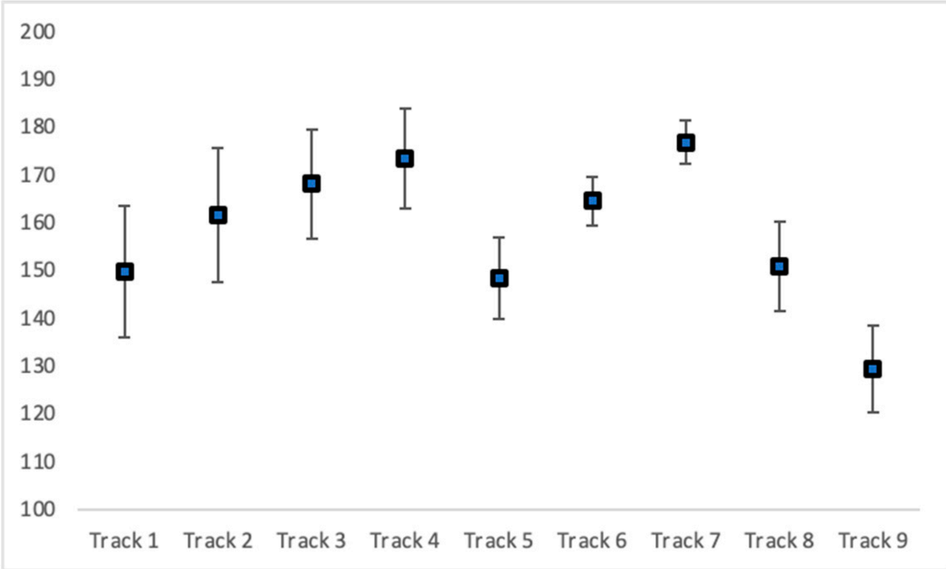

Figure 1. Average heart rate of the participants during Body Jump® in each of the tracks.

Table 3 shows the comparison between the pretests and the post-tests of both CG and BJ. Statistically significant increases were observed in the analyzed variables of physical condition in BJ. Thus, the VO_{2Max} (p = 0.0001), the CMJ flight height (p = 0.023), the SJ flight height (p = 0.003) and the 1RM value in the uat exercise (p = 0.009) improved statistically significantly in BJ. In CG, there were no statistically significant differences after the intervention period.

Table 3. Pre- and post-test results of variables related to physical fitness.

	BJ			CG		
	PRE	**POST**	**P**	**PRE**	**POST**	**P**
VO_{2Max} [1]	36.74 ± 2.3	39.16 ± 1.6	**0.001**	37.43 ±2.9	37.99 ± 3.1	0.360
CMJ [2]	25.24 ± 4.0	26.45 ± 4.3	**0.023**	26.8 ± 3.5	26.68 ± 3.7	0.845
SJ [3]	22.94 ± 4.2	24.83 ± 4.0	**0.003**	25.21 ± 3.5	24.83 ± 4.0	0.953
1 RM [4]	71.36 ± 12.4	78.52 ± 17.02	**0.009**	82.3 ± 13.43	81.2 ± 14.6	0.575

[1] VO_{2Max} = maximum oxygen uptake ($mL \cdot kg^{-1} \cdot min^{-1}$); [2] CMJ = flight height in countermovement jump (cm); [3] SJ = flight height in squat jump (cm); [4] 1 RM = 1 maximum repetition in half-squat exercise (kg).

The comparison of the parameters related to the body composition of both the CG and the BJ is shown in Table 4. A statistically significant reduction in the sum of skinfolds was observed (p = 0.003), as well as the percentage of fat mass (p = 0.002) in BJ. The folds in which It was observed a statistically significant reduction were subscapular (p = 0.005), tricipital (p = 0.016), suprailiac (p = 0.008), supraspinale (p = 0.028) and abdominal (p = 0.005). In addition, the circumference of the contracted arm increased statistically significantly (p = 0.05) in BJ. There were no statistically significant reductions in any of the parameters in CG, and even some values, such as the waist–hip index (p = 0.047) and the percentage of fat mass (p = 0.047), increased statistically significantly during the time of the study.

Table 4. Pre- and post-test results of variables related to body composition.

	BJ					CG				
	Pre		Post			Pre		Post		
	Average	[1] sd	Average	[1] sd	[2] *p*	Average	[1] sd	Average	[1] sd	[2] *p*
Height	161.11	6.83	161.11	6.83	1.000	161.31	4.45	161.31	4.45	1.000
Weight	54.59	10.44	54.39	10.32	0.409	57.76	5.34	57.95	5.32	0.556
BMI [3]	22.39	2.23	22.26	2.03	0.218	22.23	2.16	22.28	2.31	0.779
∑ SF [4]	147.65	24.61	138.03	21.17	**0.003**	133.76	35.52	137.22	36.00	0.075
WHI [5]	0.72	0.04	0.72	0.04	0.429	0.72	0.03	0.73	0.03	**0.047**
Fat mass (%) [6]	21.52	1.99	20.54	1.78	**0.002**	21.76	3.24	21.88	3.62	**0.010**
Muscle mass [7]	22.34	3.90	22.58	3.95	0.506	22.50	4.71	22.52	4.67	0.916
Bone mass [8]	9.12	1.17	9.12	1.17	1.000	8.80	0.98	8.80	0.98	1.000
Subesc [9]	13.43	2.96	12.69	3.11	**0.050**	12.75	4.20	13.36	5.06	0.600
Tricip [10]	18.26	2.77	16.95	2.17	**0.016**	16.55	3.84	16.38	3.94	0.754
Bicip [11]	8.54	2.53	9.57	4.21	0.683	7.85	2.21	8.72	3.19	0.099
Suprailiac [12]	22.54	5.55	20.10	4.10	**0.008**	19.21	6.04	19.92	6.27	1.000
Supraspinale [13]	15.04	3.89	13.64	2.99	**0.028**	13.72	5.70	14.53	5.56	0.116
Abdom [14]	22.30	4.34	20.26	4.25	**0.005**	20.61	8.00	21.68	8.81	0.117
Front thigh [15]	30.71	8.73	29.26	9.06	0.152	26.08	6.98	27.02	6.58	0.162
Med. Calf [16]	16.89	4.53	16.49	4.24	0.530	14.70	2.94	15.24	2.41	0.346
Arm circum [17]	27.71	2.42	27.87	1.87	0.969	27.91	2.23	27.75	2.37	0.363
Contract arm [18]	27.86	2.51	28.87	2.21	**0.050**	28.55	2.07	28.73	2.07	0.479
Thigh circum [19]	50.96	4.98	51.27	4.32	0.801	51.18	3.27	51.00	3.22	0.484
Calf circum [20]	35.40	2.85	35.54	2.77	0.944	34.76	2.26	34.96	2.17	0.288

[1] = standard deviation; [2] = p value; [3] = body max index; [4] = summatory of skinfolds (mm); [5] = waist–hip index; [6] = fat mass percentage (%); [7] = muscle mass (kg); [8] = bone mass (kg); [9] = subscapular skinfold (mm); [10] = tricipital skinfold (mm); [11] = bicipital skinfold (mm); [12] = suprailiac skinfold (mm); [13] = supraspinale skinfold (mm); [14] = abdominal skinfold (mm); [15] = front thig skinfold (mm); [16] = medial calf skinfold (mm); [17] = relaxed arm circumference (cm); [18] = arm circumference in contraction (cm); [19] = thigh circumference (cm); [20] = calf circumference (cm).

4. Discussion

The main results of this study showed that the Body Jump® program, performed with a frequency of three days per week, can cause positive adaptations in different variables related to physical fitness and body composition in a short period of intervention (4 weeks of duration). These results are in concordance with other similar previous studies, in which a program of physical activity directed under musical support showed similar benefits, increasing the aerobic fitness and strength performance of participants [8,22–24].

VO_{2Max}, calculated indirectly from the UKK test, increased significantly in the BJ. Other activities conducted under musical support, such as Zumba®, have also shown positive effects on cardiovascular health. The study of Summinar et al. [22] showed an increase in VO_{2Max}, as well as a better rate of recovery of heart rate after applying for an 8-week Zumba program, also in university students. On the other hand, Chavarrías et al. [10] compared different exercise programs under musical support, stating that indoor cycling alone or the combination of this activity with Zumba and Body Pump® seems to be the most effective programs to reduce blood pressure and improve the fitness level. Based on our results, we cannot affirm that Body Jump® is more effective than another type of activity under musical support since the control group simply continued with their daily activity without incorporating any additional physical activity. However, the participants showed adequate previous values of physical activity, so it can be affirmed that performing the Body Jump® program produces cardiovascular adaptations in young, healthy, and active women who already have a certain level of training, at least in the short-term. These improvements may be related to the adaptations caused by high-intensity interval training (HIIT), which have been described in the related literature [25–28]. The structure of the Body Jump® class is not uniform. The intensity is variable, and very high-intensity efforts with short duration are demanded in specific class moments. The simplest exercises are performed in these moments of maximum effort. These kinds of exercises require less concentration and coordination, and the trampoline is strongly pushed with both legs. HIIT has already shown greater physical fitness effects than uniform continuous training in short training programs (4 to 12 weeks) [29,30]. In fact, Astorino et al. [31] reported the effectiveness of HIIT in a very short time period showing significantly enhanced VO2max and power output in active men and women after only 6 HIIT training sessions. In addition, HIIT training protocol with repetitions of high-intensity efforts from 30 to 60 s has been recommended to maximize the effects of aerobic training in all populations [32]. Precisely, the moments of maximum effort, which are demanded during the Body Jump® class, had this duration.

BJ also significantly increased their 1RM values in the half-squat exercise. Other directed activities, such as Body Pump® [24] or Pilates [33], also showed positive effects on lower body strength after the application of a short-term training program (12 weeks) in women. The improvements in the strength levels may be conditioned by the initial strength levels of the study participants. Although they were categorized as physically active, none of them followed a regular strength training program. Work with low loads and with the use of the bodyweight (as occurs in the Body Jump® program) could be positive in the short-term. However, the improvements in the maximum strength levels would be compromised in the long term, requiring exercises with higher load percentages [34,35]. Nevertheless, it is important to note that BJ started with a lower 1RM starting value than GC, and this should be considered when analyzing the results. Regarding the improvement in jumping capacity observed in BJ, it could be related to the increases in the lower body muscle strength values [36]. On the other hand, these improvements could also be explained by the increases in muscle-tendon stiffness, which could have been produced after this plyometric training based on jumping on the trampoline. In this way, it has been possible to improve the stretch-shortening cycle (CEA) and thus, a greater performance when transmitting elastic energy in the CMJ was allowed [37]. There is enough scientific support to confirm the effectiveness of plyometric work in improving the jumping capacity [38,39]. These same benefits can be appreciated when performing Body Jump®, but with the particularity that the impact is minimized when landing on an elastic trampoline instead of on the ground.

Finally, regarding the changes in body composition, BJ significantly reduced the extent of skinfolds, as well as the percentage of fat mass. Otherwise, these parameters were not modified significantly in CG. The incorporation of the Body Jump® activity could increase the total weekly energy expenditure of the BJ participants, helping to decrease their fat mass. Several studies have shown that energy balance is one of the factors, which can affect and modify body composition [40,41]. However, it would be necessary for future studies directly addressing this energy expenditure measurement during the Body Jump® program to confirm this hypothesis. In addition, the oxygen demand does not decrease immediately after cessation of the physical activity in training programs characterized by reaching high exercise intensities, such as Body Jump®. This excess post-exercise oxygen consumption (EPOC) means an extra oxygen consumption in comparison with the oxygen, which is consumed at rest without previous exercise. Consequently, a higher metabolism after training will increase energy demand, affecting body composition greater [42]. These results are also related to other studies that have evaluated the effects of HIIT training protocols and their effectiveness in losing body fat in short-term training periods (4–8 weeks) [43]. On the other hand, the bone-mass parameter was not modified in either group. Despite the peak of bone mass is reached around the age of 30 [44], only 4 weeks may be insufficient time to observe changes in this parameter in adult women. The significant increase observed in the contracted arm circumference, as well as the reduction of the triceps skinfold, could be related to upper body strength exercises with body weight. Although almost all Body Jump® training is based on performing jumps on a mini trampoline (mainly involving the lower limb), one track of the program is intended to execute bodyweight exercises for the upper body, such as push-ups triceps dips, or “core” exercises. In line with these results, Titova et al. [45] found changes in body composition in a group of adult women after a three-month training period using bodyweight strength exercises. Short-term positive effects on body composition can be observed through the use of resistance exercises with the own body weight in untrained people [46]. However, people with a higher level of experience in strength training probably need higher training loads to continue obtaining changes in body composition [47].

Finally, it is important to consider some limitations of this study. First, the extensive usage of predictive equations instead of direct measurements was used to establish the results. Second, the study was performed on a small sample of young, healthy and active women with no pathologies or health disorders. Consequently, our findings were limited to healthy young women, and they could not be directly extrapolated for other populations.

5. Conclusions

Despite the possible limitations of this study, we can conclude that the Body Jump® training program, performed three times a week for one month, showed positive effects on jumping ability, aerobic fitness, strength and body composition in physically active young women. Further research is needed to establish the short, medium and long-term adaptations of physical group activities directed under musical support, such as Body Jump®, in different population groups.

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Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Ethics Committee of Alicante University (Expedient UA-2017–04–11).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: All relevant data are within the manuscript.

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Conflicts of Interest: The authors declare no conflict of interest.

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