DOI 10.26773/jaspe.201008

REVIEW PAPER

Effects of the Aerobic Exercise Program with Music on the Body Composition and Subcutaneous Fat of Young Women: A Systematic Review

Miljan Hadzovic[1], Ana Lilic[1], Nikola Prvulovic[1], Predrag Ilic[1], Mima Stankovic[1]

[1]University of Nis, Faculty of Sport and Physical Education, Nis, Serbia

Abstract

Numerous authors recommend participation in various types of aerobic exercise, pointing out their positive effects both in terms of the prevention of various illnesses, and in the improvement of one's health status. The increasingly popular group fitness programs, as preprogrammed forms of physical exercise to music, have positive effects on body composition among women, such as a decrease in body mass and fat, and thus lead to an improvement in overall physical appearance. The aim of this research was to determine the effects of aerobic exercise to music on body composition and subcutaneous fat among young women. In order to compile data from existing research on the effects of aerobic exercise on young women, the following electronic databases were searched: PubMed, SCIndeks, PEDro, J-GATE, DOAJ and Google Scholar. The systematic review was undertaken in accordance with the statement of Preferred Reports for Systematic Review and Meta-Analyses (PRISMA). Papers dating from 2006 to 2019 were analyzed. The research results confirm the positive influence of aerobic exercise to music on the parameters of body composition and subcutaneous fat among young women, irrespective of the overall duration of the exercise programs, with the conclusion that programs lasting up to 12 weeks are more effective when it comes to the decrease and maintenance of body weight, fat reduction, increase in muscle tissue, and lead to an improvement in aerobic abilities. The best effects of this type of exercise at an intensity level of 50 to 80% of maximum heart rate are primarily achieved among obese and overweight individuals.

Keywords: *Hysical Activity, Dance, Body Mass Index, Body Fat Percentage*

Introduction

The most recent data from the World Health Organization (WHO) indicate that physical inactivity and an inappropriate diet lead to obesity among all age categories, which in turn represents one of the growing problems among the world population. Experts from this organization recommend physical exercise as one of the most effective means of solving the aforementioned problem (World Health Organization, 2018). It is known that maintaining body mass over a long period of time is more easily achieved through continued physical exercise than the mere reduction of one's diet (Aksović, Aleksandrović, & Jorgić, 2017). Blair, LaMonte, & Nichaman (2004) determined that regular physical exercise, in addition to maintaining normal physical weight, contributes to the improvement of quality of life, and an increase in muscle strength and endurance. Even though physical activity, which increases energy consumption and has a positive effect on the maintenance of body weight, includes various types of movement which we perform on a daily basis such as walking, climbing, various chores around the house, riding a bicycle to do our shopping and the like, in order to improve an individual's psycho-physical health, a programmed, planned and well-organized physical exercise program is required (Ostojić et al., 2009).

The implementation of an aerobic exercise program, that is,

Correspondence:

Montenegro Sport

Miljan Hadzovic
University of Nis, Faculty of Sport and Physical Education, Carnojevica 10A, Nis 18000, Serbia
E-mail: miljanhadzovic@gmail.com

the activation of large muscle groups over an extended period of time, impacts the improvement and development of aerobic and cardiovascular fitness, that is, aerobic endurance (Pantelić et al., 2007; Radovanović et al., 2009). Numerous authors recommend participation in various types of aerobic exercise, pointing out the positive effects both for the prevention of various illnesses, and the improvement of one's health status (Donges, Duffield, & Drinkwater, 2010; Stasiulis, Mockiene, Vizbaraite, & Mockus, 2010; Jorgić, Pantelić, Milanović, & Kostić, 2011; Kimura & Hozumi, 2012; Pantelić, Milanović, Sporiš, & Stojanović-Tošić, 2013; Sivvas, Batsiou, Vasoglou, & Filippou, 2015; Aksović et al., 2017). Walking, running, riding a bicycle, swimming, dance aerobics and other forms of group fitness represent the most frequently used sports-recreational activities by adults for the reduction of body weight, performed at a moderate intensity of 50% to 80% of the maximum heart rate (Đorđević, 2005).The increasingly popular group fitness programs, as programmed forms of physical exercise to music, have positive effects on body composition, the decrease in body mass, and amount of fat among women, also leading to an improvement in physical appearance (Bjelica, Gojković, & Fulurija, 2017).

The aim of the research was to determine the effects of aerobic exercise to music on body composition and subcutaneous fat among young women. After compiling the relevant data from previous experimental studies dating from 2006 to 2019, under the assumption that the implementation of aerobic exercise to music has a positive impact on the body composition of women, an evaluation of the effects was carried out.

Methods

Inclusion criteria

For an experimental study to be included in the final analysis, it had to meet certain criteria: the participants in the research were individuals not afflicted by any chronic conditions; the experimental research included females of an average age of 18 to 36, irrespective of their lifestyle; the experimental group took part in an aerobic exercise program to music during which its effects were evaluated and measurements taken of the parameters of body composition of the young women; the research was published in English. The exclusion criteria included:studies which included only male participants, studies which included female participants whose average age did not range from 18 to 36, papers not published in English.

Search strategy

In order to compile existing research on the effects of aerobic training programs among young women, the following electronic databases were searched: PubMed, SCIndeks, PEDro, J-GATE, DOAJ and Google Scholar. Papers dating from 2006 to 2019 were analyzed. The following key words were used for the data search: physical activity, dance, body mass index, body fat percentage. The titles of various studies were identified; abstracts and entire texts were then read and analyzed. This systematic review was undertaken in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher, Liberati, Tetzlaff, & Altman, 2009).

Data extraction and selection

Experimental research which met the set criteria was then analyzed and presented based on the following parameters: references (the initials of the author and year of publication), the sample of participants (health status and lifestyle, age, overall number and subgroups of the participants), physical exercise program, the duration and frequency of exercise, intensity of exercise, research results.

Study quality and risk of bias

Risk of bias was evaluated according to the PRISMA recommendation and two independent reviewers assessed the risk of bias. When there was disagreement about the risk of bias a third reviewer checked the data and took the final decision on it.

Synthesis of results

By searching the electronic databases, 1112 experimental studies were identified on the set topic. Primarily 510 studies were eliminated as duplicates, then 538 papers were rejected based on abstracts, while 44 studies were excluded and based on age and gender of the subjects, or were not written in English (Graph 1). Applying the set criteria, the final analysis included 20 experimental studies (Table 1).

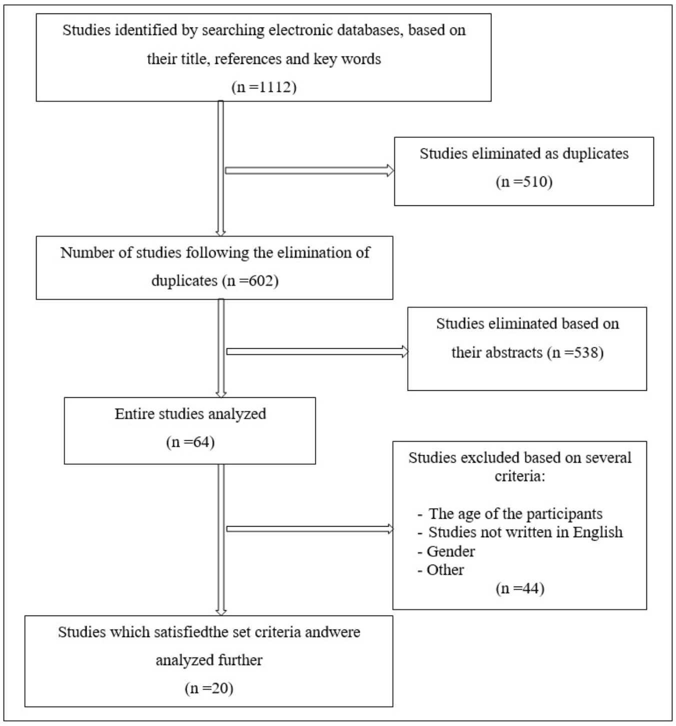
Results

In accordance with the aim of the study and the set criteria, a final analysis of 20 experimental studies was performed (Kin-Isler & Kosar, 2006; Stojiljković, Mandarić, Todorović, & Mitić, 2010; Çakmakçi, Arslan, Taşkin, & Çakmakçi, 2011; Changela, 2013; Marandi, Abadi, Esfarjani, Mojtahedi, & Ghasemi, 2013; Mathunjwa, Semple, & du Preez, 2013; Najafnia, Bararpour, Amirinejahad, & Nakhaee, 2013; Nikić & Milenković, 2013; Pantelić et al., 2013; Ljubojević et al., 2014; Kostrzewa-Nowak et al., 2015; Haghjoo, Zar, & Hoseini, 2016; Delextrat, Warner, Graham, & Neupert, 2016; Kaya, Nar, Erzeybek, & Bozdoğan, 2016; Kumar, 2016; Vassilopoulou, Piperari, & Christoforou, 2017; Ativie et al., 2018; Bastug, 2018; Biswas & Bandopadhyay, 2018; Oktay, 2018). The total number of participants included in this survey was 1127. In 17 of the 20 papers, the participants were only women or 854 participants in total, while 273 male participants were represented in three studies where the groups were mixed (Kin-Isler & Kosar, 2006; Kaya et al., 2016; Bastug, 2018). The analyzed studies included young women from 10 different countries such as: Great Britain, Republic of Poland, Republic of Serbia, Bosnia and Herzegovina, Republic of Turkey, Republic of Cyprus, Islamic Republic of Iran, Republic of India, Republic of South Africa, Federal Republic of Nigeria. Although in 10 studies (Stojiljković et al., 2010; makakmakçi et al., 2011; Changela, 2013; Marandi et al., 2013; Mathunjwa et al., 2013; Kostrzewa-Nowak et al., 2015; Haghjoo et al., 2016; Kaya et al., 2016; Vassilopoulou et al., 2017; Ativie et al., 2018) obese or overweight people were included in the exercise program, most of the analyzed studies had healthy young women with normal body weight for the respondents.

Discussion

The research results, presented in table form (Table 1), indicated that the analyzed studies mostly included programs which incorporate several types of aerobic exercise to music and a combination of various types of dance (Stojiljković et al., 2010; Changela, 2013; Marandi et al., 2013; Najafnia et al., 2013; Kumar, 2016; Ativie et al., 2018; Bastug, 2018; Biswas & Bandopadhyay, 2018), followed by studies which included various types of Zumba exercise programs (Ljubojević et al., 2014; Haghjoo et al., 2016; Delextrat et al., 2016; Kaya et al., 2016; Vassilopoulou et al., 2017; Biswas & Bandopadhyay, 2018; Oktay, 2018). The authors of four studies used "Hi-Lo" aerobics (Çakmakçi et al., 2011; Pantelić et al., 2013; Kostrzewa-Nowak et al., 2015; Biswas & Bandopadhyay, 2018), two of the studies involved independent use of "Step" aerobics (Kin-Isler & Kosar, 2006; Nikić & Milenković, 2013) and one included Tae-Bo (Mathunjwa et al., 2013).

The duration of the experimental studies differed and ranged from an interval of 24 weeks (Stojiljković, et al., 2010) to eight weeks (Çakmakçi et al., 2011; Changela, 2013; Mathunjwa et al., 2013; Ljubojević et al., 2014; Haghjoo et al., 2016; Delextrat et al.,



GRAPH 1. A diagram of the course of analysis of the papers

2016; Kaya et al., 2016; Vassilopoulou et al., 2017; Ativie et al., 2018; Oktay, 2018) which is also the most frequent duration of the implemented exercise programs. The greatest weekly frequency of training was determined in 16 of the studies (Kin-Isler & Kosar, 2006; Stojiljković et al., 2010; Çakmakçi et al., 2011; Changela, 2013; Marandi et al., 2013; Mathunjwa et al., 2013; Najafnia et al., 2013; Nikić & Milenković, 2013; Pantelić et al., 2013; Ljubojević et al., 2014; Kostrzewa-Nowak et al., 2015; Haghjoo et al., 2016; Delextrat et al., 2016; Kaya et al., 2016; Vassilopoulou et al., 2017; Oktay, 2018) and included three training sessions per week for a duration of 60 minutes. Kumar (2016) included exercises for a duration of 60 minutes, but five times a week, while in one study (Ativie et al., 2018) the frequency was four training sessions per week for a period of eight weeks, while the duration of the sessions increased every two weeks, ranging from 30 to 60 minutes. The longest running study included training sessions once a week, for a duration of 30 to 70 minutes. In addition, in one study there is no data on the weekly frequency and duration of the exercise (Biswas & Bandopadhyay, 2018).

The intensity of the exercise in the analyzed experimental studies was moderate to high and ranged from 50% to 90%. One study included a program with the highest intensity, 90% (Stojiljković et al., 2010). In four of the studies (Haghjoo et al., 2016; Delextrat et al., 2016; Kumar, 2016; Vassilopoulou et al., 2017) the intensity was 85% of maximum heart rate (HRmax), in another four the upper limit of the exercise intensity was 80% of maximum heart rate (Nikić & Milenković, 2013; Pantelić et al., 2013; Bastug, 2018). One study (Çakmakçi et al., 2011) included a program of moderate intensity of 60-70% HRmax. The lowest intensity of exercise ranged from less than 40% HRmax (Delextrat et al., 2016;), in nine of the studies (Changela, 2013; Mathunjwa et al., 2013; Kostrzewa-Nowak et al., 2015; Nikić & Milenković, 2013; Haghjoo et al., 2016; Kumar, 2016; Vassilopoulou et al., 2017; Bastug, 2018; Oktay, 2018) the minimum intensity was 50% HRmax, while in three studies (Stojiljković et al., 2010; Çakmakçi et al., 2011; Pantelić et al., 2013) the lowest exercise intensity was 60% of maximum heart rate. In two of the studies (Kin-Isler & Kosar, 2006; Marandi et al., 2013) the exercise intensity was determined based on the resting heart rate, ranging from 45 to 75% and from 60 to 80% of heart rate reserve.

The structure of the training sessions implemented in all the studies was the same, and included an introductory (warm up) part of lower intensity for a period of 5 to 10 minutes (Kin-Isler & Kosar, 2006; Çakmakçi et al., 2011; Changela, 2013; Mathunjwa et al., 2013; Najafnia et al., 2013; Nikić & Milenković, 2013; Pantelić et al., 2013; Ljubojević et al., 2014; Kostrzewa-Nowak et al., 2015; Haghjoo et al., 2016; Kaya et al., 2016; Ativie et al., 2018; Oktay, 2018), followed by the main part of the training session (from 25 to 45 minutes) with higher intensity exercises, which consisted of a number of shorter choreographies with smaller breaks, and a final part (from 10 to 15 minutes) consisting of exercises meant to cool down the body, and stretching exercises.

The systematic overview of the parameters which were measured noted multiple effects of the implemented exercise programs on the body composition of young women. The effects of the aerobic exercise programs to music led to a decrease in the BMI, with a statistically significant difference in favor of the studies with longer exercise programs. The greatest statistically significant decrease ($p<0.001$) in BMI was determined by Kumar (2016), whose program lasted for 12 weeks, with five training sessions per week of 60 minutes each, as well as in a study which lasted 24 weeks with three 60-minute training sessions a week (Stojiljković et al., 2010), followed by a study which lasted for 14 weeks with a single training session per week of 30 to 70 minutes (Bastug, 2018) and the study of Kostrzewa-Nowak et al. (2015) which lasted for 12 weeks ($p<0.01$). The exercise programs included in studies which lasted eight weeks (Kaya et al., 2016; Ativie et al., 2018), with three and four training sessions per week, led to a statistically significant difference ($p<0.05$) in the BMI in favor of the experimental group. Similar effects to those of the previous study were obtained by Mathunjwa et al. (2013) whose study lasted for 10 weeks, with three training sessions per week of a durationof 60 minutes.

Comparing the results of exercise on the decrease in skinfold thickness, two studies including obese or overweight participants (Mathunjwa et al., 2013; Kostrzewa-Nowak et al., 2015) showed a statistically significant difference ($p<0.05$) in favor of the experi-

Table 1. The systematic review and characteristics of the selected research

Study (year)	Health status	Gender	Lifestyle	Participants' age (MEAN ± SD)	Sample size (n)	(BMI kg/m²)	No. of participants	Duration Frequency (days/ weeks)	Intensity Duration of the training (min)	Type of activity	Results (r)
Kin-Isler & Kosar, 2006	Healthy individuals	F=64 M=54	Sedentary	EΓ (M + F) F=25.00±1.46 M=22.48±2.02 KΓ (M + F) F=21.00±1.42 M=22.13±1.70	n=118	X	EΓ=33F+27M KΓ=31F+27M	10 weeks 3/7	50min HRR 60–80%	EG – dance aerobics (Step) KG – no physical activity	M≠F BFP%(M) ↓ p<0.05 LBM (M) ↑ p<0.05 MSL (M) ↑ p<0.05 BW ¥ p>0.05 EG»KG (GxG) BFP% ¥ LBM ¥ MSL ¥ BW ¥ MPRBW ↑ p<0.05 EG»KG (F»M) APVJ ↑ p<0.05
Stojiljković et al., 2010	Healthy individuals with normal weight and overweight	F	Sedentary	33.6±6	n=10	25.61±3.87	EG=10	24 weeks 3/7	60min HRmax 60–90%	Omnibus aerobics (a combination of 12 types of aerobics)	EG» BW ↓ p≤0.01 BMI ↓ p≤0.01 WC ↓ p≤0.01 HC ↓ p≤0.01 WHR ¥ ON ↓ p≤0.01 OP ↓ p≤0.05 ONL ↓ p≤0.01 CCH ↓ p≤0.01 CRNC ↑ p≤0.01 SQ ↑ p≤0.01 PU ↑ p≤0.01
Çakmakçi et al., 2011	Obese individuals	F	Sedentary	EG=35.10±9.12 KG=30.27±10.85	n=55	EG=26.58±2.26 KG=26.11±3.64	EG = 29 KG = 26	8 weeks 3/7	60min HRmax 60–70%	EG – dance aerobics (Hi-Lo) KG – no physical activity	EG»KG BW ↓ p<0.05 BMI ↓ p<0.05 WC ↓ p<0.05 WHR ↓ p<0.05 SFLB ↓ p<0.05 SFLT ¥ SFLS ¥ SFLSI ¥ BMR ↓ p<0.05 BFP% ↓ p<0.05 LBM ↓ p<0.05

Study (year)	Health status	Gender	Lifestyle	Participants' age (MEAN ± SD)	Sample size (n)	(BMI kg/m²)	No. of participants	Duration Frequency (days/ weeks)	Intensity Duration of the training (min)	Type of activity	Results (r)
Changela, 2013	Obese women	F	Sedentary	19-25	n = 20	EGa=31.93±1.47 EGb=32.19±2.57	EGa=10 EGb=10	Dance aerobics 8 weeks 3/7 Resistance training 6 weeks of alternatives	Dance aerobics 40min HRmax 50-75% Resistance training 4 sets of 10 reps 50-100% RM	EGa – dance aerobics EGb - resistance training	EGa» HRmax↑ p<0.001 SBP ↓ p<0.001 DBP ↓ p<0.05 BW ↓ ‡ p=0.06 BMI ↓ ‡ p=0.06 BFP% ↓ ‡ p=0.06 EGb» HRmax↓ p=0.04 SBP ↓ p<0.001 BW ↓ ‡ p=0.06 BMI ↓ ‡ p=0.06 BFP% ↓ ‡ p=0.06 EGa» EGb VLDL ↓p<0.05 HDL ↑ p<0.05
Marandi et al., 2013	Obese individuals and overweight individuals	F	X	25-40	n=45	EGa=27.83±4.15 EGb=29.19±3.86 KG=30.38±4.98	EGa=15 EGb=15 KG=15	10 weeks 3/7	60min EGa 45-50% HRRmax EGb 70-75% HRRmax	EGa – dance aerobics (Low int.) EGb - dance aerobics (Moderate int.) KG – no physical activity	EGa and EGb » KG BW ↓ p<0.00 BMI ↓ p<0.00 BFP% ↓ p<0.05 FMkg ↓ p<0.03 WHR ↓ p<0.00 LBM ↑ p<0.02 HDL ↑ p<0.00
Mathunjwa et al., 2013	Obese individuals and overweight individuals	F	Sedentary	25±5	n=60	Overweight BMI>25–29.90 kg/m2 Obese BMI≥30-39.90 kg/m2	EG=60	10 weeks 3/7	60min 1-5 weeks moderate tempo 6-10 weeks high tempo	Aerobics (Tae-Bo)	EG» BW ↓ p≤0.05 BMI ↓ p≤0.05 WC ↓ p≤0.05 HC ↓ p≤0.05 ∑SFL ↓ p≤0.05
Najafnia et al., 2013	Healthy individuals	F	15 physically active individuals 15 individuals with a sedentary lifestyle	EG=26.24±5.86 KG=25.94±5.88	n=30	X	EG=15 KG=15	8 weeks 3/7	50-60min HRmax 50–75%	EG - dance aerobics (Step) KG – no physical activity	EG»KG BFP% ↓ p=0.02 FLB ↑ p=0.01 SB ↑ p=0.01 VO2max ↑p=0.01 VIT ↑ p=0.02 BLD ↓ p=0.01 FGS ↓ p=0.02

(Continued on next page)

Study (year)	Health status	Gender	Lifestyle	Participants' age (MEAN ± SD)	Sample size (n)	(BMI kg/m²)	No. of participants	Duration Frequency (days/ weeks)	Intensity Duration of the training (min)	Type of activity	Results (r)
Nikić & Milenković, 2013	Healthy individuals	F	X	18-25	n=24	X	EG=12 KG=12	12 weeks 3/7	60min HRmax 50–80%	EG – dance aerobics (Step) KG – no physical activity	EG»KG MS ↑ p≤0.01 CD ↑ p≤0.01 BW ↓ p≤0.01 BFP% ↓ p≤0.01 BWP% ↑ p≤0.01 MM ↑ p≤0.01 BMR↑ p≤0.01
Pantelić et al., 2013	Healthy individuals	F	X	EG=23.10±1.90 KG=22.70±1.80	n=59	EG=23.00±2.20 KG=21.70±1.70	EG=29 KG=30	12 weeks 3/7	60min HRmax 60–80%	EG – dance aerobics (Hi-Lo) KG – no physical activity	EG» BW ↓ ¥ ΣSFLUB ↓ p<0.05 ΣSFL ↓ p<0.05 BFP% ↓ p<0.05 KG» BW ↓ ¥ MM% ↓ p<0.05 EG»KG ΣSFLLB ↓ p<0.05 ΣSFL ↓ p<0.05 BFP% ↓ p<0.05
Ljubojević et al., 2014	Healthy individuals	F	X	25-35	n=12	X	EG=12	8 weeks 3/7	60min	EG – Zumba exercise program	EG» BW ↓ p=0.02 BFP% ↓ p=0.01 BFkg↓ p=0.00 FFM ↑ ¥ TBW ↑ ¥
Kostrzewa-Nowak et al., 2015	Healthy undernourished individuals, individuals with normal mass, overweight individuals	F	X	19-24	n=37	Undernourished EGa=17.90 (mean) Normal mass EGb=21.30 (mean) Overweight EGc=26.00 (mean)	EGa =10 EGb = 12 EGc = 12	12 weeks 3/7	60min HRmax 50–75% 3 weeks 50-60% 3 weeks 55-65% 3 weeks 60-70% 3 weeks 65-75%	Dance aerobics (Hi-Lo)	EGa» BW ↑ p=0.01 BMI ↑ p=0.01 VO2max ↑ p=0.05 EG6» ¥ EGc» BW ↓ p=0.01 BMI ↓ p=0.01 FFM ↓ p=0.01 TBW ↓ p=0.05 BFP% ↓ p=0.01 ΣSFL ↓ p<0.05

Study (year)	Health status	Gender	Lifestyle	Participants' age (MEAN ± SD)	Sample size (n)	(BMI kg/m²)	No. of participants	Duration Frequency (days/ weeks)	Intensity Duration of the training (min)	Type of activity	Results (r)
Haghjoo et al., 2016	Healthy overweight individuals	F	X	EG=31.50±6.97 KG=29.85±8.17	n=29	EG=27.88±4.60 KG=28.66±4.53	EG=16 KG=13	8 weeks 3/7	60min HRmax 50–85%	EG – Zumba KG – no physical activity	EG»KG BFP% ↓ p=0.001 BMI ↓ p=0.001 FMkg ↓ p=0.001 WHR ↓ p=0.004 PM p=0.92 ¥
Delextrat et al., 2016	Healthy individuals	F	X	EG=26.60±5.40 KG=27.90±6.00	n=37	X	EG=19 KG=18	8 weeks 3/7	60min HRmax 40–85%	EG – Zumba at home (DVD) KG – no physical activity	(GxT) VO2max ↑ p=0.01 EG» (GxT) VO2max↑ +3,6%; p<0.01 KG» VO2max ‡ −2,4% p=0.06 EG» KG ¥ BW ↓p>0.05 BFP% ↓ p>0.05
Kaya et al., 2016	Healthy individuals with normal weight and healthy overweight individuals	F=46 M=44	Sedentary	EGM=30.70±6.44 EGF=29.13±5.80	n=90	EGM=25.52±3.55 EGF=26.79±5.01	EGM=44 EGF=46	8 weeks 3/7	45-60min Resistance training 3 sets of 10-14 reps >40% RM Zumba training to music	EGM – resistance training EGF – Zumba	EGM » and EGF » BW ↓ p<0.05 BMI ↓ p<0.05 BMR ↓ p<0.05 BFP% ↓ p<0.05 BFkg↓ p<0.05 FFM ↓ p<0.05 TBW ↓ p<0.05
Kumar, 2016	Healthy individuals	F	X	18–24	n=30	X	EG=15 KG=15	12 weeks 5/7	60min HRmax 50–85%	EG – Zumba and aerobics (Hi Low, Step, Floor) KG – no physical activity	EG» KG CE↑ p<0.01 BMI ↓ p<0.001

(Continued on next page)

Study (year)	Health status	Gender	Lifestyle	Participants' age (MEAN ± SD)	Sample size (n)	(BMI kg/m²)	No. of participants	Duration Frequency (days/ weeks)	Intensity Duration of the training (min)	Type of activity	Results (r)
Vassilopoulou et al., 2017	Healthy overweight individuals	F	Physically active	KG=27.80±4.89 EGa=28.27±4.96 EGb=27.00±5.06	n=32	KG=25.98±1.82 EGa=25.24±1.17 EGb=26.10±1.34	KG=10 EGa=11 EGb=11	8 weeks 3/7	60min HRmax 50–85%	KG – Zumba EGa – Zumba + diet seminars EGb – Zumba + individual diet plans	KG ‡ p>0.05 BW ↓ p=0.07 BFP% ↓ p=0.59 WHR ↓ p=0.10 WC ↓ p=0.36 HC ↓ p=0.07 EGa» BW ↓ p=0.14 BFP% ↓ p=0.05 WHR ↓ p=0.59 WC ↓ p=0.07 HC ↓ p=1.00 EGb» BW ↓ p=0.04 BFP% ↓ p=0.04 WHR ↓ p=0.13 WC ↓ p=0.07 HC↓ p=0.03
Ativie et al., 2018	Obese individuals and overweight individuals	F	X	18–30 EG=20.06±1.50 KG=21.14±1.60	n=61	EG=27.07±2.38 KG=29.12±4.63	EG=32 KG=29	8 weeks 4/7	0-2 weeks 30min 2–4 weeks 40min 4-6 weeks 50min 6–8 weeks 60min Moderate intensity 12-14 (the Borg scale 6-20)	EG – dance aerobics KG – no physical activity	EG»KG BW ↓ p<0.05 BMI ↓ p<0.05 WC ↓ p<0.05 HC ↓ p<0.05 WHR ↓ p<0.05 BFP% ↓ p<0.05 EG» MM ↑ p<0.05
Bastug, 2018	Healthy individuals	F=93 M=175	X	20.59±1.59	n=268	EG=23.30±2.75 KG=22.80±3.03	EG=129 KG=139	14 weeks 1/7	30-70min HRmax 50–80%	EG – Salsa, Zumba and Modern dance KG – no physical activity	EG»KG BW ↓ p<0.01 BMI ↓ p<0.01 FLX ↑p<0.05 BLC ↑ p<0.001 CONC ↑ p<0.001

Study (year)	Health status	Gender	Lifestyle	Participants' age (MEAN ± SD)	Sample size (n)	(BMI kg/m²)	No. of participants	Duration Frequency (days/ weeks)	Intensity Duration of the training (min)	Type of activity	Results (r)
Biswas et al., 2018	Healthy individuals	F	X	20–25	n=90	X	KG=30 EGa=30 EGb=30	12 weeks	X	KG – no physical activity EGa – Zumba EGb – Aerobics	EGa»KG p<0.05 BFP% ↓ p<0.05 MM% ↑ p<0.05 BMD ↑p<0.05 EGb»KG p<0.05 BFP% ↓ p<0.05 MM% ↑p<0.05 BMD ↑p<0.05
Oktay, 2018	Healthy individuals	F	Sedentary	21.30±2.29	n=20	X	EG=20	8 weeks 3/7	60min HRmax 50-60%	Zumba	EG» BW ↓ p<0.05 BFP% ↓ p<0.05 VO2max ↑p<0.05 FLX ↑ p<0.05 SB ↑ p<0.05 SL ↑ p<0.05 DGS ↑ ¥ SBP ↓¥ DBP ↑ ¥ HRR ↑ ¥

M - male; F - female; X - unavailable; n – number of participants; EG-experimental group; KG- control group; BW- body weight; BFP% - body fat percentage; BFkg – amount of fat tissue (kg); FFM – fat free mass (kg); BWP% – body water percentage; TBW – total amount of water in the body (kg); BMI – body mass index (kg/m²); RM – repetitive maximum; WHR – waist to hip ratio; BMD – bone mass density; BMR – basal metabolic ratee; LBM – lean body mass (kg); MSL – leg muscle strength; SBP – systolic blood pressure; DBP – diastolic blood pressure; HDL - high density lipoproteins; VLDL – very low density lipoproteins; MPRBW – muscle power ratio to body weight (W/kg/BW); APVJ – anaerobic power of the vertical jump; PM – protein mass; MM% - muscle mass percentage; MM – muscle mass (kg); SFLB – bicep skinfold thickness (mm); SFLT – triceps skinfold thickness (mm); SFLS – subscapular skinfold thickness (mm); SFLSI – suprailiac skinfold thickness (mm); ∑SFLUB – sum of upper body skinfold thickness (mm); ∑SFLLB – sum of lower body skinfold thickness (mm); ∑SFL – sum of skinfold thickness (mm); FLX – body flexibility (cm); FLB – spinal column flexibility (cm); SB – back muscle strength (kg); SL – leg muscle strength (kg); DGS – dominant grab strength (kg); BLC – body balance; CONC – concentration; EG»KG – differences in favor of the experimental group compared to the control group following the exercise program; (GxT) – significance of the effect of interaction between groups and time; (GxG) – significance of the effect of interaction between groups and gender; M≠F –differences between the male and female participants; (F»M) – significant differences in favor of the female participants compared to the male ones; WC – waist circumference; HC- hip circumference; ON – upper leg circumference; OP – lower leg circumference; ONL – upper arm circumference; CCH – thoracic circumference; CRNC – crunches; SQ – squats; PU – push-ups; VO2max – maximum oxygen uptake (ml/kg/min); CE – cardiorespiratory endurance; HRmax– maximum heart rate; HRR – (heart rate reserve) resting heart rate; VIT – vitality; BLD – bewilderment; FGS – fatigue; MS – motor skills; CD – circular dimensionality; p – level of statistical significance; ↑- improvement/increase; ↓ - decrease; ‡ - statistical significance of moderate intensity; ¥ - lack of statistical significance; » - differences between the initial and final measurement.

mental group, compared to the control one, as did a study which included female participants with normal body weight, but which included a longer period of training (Pantelić et al., 2013). In one of the studies a statistically significant difference was noted ($p<0.05$) only in the case of skinfold thickness of the biceps (Çakmakçi et al., 2011). A study which included overweight women (Vassilopoulou et al., 2017) showed the same value of significance, but in a group of participants with reduced food intake who adhered to a strict diet plan.

The greatest statistically significant decrease ($p\leq0.01$) in body fat percentage (BFP%) was noted in studies where the exercise program lasted for 12 weeks (Nikić & Milenković, 2013; Kostrzewa-Nowak et al., 2015), but also in studies (Ljubojević et al., 2014; Haghjoo et al., 2016) which included a Zumba exercise program and lasted for a period of eight weeks. A statistically significant decrease in body fat percentage ($p<0.05$) was noted in eight additional studies (Çakmakçi et al., 2011; Marandi et al., 2013; Najafnia et al., 2013; Pantelić et al., 2013; Kaya et al., 2016; Vassilopoulou et al., 2017; Ativie et al., 2018; Biswas & Bandopadhyay, 2018), where various types of aerobic exercise were used ("Hi-Lo"and "Step" aerobics, Zumba, combinations of aerobic dance exercises and modern dance). The authors of one study concluded that there is no statistically significant difference in the achieved effects on the BFP% between dance aerobics and a Zumba exercise program, indicating that the experimental group, using the various types of exercise, achieved a statistically significant decrease compared to the control group (Biswas & Bandopadhyay, 2018).

A statistically significant decrease in body weight (BW)at the $p<0.01$ level under the influence of aerobic exercise to music was confirmed among young women in five studies which had the longest program duration (Stojiljković et al., 2010; Nikić & Milenković, 2013; Kostrzewa-Nowak et al., 2015; Bastug, 2018), and in a ten-week study which included an aerobic exercise program of low and moderate intensity (Marandi et al., 2013). In addition, in seven studies (Çakmakçi et al., 2011; Mathunjwa et al., 2013; Ljubojević et al., 2014; Kaya et al., 2016; Vassilopoulou et al., 2017; 2018; Ativie et al., 2018; Oktay, 2018) a statistically significant decrease in body weight was noted at the $p<0.05$ level, which can be a consequence of the program duration, which lasted only eight weeks.

Three studies have determined the positive effects of exercise on the increase in muscle mass (Nikić & Milenković, 2013; Ativie et al., 2018; Biswas & Bandopadhyay, 2018). The implementation of exercise programs have led to statistically significant effects among young women ($p\leq0.01$) in the case of parameters related to body build, that is, led to an increase in body water percentage (BWP%), an improvement of the basal metabolism (Nikić & Milenković, 2013), as well as an increase ($p<0.05$) in bone density (Biswas & Bandopadhyay, 2018).

Studies which included exercise programs with the lowest intensity for a duration of eight weeks, consisting of Zumba exercises performed at home to the accompaniment of video recordings (Delextrat et al., 2016), were the only ones where the implementation of the program in question did not lead to visible changes in the body composition of sedentary women. This is probably a consequence of the shorter duration of the experimental program, and their authors have indicated the need to implement a different style of Zumba exercise, or a combination of exercises with a change in the participants' diet.

Based on the results, we can conclude that the implementation of an aerobic exercise program to music with an intensity of 50 to 85% of the maximum heart rate over a longer period of time, and a duration of 30 minutes in the main part of the training session, enables greater oxidation of fat that is needed to create energy, which in turn influences the reduction of body fat. This conclusion is shared by the author Borer (2008), who stated that during low intensity aerobic exercise, most of the energy is obtained through the oxidation of fat which originates from fat depots and to a smaller extent from the glucose produced in the liver. In addition, with an increase in intensity, this relation decreases and alternative sources of energy are required. Based on the results of this study, the implementation of mild to moderate intensity exercise over an extended period of time of eight weeks can be used for the reduction of visceral, subcutaneous and total abdominal fat without a reduction of one's diet, which is in accordance of the claims of previous authors (Hrvoj, Slišković, & Šimić, 2015). In addition, the results indicate that different types of dance aerobics can be used with the aim of improving physical ability, but also as a means of impacting body composition, that is, reducing the amount of body fat, and increasing muscle mass, which is in accordance with the findings of previous studies (Blair et al., 2004; Kimura & Hozumi, 2012).

Conclusion

By analyzing the compiled studies, we can confirm the positive influence of aerobic exercise programs to music on the parameters of body composition and subcutaneous fat among young women, irrespective of the overall duration of the implemented exercise programs, with the conclusion that exercise programs which lasted 12 or more weeks had a greater impact on the reduction and maintenance of body weight, body fat reduction, increase in muscle tissue, and led to the improvement of aerobic capacity. The greatest effects were primarily noted among obese and overweight individuals who followed an exercise program of an intensity of 50 to 80% of maximum heart rate.

Finally, after summing up all the results, we can conclude that taking part in activities of moderate to high intensity accompanied to music is very useful, and thus can be recommended for continued use as a recreational activity which contributes to the decrease in the amount of fat in the body, the increase in muscle mass and amount of water in the body, as well as the maintenance of normal and a reduction of overweight body mass.

Acknowledgements
There are no acknowledgements.

Conflict of Interest
The authors declare that there are no conflicts of interest.

Received: 20 August 2020 **| Accepted:** 28 September 2020 | **Published:** 16 October 2020

References

Aksović, N., Aleksandrović, M., & Jorgić, B. (2017). Effects of high intensive training on body composition of women. *TIMS. Acta*, *11*(1), 53-64.

Ativie, R.N., Aigbiremolen, A.A., Ohwin, P.E., Okemuo, A.J., Odigie, O.M., Agono, J., & Igweh, J.C. (2018). Modulations of 8-Week Aerobic Dance Exercise on Selected Anthropometric Indicators in Overweight and Obese Females. *Journal of Applied Life Sciences International, 16*(3), 1-8.

Bastug, G. (2018). Examination of Body Composition, Flexibility, Balance, and Concentration Related to Dance Exercise. *Asian Journal of Education and Training*, *4*(3), 210-215.

Biswas, S.K., & Bandopadhyay, K. Effect of Aerobics and Zumba on Selected Body Composition Variables on Young Working Women. *International Journal of Physical Education and Sports*, *3*(04), 34-47.

Bjelica, B., Gojković, D., & Fulurija, D. (2017). Efekti zumba plesa na tjelesnu kompoziciju i poboljšanje zdravlja kod žena. *Sport i zdravlje*, *2*(2), 5-10.

Blair, S.N., LaMonte, M.J., & Nichaman, M.Z. (2004). The evolution of physical activity recommendations: how much is enough?. *The American journal of clinical nutrition*, *79*(5), 913S-920S.

Çakmakçi, E., Arslan, F., Taşkin, H., & Çakmakçi, O. (2011). The effects of aerobic dance exercise on body composition changes associated with weight change in sedentary women. *Selçuk University Journal of Physical Education and Sport Science*, *13*(3), 298-304.

Changela, P.K. (2013). A Study to Compare the Effect of Aerobic and Resistance Training on Cardiovascular (CVS) Fitness in Young Obese

Sedentary Females. *International Journal of Scientific and Research Publications*, *3*(2), 1-5.

Delextrat, A.A., Warner, S., Graham, S., & Neupert, E. (2016). An 8-week exercise intervention based on Zumba improves aerobic fitness and psychological well-being in healthy women. Journal of Physical Activity and Health, *13*(2), 131-139.

Donges, C.E., Duffield, R., & Drinkwater, E.J. (2010). Effects of resistance or aerobic exercise training on interleukin-6, C-reactive protein, and body composition. *Medicine and science in sports and exercise*, *42*(2), 304-313.

Đorđević, A. (2005). Rekreacija kao način savremenog življenja. *Sportska medicina*, *5*(2), 54-78.

Đurašković, R. (2001). *Biologija razvoja* čoveka *sa medicinom sporta – praktikum*. Niš: S.I.I.C.

Haghjoo, M., Zar, A., & Hoseini, S. (2016). Effect of 8-week Zumba training on overweight women's body composition. *Pars Journal of Medical Sciences*, *14*(2), 21-29.

Jorgić, B., Pantelić, S., Milanović, Z., & Kostić, R. (2011). The effects of physical exercise on the body composition of the elderly: A systematic review. *Facta universitatis-series: Physical Education and Sport*, *9*(4), 439-453.

Kaya, F., Nar, D., Erzeybek, M.S., & Bozdogan, Z. (2016). Among the physical fitness workouts, the efficiency of the weight training and zumba exercises on the body composition in men and women. In H.B. Gündüz, E. Masal & H. Çalişkan (Eds.), *ERPA International Congresses on Education 2016, SHS Web Conference, Volume 31* (pp.1-5). Sarajevo: EDP Sciences.

Kimura, K., & Hozumi, N. (2012). Investigating the acute effect of an aerobic dance exercise program on neuro-cognitive function in the elderly. *Psychology of Sport and Exercise*, *13*(5), 623-629.

Kin-Isler, A., & Kosar, S.N. (2006). Effect of step aerobics training on anaerobic performance of men and women. *Journal of Strength and Conditioning Research*, *20*(2), 366-371.

Kostrzewa-Nowak, D., Nowak, R., Jastrzębski, Z., Zarębska, A., Bichowska, M., Drobnik-Kozakiewicz, I., Radzimiński, L., Leońska-Duniec, A., Ficek, K., & Cięszczyk, P. (2015). Effect of 12-week-long aerobic training programme on body composition, aerobic capacity, complete blood count and blood lipid profile among young women. *Biochemia medica: Biochemia medica*, *25*(1), 103-113.

Kumar, S. (2016). The effect of Zumba& aerobics exercise training on physical fitness variables-A study. *International Journal of Physical Education, Sports and Health* 3(5), 275-276.

Luettgen, M., Foster, C., Doberstein, S., Mikat, R., & Porcari, J. (2012). ZUMBA®: Is the "fitness-party" a good workout?. *Journal of sports science & medicine*, *11*(2), 357-358.

Ljubojević, A., Jakovljević, V., & Popržen,M. (2014). Effects of Zumba fitness program on body composition of women. *SportLogia*, *10*(1), 29-33.

Marandi, S.M., Abadi, N.G.B., Esfarjani, F., Mojtahedi, H., & Ghasemi, G. (2013). Effects of intensity of aerobics on body composition and blood lipid profile in obese/overweight females. *International journal of preventive medicine*, *4*(1), S118-S125.

Mathunjwa, M.L., Semple, S.J., & du Preez, C. (2013). A 10-week aerobic exercise program reduces cardiometabolic disease risk in overweight/obese female African university students. *Ethnicity & disease*, *23*(2), 143-148.

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D.G. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of internal medicine, 151*(4), 264-269.

Najafnia, Y., Bararpour, E., Amirinejahad, B., & Nakhaee, H. (2013). Effects of 8-week step aerobic exercise on women's physiological characteristics, body fat percentage, and quality of life. *International Journal of Sport Studies*, *3*(12), 1335-1341.

Nieri, T., & Hughes, E. (2016). All about having fun: women's experience of Zumba fitness. *Sociology of Sport Journal*, *33*(2), 135-145.

Nikić, N., & Milenković, D. (2013). Efficiency of step aerobic program in younger women. *Acta Medica Medianae, 52*(3), 25-34.

Oktay, G. (2018). Investigation of effects of 8 weeks zumba exercise of women on health related physical fitness factors. *European Journal of Physical Education and Sport Science*, *4*(6), 16-24.

Ostojić, S., Stojanović, M., Veljović, D., Stojanović, M.D., Međedović, B., & Ahmetović, Z. (2009). Fizička aktivnost i zdravlje. *Tims Acta*, *3*(1), 1-13.

Pantelić, S., Kostić, R., Mikalački, M., Đurašković, R., Čokorilo, N., & Mladenović, I. (2007). The effects of a recreational aerobic exercise model on the functional abilities of women. Factauniversitatis-series: Physical Education and Sport, *5*(1), 19-35.

Pantelić, S., Milanović, Z., Sporiš, G., & Stojanović-Tošić, J. (2013). Effects of a twelve-week aerobic dance exercises on body compositions parameters in young women. *International Journal of Morphology*, *31*(4), 1243-1250.

Radovanović, D., Aleksandrović, M., Stojiljković, N., Ignjatović, A., Popović, T., & Marinković, M. (2009). Uticaj treninga u preadolescentnom uzrastu na kardiorespiratornu izdržljivost. *Acta Medica Medianae*, *48*(1), 37-40.

Sivvas, G., Batsiou, S., Vasoglou, Z., & Filippou, D.A. (2015). Dance contribution in health promotion. *Journal of Physical Education and Sport*, *15*(3), 484-489.

Stasiulis, A., Mockienė, A., Vizbaraitė, D., & Mockus, P. (2010). Aerobic exercise-induced changes in body composition and blood lipids in young women. *Medicina*, *46*(2), 129-134.

Sternlicht, E., Frisch, F., & Sumida, K.D. (2013). Zumba® Fitness workouts: are they an appropriate alternative to running or cycling?. *Sport Sciences for Health*, *9*(3), 155-159.

Stojiljković, S., Mandarić, S., Todorović, K., & Mitić, D. (2010). Efekti primene 'omnibus' aerobika na telesnu kompoziciju žena. *Fizička kultura*, *64*(2), 59-67.

Vassilopoulou, E., Piperari, G., & Christoforou, C. (2017). Is Zumba® Fitness Effective to Manage Overweight Without Dietary Intervention?. *Arab Journal of Nutrition and Exercise (AJNE)*, *1*(3), 113-121.

World Health Organization, (2018, 12 December). *Physical activity*. Retrieved from World Health Organization website: https://www.who.int/news-room/fact-sheets/detail/physical-activity