"BABEȘ-BOLYAI" UNIVERSITY

Cluj-Napoca

FACULTY OF PHYSICAL EDUCATION AND SPORT

DOCTORAL SCHOOL OF PHYSICAL EDUCATION AND SPORT

THESIS

- SUMMARY -

PhD supervisor:

PROF. UNIV. DR. IACOB HANŢIU

PhD student:

GIURGIU ALEXANDRA IOANA

2020

"BABEȘ-BOLYAI" UNIVERSITY

Cluj-Napoca

FACULTY OF PHYSICAL EDUCATION AND SPORT

DOCTORAL SCHOOL OF PHYSICAL EDUCATION AND SPORT

The impact of physical activities on anthropometric indicators and self-esteem at adult women

PHD THESIS SUMMARY

Keywords: physical activity, self-esteem, anthropometric indices, body composition, adult women.

PhD supervisor:

PROF. UNIV. DR. IACOB HANŢIU

PhD student:

GIURGIU ALEXANDRA IOANA

2020

Introduction

People's lives have been strongly influenced by changes in science and technology, which through rapid industrialization and urbanization has significantly changed living and working conditions. Technology and robotization, not only in industrial processes but also in households, have reduced the physical activity of the individual. Experience and studies have shown that this is not a positive factor, because the need for movement remains a constant in the harmonious existence of a person. In other words, if for our daily life we are no longer so physically demanding, in order to keep our balance we should resort to the use of physical exercises. Exercise, practiced in various forms, is a very effective means of maintaining health and strengthening the body. It has gained notoriety as an activity with minimal investment, having many benefits and can be easily practiced, being available to most of the population.

Carnethon (2009) found that only one hour of moderate-intensity aerobic activity per week correlated with lower rates of heart attacks, strokes, and deaths regardless of the cause. Part of the activities carried out in a gym are aerobics programs. Aerobics can be defined as a form of physical activity that combines stretching exercises with rhythmic aerobic exercises, differing in intensity from a "light" to an "intense" level resulting in improved physical condition. It is used to improve muscle strength, cardiovascular system and flexibility. From the multiple benefits of aerobic exercise, we mention the decrease and maintenance of an optimal body weight as well as the reduction of the risks of illness.

To improve physical health, constant exercise is essential. Individuals can choose from a variety of programs, including daily recreational activities. According to Trost (2002), the lack of time to exercise is no longer a common obstacle.

Motivation for choosing the theme

Following the studies I graduated, as well as the interrelationship in my social group with women, I noticed a general state of dissatisfaction with them related to both appearance and health.

Therefore, we identified the need to approach in a scientific system the participation of women in a training program that can be incorporated into existing daily activities. A program that brings results, in order to create that need for continuity. From the lack of motivation I noticed I deduced that some statistics are not enough to determine someone to introduce exercise into his routine, therefore I included in the study observations related to self-esteem.

In the presented study we aimed at streamlining the various physical activity programs and the impact of participation on self-image.

Type and objectives of the research

The field of physical exercise is a complex one and makes connections between knowledge and practices in areas where physical activities with different intensities are involved. The objectives of the research are set out in such a way that, once achieved, they can support the research by identifying a coherent application both in the initial phase and subsequently in specialized professional activities.

The topic will be approached from a dual perspective: theoretical and practical-applied substantiation, aiming to achieve impact results on attitude change among adult women, demonstrating that by practicing physical activities, beneficial changes are obtained health and increased self-esteem.

The choice of research topic is therefore aimed at demonstrating that different types of physical activity have an effect on women's fat mass, starting from scientific premises, with practical applicability to change the lifestyle, not by upsetting it, but only by adjusting some aspects.

So that women get positive results by finding the time necessary for physical activity, and the female population to benefit from everything that comes with movement, mind, spirit and body healthy and balanced.

As such, in this research paper our general objectives were:

• Identification of a female target group practicing physical activities in gyms;

• Design and implementation of programs that include appropriate exercise.

Given the dimensions of the research, the specific objectives proposed took into account:

1. optimizing self-esteem for the target group;

2. identification and verification of the tools to be used in the research; will be applied individually, at different time intervals, each person having a personalized file where all the necessary information will be noted, namely: name, surname, periodic measurements, known medical problems from the beginning of the project until its completion.

The increasing prevalence of overweight and obesity is documented, posing a major challenge to public health and healthcare systems (WHO, 1998). As a measure, it is recommended that each state, through the established bodies, propose and implement, for all

categories of the population, programs to reduce the risk of diseases caused by overweight and obesity.

Human populations have recently shown an increased interest in physical activity. These range from simple walking exercises, to running and practicing sports activities or disciplines: tennis, swimming, yoga, aerobic exercises, etc.

Constant exercise is an important component in weight loss and the World Health Association (1998) recommends at least one hour a day of exercise to prevent weight gain, promote weight loss and / or prevent weight gain. of kilograms.

The concrete conditions on which the research is carried out

People need to be informed about modern life factors that prevent weight gain.

National Academy Press (2013) argues the importance of practicing physical activities every day, at least half an hour, for a long period of time. During physical activity it is important not to omit any major muscle group.

Without this knowledge that prevents weight gain and their practical application, overweight or obesity become an inevitable consequence of living the modern lifestyle (Bogdanis, 2012). Women are more likely to gain weight as they get older. In recent years, women are becoming more aware of their physical appearance and, out of a desire to improve it, have resorted to a multitude of methods that reduce body weight or, in some cases, increase it.

Research hypotheses:

In this research we aimed to verify the following hypotheses:

- practicing different types of physical activity results in changes in the anthropometric indicators of the subjects;

- participation in training programs organized in fitness halls positively influences the self-esteem of adult women;

- there is a link between the type of activity practiced and self-esteem.

PART I. THEORETICAL BASIS

CHAPTER 1. Morpho-functional peculiarities of women Adults

There are physical differences between women and men, namely women have only 65% of a man's strength, women have a disadvantage in anaerobic events due to the fact that they have a lower proportion of muscle tissue, a disadvantage in aerobic events due to the fact that they have a smaller heart. and that the rate of oxygen uptake is lower but they have an advantage in long distance events due to the use of fat as a fuel for exercise (Hatos, 2004). Many factors prevent women's participation in physical activity so that physical inactivity is generally more prevalent among women than their male counterparts. According to Rangu (1984), the somatic characteristics of women are:

• more fragile bone system;

• shorter lower extremities;

• relatively larger bust compared to that of the man.

Hatos (2004) argues that an important aspect of women's physical activity is positive self-esteem, in other words, self-confident women will engage in physical activity.

Constant physical activity helps to improve health, both physical and mental, and helps reduce the risk of chronic diseases, improve self-confidence, maintain optimal weight.

Body composition in women

The World Health Organization (2017) reported that cardiovascular disease (CVD) is the number one cause of death globally, with 29% of all deaths. Most cardiovascular diseases (high blood pressure, abdominal fat, high triglyceride levels, etc.) can be prevented by addressing risk factors such as physical inactivity and obesity.

Folgelholm (2010) argues that adiposity is a major risk factor in obesity and cardiovascular disease. Most studies use anthropometric measurements to measure adiposity. In order to have an accurate value of body composition, it is necessary to test body fat. There are many ways to find out fat, but experts say that the DEXA test is the most accurate at present.

Underwater measurement has long been considered the gold standard but it cannot take into account bone density. As a result, hydrostatic tests tend to underestimate body fat in

people with high bone density and overestimate them in older adults who have low bone density.

The percentage of body fat is a value that people use in excess. Body fat testing provides another very important number: Lean Body Mass (LBM). LBM is simply low body fat out of total body weight. LBM includes organs, bones, muscles, and anything else in the body except body fat. Usually, changes in LBM come mainly from increases or decreases in muscle mass. Changes in bone density can also affect an individual's lean body mass, however, a DEXA scan will be able to tell the difference between the two.

Chapter 2. Physical activity in adult women

According to Physical Activity Guidelines (2008) physical activity is "any kind of body movement that involves the use of muscles and increases energy consumption above resting level." It includes physical leisure activities (including most sports), physical activities at work, physical activities at or near home and physical activities associated with travel. In addition to personal factors, environmental influences on physical activity levels can be physical (eg, environmental, built, spatial planning), social, and economic.

2.1 Recommended level of physical activity

For adults in the age group 18-64, WHO (2010) recommends recreational or leisure physical activities, walking or cycling, doing household chores, planned physical activities, in the context of daily activities, family and community, with benefits on the cardio-respiratory and muscular system, bone health and the reduction of the risk of depression.

The following are recommended for them:

• At least 150 minutes of moderate-intensity aerobic exercise spread throughout the week or at least 75 minutes of high-intensity aerobic physical activity or an equivalent combination of moderate and intense intensity activity;

• The aerobic activity must take place in sessions lasting at least 10 minutes;

• For additional health benefits, adults should increase their moderate-intensity physical activity to 300 minutes per week or 150 minutes of intense activity;

• Exercises to strengthen muscles through strength exercises should be performed at least twice a week.

For adults over 65, the same program is recommended, especially since programs that contain strength and balance exercises are important for this age group.

Adults who are inactive or underactive and do not yet achieve the equivalent of 150 minutes of moderate-intensity physical activity per week should gradually work towards this goal. The initial volume of activity should be light or of moderate intensity, for short periods of time, with physical activity sessions dosed throughout the week.

As a person goes from 150 minutes of exercise to 300 minutes a week, the health benefits accumulate. For example, a person who does 300 minutes a week has an even lower risk of cardiovascular disease or type 2 diabetes than a person who does only 150 minutes of exercise a week.

If adults are involved in moderate-intensity physical activity for more than 300 minutes (5 hours) per week, they gain additional benefits.

They are also recommended to include in the physical activity program, at least twice a week, programs that include exercise for all major muscle groups to strengthen muscles.

2.2 Effects of physical activity

Physical activity is beneficial and necessary for the proper functioning of the human body. Movement optimizes the functional parameters of the human body. Due to evolution, people make a minimal effort to have the necessities of survival, but in the past people made a significant effort to procure food and the necessities of survival. But modern evolution and lifestyle combat the active lifestyle. Consequently, physical activity is vital to keeping us healthy.

Efrem (1981) says that physical effort must be accessible to everyone, to correspond to particularities, to compensate for the position taken during work and activity. The exercises should be easy to learn and perform, without requiring too much attention.

According to specialized studies, the effects of exercise training are:

• developing mental condition and self-confidence (Biddle, 2011);

• decreased heart rate, decreased blood pressure, especially systolic (Miller, 2016);

• increase cellular respiration; oxygen consumption or VO2 max. is an important factor in determining respiratory function or aerobic capacity (Rahnama, 2010);

• decrease in adipose tissue (Weinheimer, 2010);

• developing and increasing muscle mass (Garber, 2011).

Elevated cholesterol levels are caused by sedentary lifestyle, obesity and can lead to cardiovascular disease. Constant physical activity is effective in maintaining a normal weight and indirectly positively influences cholesterol levels.

Physical activity helps maintain physical and mental health (Rimer, 2012). Regular exercise has major benefits on the most common mental illnesses, including anxiety, depression, eating disorders (Taylor, Sallis, Needle, 1985). Physical exertion facilitates the production of serotonin and endorphins, which have beneficial effects on mood and reduce stress, thus influencing the mental state of the subject (Cornier, Despres, Davis, Grossniklaus, Klein, Lamarche et al., 2011).

Being physically active is one of the most important actions that people of all ages can take to improve their health.

Physical activities are varied and by practicing physical exercises, people relax, are distracted from other stressors, thus influencing well-being. (Roman, 2008, p. 5).

The benefits of physical activity are numerous. They have long-term effects on multiple levels, such as aesthetic, mental, social. By exercising, people relax, feel good, socialize and self-esteem increases and work efficiency is higher. To combat the harmful effects of sedentary work style, exercise is recommended after the work schedule and short sessions of exercises and stretching during the work schedule. Physical exercise has important morpho-genetic influences on the musculoskeletal system, which determines the body and physiological shape and structure, determining the functionality of organic systems. Exercise improves not only the shape, volume and structure of muscles, but especially their functions (Karasik, 2008).

Also through physical activity, a correct posture of the body is acquired, which is the expression of a harmonious development, of its form and of a functional balance, mirroring a physical and mental well-being. Following the practice of physical exercises, the organic functions develop in parallel with the body, related to age.

For adults, for people involved in lucrative activities, exercise is a defender of health, a strengthener and a factor in the recovery of the workforce. "This harsh life experience of work is necessary for humanity: no one can be exempt from it. But sports, physical exercises and physical education represent the opposite pole ”(Ponomariov, 1977, p. 37).

Physical activity is as optional as it is necessary, and for a healthy lifestyle physical exercise should be included in an individual's daily schedule or practiced at least once every two days, according to WHO recommendations (2020).

According to Ponti (2020), physical condition is characterized by: body mass relative to height, body composition, distribution of adipose tissue, blood pressure, strength and endurance of abdominal and dorso-lumbar muscles.

"Healthy mind in a healthy body" is a Latin saying that has a wide coverage when it comes to personality development as a whole, including self-esteem. The benefits of exercising contribute to improving the perception of one's body in the general conception of self.

During exercise, there are a number of physiological changes that influence well-being. They have a positive effect on a person's well-being.

In 2018, the Physical Activity Guidelines for Americans claimed that some of the benefits of physical activity on the brain appear immediately after a moderate-high intensity exercise session and these consist of: decreased anxiety, improved cognitive function in some respects and improved sleep.

If exercise sessions are maintained for a longer period, the benefits are numerous, e.g. improvements in the mechanisms of prevention of long-term anxiety, control of emotions, better ability to organize the individual and a deeper sleep.

2.3 Consequences of physical inactivity

The World Health Organization (2010) identifies physical inactivity as the 4th leading risk factor for global mortality. Although the benefits of physical activity and their role are known, the World Health Organization published in 2000 a global report from 14 regions showing that 17.7% of the world's population (over 15 years old) has not was involved in any physical activity and that almost 58% of individuals do not reach the recommended volume of moderate-intensity physical exertion. In 2011, Dumith estimated that 1 in 5 adults is physically inactive.

The sample consisted of 300,000 individuals from 76 countries over the age of 15. Physical inactivity leads to the accumulation of visceral fat around the abdomen (Slentz, 1985).

Specialized studies state that Romanians are among the Europeans most affected by stress (International Labor Organization, 2017) and that this is a major health risk factor. Stress, a major cause of anxiety, obesity and other cardiovascular health problems is a phenomenon that is unprecedented and must be combated, and one of the methods is to approach an active life in terms of physical training.

The level of stress has reached one comparable to that of epidemics and is the main cause of strokes and heart attack, says the same researcher. Knepp (2020) indicates the prolonged effect of a workout on the individual. It emphasizes the direct chemical bonds

produced in the body by stress through the production of hormones and other chemicals released into the blood in the presence of stress triggers.

2.4 The difference between daily physical activity and specialized physical exercise

Daily physical activities and specialized physical exercises are terms that describe different concepts, and are often confused with each other.

Unorganized activities are physical activities of daily living (walking, hiking, biking, mountain biking, climbing stairs, doing housework, attending fitness and wellness centers, swimming.

Specialized physical exercise is a planned, structured and repetitive physical activity and aims to improve or maintain physical condition. Multi-component physical activity encompasses more than one type of physical activity such as aerobics, muscle strength development and balance training and is done in a community setting as part of a structured program (Division of Nutrition, Physical Activity , and Obesity, National Center for Chronic Disease Prevention and Health Promotion, 2008).

Exercise results in: cardio-respiratory endurance, muscle endurance, muscle strength, body composition and flexibility.

Maintaining an optimal level of physical activity requires both daily physical activities and specialized physical exercises (Caspersen, 1985). A specialized exercise program includes the transition from easy to difficult, from simple to complex.

There are four main aspects of any physical activity when considering the relationship between physical activity and health:

1. Frequency of participation:

The more frequent physical activity, the greater the health benefits. Encouraging daily exercise can help maintain consistency in beginners. Once the subject is able to make continuous effort for 30 minutes, it is reasonable to adjust the frequency to 5 days a week.

2. Type of physical activity:

Depending on the desired result, there are sports that train the whole body, such as swimming, and others that involve only certain muscle segments such as archery.

Aerobic exercises, such as walking (outdoors or on a treadmill) and cycling (vertical or loaded with minimal resistance) are recommended for beginners. Any session should begin with a warm-up of the body and end with relaxation of the body after exertion by stretching the major muscle groups used during exercise with a hold of 20-30 seconds. This ritual can

minimize the risk of injury and fatigue and increase flexibility and mobility. In addition, the sedentary subject should be given advice to increase his general physical activity (American College of Cardiology, 2020).

3. Duration of physical activity:

Initially, long sessions of exercise and exercise were recommended, but it was found that short sessions can influence health in the same way.

It is recommended that people start gradually and maintain the exercise session for as long as they think they can handle it. It can be only 3-5 minutes at the beginning, but the most important thing is for the person to enjoy the activity and feel good. Several short stretches of exercise during the day is a useful approach to increase exercise time over time, while avoiding fatigue or over-exercise for the sedentary individual. An interval of 30 minutes / day x 5 days) or 75 minutes of intense weekly activity are recommended by the American College of Cardiology (2020).

4. Level of physical activity intensity:

There are sports that involve intense physical activity, such as basketball, while golf requires little involvement and fishing requires almost no physical effort (Hatos, 2004).

All sports have the ability to stimulate mental health, but not all have the same influence on muscle mass.

Before starting a program of physical activities, it is recommended to consult a doctor to determine certain contraindications or limits of execution in which the subject must fall. Limits may be imposed on people suffering from chronic heart, bone or lung disease.

2.5 Principles of building the exercise plan

The exercise plan is designed by specialized instructors or people in the field and is designed based on somatic type, level of physical condition and anthropometric data of the subjects, being adapted to the needs and objectives of each person.

These programs are created taking into account the characteristics of the physical effort listed below, taking into account the history of the target group and its specifics.

In the preparation of physical programs, the following are taken into account:

- intensity of exercises;
- training intensity;
- recovery after exertion.

Mirkin (1995) states that the heart muscles and skeletal muscles cannot be trained with the same exercises. To strengthen the heart muscles requires vigorous training to increase the heart rate and maintain them for a period of time. In order to strengthen the skeletal muscles, the training must be adapted in order to increase the resistance. The formula for the physical condition of the lungs and heart is for the pulse to increase to at least 20 beats per minute above the resting rate. To improve skeletal muscles it is recommended to lift weights or exercise on fitness equipment.

In preparing the physical program will take into account:

• the particularity of the effort - it is obtained by the aggregation of certain moving organs and takes into account the age, physical and mental capacity of the subject. The personalization of stimuli in accordance with the characteristic of the practitioner supports the improvement of his physical performances, such as speed, endurance, quality of execution (Monea, 2010, p.124);

• the quantitative part of the training - is the part that presents the two coordinates: time and speed and / or resistance of the movement (Monea, 2010, p.127);

• the degree of difficulty, characterized by the physical effort made in performing the designated physical exercise;

• the density is given by the ratio between the duration of the actual effort and the total duration of the training;

• the degree of difficulty of the training determined by how many physical actions are performed at the same time;

• relaxation takes place between short exercise sessions to give the opportunity for temporary physical recovery.

2.6 Physical activity recommended for sedentary people

WHO (2011) points out that the length of time spent in sedentary activities is directly proportional to the increased risk of obesity, diabetes and heart disease, as well as mortality, in general, from cardiovascular causes.

One method to more accurately estimate the intensity of physical activity is by applying the equivalent metabolic method (MET). A measure of MET corresponds to the level of energy expenditure, so physical activity can be classified into physical activity of light intensity (<3 MET), moderate intensity (3-6 MET) and high intensity (> 6 MET).

Sedentary lifestyle, with low energy consumption (<1.5 MET - metabolic equivalent units), and not only in the absence of exercise, thus becomes a major risk factor for the

occurrence of major chronic noncommunicable diseases. Currently, there are a variety of recommendations to meet the minimum requirements for physical activity.

Most of these recommendations indicate that individuals should engage in moderate or intense physical activity for a certain period of time per week. It is recommended at least 30 minutes of moderate physical activity, five days a week or 20 minutes of more intense physical activity, 3 days a week. The World Health Organization (2011) recommends that adults between the ages of 18 and 64 accumulate at least 150 minutes of moderate-intensity aerobic physical activity during the week or undertake at least 75 minutes of high-intensity aerobic physical activity during the week. during the week or perform a combination of both forms of physical activity.

Aware of the terminological inconsistencies, the Sedentary Behavior Research Network (SBRN) proposed, in 2012, a definition of sedentary behavior as any waking behavior with an energy expenditure of ≤1.5 MET, while in a resting position. or sitting down. The term "physical inactivity" has been described as performing insufficient amounts of physical activity, ie it does not follow the instructions specific to physical activity (Owen, 2011).

Combating sedentary lifestyle can start by changing static routines and including healthy habits.

E.g:

• performing daily physical exercises for at least 30 minutes;

• going up and down the stairs in exchange for using the elevator;

• easy walking;

• standing;

• adoption of an exercise program adapted to age and pathology.

2.7 The consequences of sedentary lifestyle

The main interest of the research studies was to highlight the benefits of physical activities. Positive health outcomes can also be highlighted through a better understanding of the harmful effects of both physical inactivity and sedentary behaviors.

Increasing energy intake and decreasing energy expenditure are obvious candidates as contributors to increased obesity (Shields, 2008).

Sedentary lifestyle is a vicious way of life and deeply detrimental to any socio-professional group.

It affects the individual, diminishes his capacity for work and creation, affects the family, reducing the range of activities that can be done and affects society by compromising economic and social efficiency. Lack of physical exercise (which defines sedentary lifestyle) occurs apathy, physical discomfort, depression on various backgrounds and then, not too late, physical illness. Since physical exercises not only stimulate the muscles, they also act on the intellect, the memory becoming stronger, the concentration being better.

Practicing physical activities constantly keeps the mental capacity of the practitioner in shape. Exercise stimulates nutrition processes, activates the metabolism of all energy substances.

During exercise, the muscles considered as the main organ of metabolism engage up to 90-95% of metabolic processes. Muscle activity causes food to be used as it is introduced into the body, preventing the deposition of assimilated substances in reserves. (Freese, 2017).

The direct results of physical activity, as a subsequent effect, consist in decreasing fatigue, increasing good mood, restoring work capacity and increasing work efficiency. By practicing physical exercises, man develops himself, improves himself and learns to overcome himself.

Leisure activity has increased from the mid-1980s to the present. However, leisure-time physical activity is a low-value component of all obesity-related habits.

Statistics show worrying figures related to the spread of obesity: in 2005-2008 over 33.9% of those over the age of 20 were obese, it is estimated that by 2030 over 20% of the entire population will fall into this category and 38 % have weight issues (Shields, 2008).

Our way of life has been influenced by contemporary scientific and technical development and accelerated technical progress and the growth of economic processes significantly change the way people live and work. In addition to the advantages of the evolution of technology, there are also influences that act negatively on health by the fact that man is deprived of physical effort but is subjected to additional intellectual effort and these realities continue after the work schedule, ie in free time, due to absence physical exertion.

Chapter 3. Types of physical activities

Aerobic activities (called cardio or endurance) are physical activities in which adults engage their muscles in a rhythmic manner for a period of time. Regular aerobic activity makes a person's heart beat faster, thus strengthening their cardiovascular system. For better

health, all activities of moderate and intense intensity are more important than the duration of each activity.

Cardiovascular exercise (aerobic exercise)

The American College of Sports Medicine (ACSM) defines aerobic exercise as any activity that uses large muscle groups, can be maintained continuously, and is rhythmic in nature (Wahid, 2016).

Aerobic exercise improves heart rate and breathing. These activities help maintain health and improve fitness. Endurance exercises improve the health of the heart, lungs and circulatory system.

It is advisable to consult a doctor before starting sports activities to assess the person's health and the recommendations of the specialist.

Depending on these, the sports instructor can develop a training program that differentiates and customizes in such a way as to avoid any problems.

Strength exercises

The advantages associated with strength training are:

• increase in body weight;

• increase in metabolic rate;

• increase in bone density;

• reducing the risk of injury; building muscle tissue lost in the past, a situation that occurs frequently with age (Stiegler, 2006).

Certain accessories can be used to diversify exercise and increase endurance and strength, as follows:

• weights;

• special balls for physical exercises;

• elastic bands.

Exercises for mobility

Maintaining the essential elements of postural stability is very important for autonomy in carrying out activities of daily living and for reducing the risk of falls. A set of stretching exercises is indicated before or after the actual exercise program.

There are two types of stretching: static when a segment of the body is held in a certain position for a period of time and dynamic when the body is in a fluid motion, during which time its flexibility improves.

Exercises for balance, agility and coordination

Balance, agility and coordination are important not only in performance sports. Balance can be negatively influenced by the aging process. Balance and agility must be constantly improved. Exercises for beginners can consist of standing on one leg, walking on tiptoes, walking on heels, standing on tiptoes. For intermediaries they can include exercises with their eyes closed or sitting on one leg and for advanced ones they can include exercises with the ball.

3.1 Types of physical activities encountered in gyms

Emmanuel Stamatakis (2017) analyzed in his study over 80,000 adults and concluded that aerobics is the most effective in preventing cardiovascular disease, with a 21% lower risk of death, while strength training is the best way to reduce the risk of cancer deaths by 31% lower than inactive people.

Sherwood (2000) argues that people who have never attended classes with less physical activity have less courage, finds that exercising exercises in a gym is inaccessible, and believes that they are difficult in terms of difficulty. .

A study by Gauvin (2000) supports the positive relationship between practicing exercises and support from the instructor.

Currently, women are familiar with aerobics classes, coming to the gym both to exercise and to socialize. Women come to the gym not to develop their muscles excessively, but even run away from it, they want to lose weight and move towards a healthy lifestyle.

According to the study by Mathunjwa (2013), the prevalence of obesity and cardiovascular disease is increasing among black women of color and he used physical activity as a program to reduce body weight Tae-bo.

The study was conducted on a number of 60 overweight and obese people for 10 weeks, with a frequency of participation in this activity 3 times / week. Improvements were observed in weight, body mass index, hip and waist circumference.

Tae-bo is a physical activity that can be practiced in most gyms, Billy Blanks, the founder of this sport had this initiative and created a cardio and toning class with Boxing and Taekwondo movements. Tae-bo is a mass aerobic activity, primarily cardio and it is not necessary to have practiced martial arts before, the basic exercises being demonstrated by the instructor. It uses its own body weight, and dumbbells of different weights can be used to tone the upper area.

Figure 1. Tae-bo movements (retrieved https://graphicriver.net/item/taebo-silhouettes-set/515464)

Fit-ball is the physical activity where the accessory is the ball with a soft elastic structure with variable diameter depending on the height. The activity is done on music, and the exercises can be static or dynamic and can be used for all major muscle groups. . Exercises with this ball is effective in improving strength, flexibility, coordination due to the fact that both the lower and upper part are worked (Stockbruegger, 2001). It is also suitable for sports such as baseball, golf, tennis and hockey (Earp, 2010). Wonjong (2017) in his study concluded that fit-ball stimulates the abdominal muscles and is considered effective for the development of dynamic balance.

Figure 2. Images from fit-ball classes

Aerobics is the general name for an activity that trains the vast majority of muscle groups.

There is an infinite variety of exercises, but the class must contain three parts: preparing the body for effort, the main part and returning the body after effort.

Figure 3. Images from aerobics classes

Circuit is a program composed of a series of exercises that follow each other without a break. Combine static and dynamic exercises.

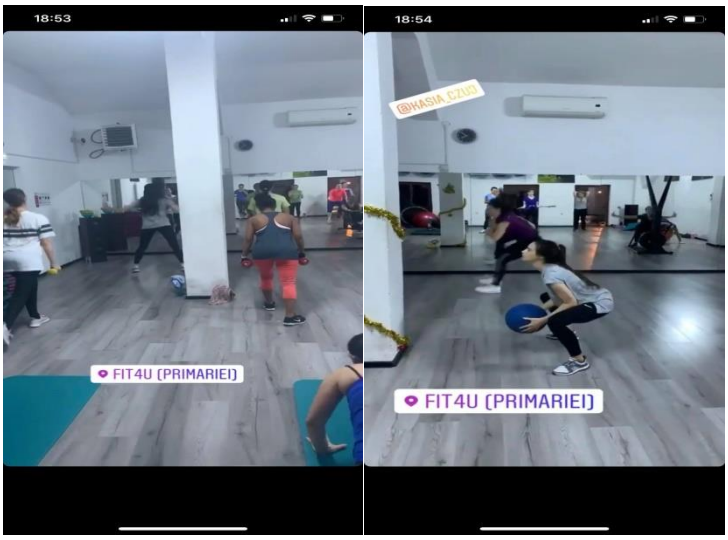


Figure 4. Images from circuit classes

Softball is a class in which you work with a ball weighing 2 kg. The purpose of the class is to bring the effectiveness of muscle toning exercises. The exercises consist of easy-to-learn movements.

Figure 5. Soft-ball ball

Chapter 4. Self-esteem in adult women

Self-esteem is a fundamental psychological aspect of well-being and is important for a successful life (Rosenberg, 1965). According to the World Health Organization, quality of life means physical, mental and social well-being and the ability to perform daily tasks (WHO 1998).

Self-esteem is the evaluative component of the self and refers to the emotional experience, the emotions that the person experiences when referring to their own person - Constantin, 2004, p. 2) and the "quality of life" that is given by the perception of each individual on social situations, standards and aspirations.

Barton (2012) and Legrand (2014) argue in their studies that self-esteem increases with physical activity. Instead, Ekeland (2005) argues that self-esteem is influenced by exercise but only in the short term.

Self-esteem is a term used in psychology to express the degree of positivity of individuals toward themselves. There are many individual, social and environmental factors that influence mental health, including self-esteem (Sonstroem, 1998). Recent research has shown that in the UK, 1 in 4 adults has lifelong mental health problems. Blair (1992) argues that physical activity has strong positive effects on mental health and benefits on managing anxiety, anger, depression. People with high self-esteem self-evaluate as positive people and have a positive attitude towards aspects of their lives (Ghaffari, 2007), while people with low self-esteem feel discouraged and inferior (Maslow, 2000). Lately, psychological problems are receiving more attention from specialists. There are many individual, social, environmental factors that influence mental health, including the aspect of self-esteem (Ekeland, 2005).

Physical activities can be ways in which practitioners become more aware of their personal worth and can reach their potential. Those who practice sports have a positive perception of how they look and feel. Researchers have suggested a way to improve self-esteem through physical activity that improves mental and physical health. Studies (Mansour, 2012) show that by improving mobility and effectiveness, exercise has positive effects on self-esteem. Findlay et al. (2009) showed that performance athletes have a high level of competitiveness, an athletic body and a high degree of self-esteem towards non-athletes. Pangrazi (1982) demonstrated that involvement in physical activities generates a sense of success and well-being that can turn into competitiveness and self-acceptance. After conducting his study, Raustorp (2010) found that self-esteem in 42 women with breast cancer improved after participating in aerobic exercise.

Bicer (2013) in his study, found that the average self-esteem increased as an effect of practicing aerobic exercise for 12 weeks among students. Before the intervention it was 33.21% and after the intervention it increased to 36.32% and he concluded that self-esteem is positively influenced by practicing physical exercises.

A study by Dishman (2006) analyzed the effects of physical activity and participation in physical activity on the symptoms of depression among adolescent girls and the result was a strong positive relationship between the general physical concept of self and self-esteem.

Historically, women have been discouraged from participating in sports activities and competitions, although Basich (2006) argues that physical activity not only positively influences self-esteem but also provides an improvement in physical appearance and overall well-being.

Initially, it was assumed that women's bodies could not manage the stress of physical exertion (Gilbert, 2001).

Women were considered inferior to men and were considered to be very good at other areas such as cooking or housekeeping. The lack of medical treatment was another reason why they were forbidden to perform any type of physical activity. Over time, women began to practice traditional men's sports such as tennis, bowling and even swimming. Any other form of physical exercise that exceeded these sports seemed, in the end, to lead to the masculinization of women and their transformation into a more unattractive being. Those days disappear, and the new generation of women is involved in exercise and sports activities (Gilbert, 2001). Many professionals have developed basic programs and promote exercise by women. Men participated in sports competitions more than women. Until the 1980s, there were no races longer than 1,500 meters for women, and women were not allowed to participate in the Boston Marathon in 1970 because they were not physically able to run such a long distance (Lovett, 1997).

The image of the body is not necessarily related to its weight and size, but has an important role in self-esteem and general well-being. It has been shown that girls have an exaggerated concern for body image, as pressure from the media but also from people around them (Mendelson, 1996). In exercising, boys tend to focus on winning competitions for both intrinsic and personal value (Jonas, 2002). It has been shown that young girls are more interested in building interpersonal relationships at the expense of developing athletic skills (Felte, 1998).

Participating in physical education classes is the main way for girls to exercise; however, girls can be regularly active on their own, using a wide variety of physical activities.

Many girls think that they need to get involved in a group activity to exercise. Studies have shown that the beneficial effects of physical activity can be achieved with any other non-sport-related physical exercise, such as running or cycling (Feltes, 1998).

PART II

PILOT RESEARCH FOR CHECKING THE WORKPLACE AND PHYSICAL ACTIVITIES PERFORMED IN FITNESS ROOMS

CHAPTER 5 - Verification of work protocol, training programs and work tools

5.1 Introduction

Physical activity is considered to be an important part of human life. Physical activity keeps the mind relaxed and the body active. To maintain a healthy lifestyle are indicated adequate regular meals, adequate sleep, physical activities, which should have an appropriate intensity, frequency and duration. With the evolution of technology, people's lifestyles have changed, reducing physical activity and accumulating more stress. "To stay healthy, adults should do at least 150 minutes of aerobic exercise a week, at a moderate intensity," recommends the Health Promotion Council (HPB).

5.1.1 Purpose

The aim of this study was to verify the content of training sessions, work protocol and the effect of physical activity programs practiced by adult women in gyms on anthropometric indicators and self-esteem.

5.1.2 Objectives

In order to verify the working protocol, we set ourselves the following objectives:

- elaboration and implementation of weekly training programs;
- somatic assessment and self-esteem of the subjects;
- checking the content of intervention physical activity programs;

• verification of applied statistical tests:

• training the skills of regular practice of physical activities;

5.1.3 Hypotheses

The following hypotheses were formulated for this study:

- the anthropometric indicators of the subjects are influenced by the physical activity practiced in gyms;

- there may be correlations between anthropometric indicators;

- practicing physical activities contributes to increasing self-esteem.

5.2 Materials and methods

Subjects

This study, conducted between September 5 and December 5 in a fitness room in Oradea, was attended voluntarily by 28 subjects, divided into two equal groups, depending on the training program they opted for (fitball or circuit).

There were three weekly training sessions, each lasting 60 minutes, over a period of three months, the groups being measured before the start of the physical activity program and after its completion. Prior to these physical activity sessions, a period of time was allotted for the application of the self-esteem questionnaire.

The materials used in this stage were: stopwatch, scale, centimeter, adipocentimeter, balls, elastics, dumbbells 0.5 kg. All training sessions were led by the researcher. A data record template with data on different parameters was used for data recording (Annex no. 2) and for collaboration with research subjects a participation and data recording agreement signed by both parties was used before starting the activity.

Music is an important part of an aerobics class, and if it is chosen it is to the taste of the class participants, the exercises seem easier and the classes become a pleasure. Rhythm is chosen to enter the pleasant atmosphere of aerobics class where the main goal is to lose body mass. The music used in classes in the main part had a frequency of 132 beats per minute. The exercises were performed by repetition in series of 8 repetitions, the number being given by the 8 beats of each musical phrase and 4 8-beat musical phrases make up a 32-beat musical block.

Research methods

The following research methods were used in the preliminary study:

1. Bibliographic study method

2. The method of observation

3. Method of measurements and tests

4. Questionnaire survey

5. The method of the experiment;

6. Statistical-mathematical method of data processing and interpretation.

Description of physical activity programs

The total duration of the physical activities was 60 minutes, consisting of three parts:

Warming up the body for 10 minutes of effort. The main part, which lasted 45 minutes and the body's return after exertion at the end of the physical program lasted 5 minutes. It was recommended that the three exercise sessions take a break between them, alternating with a day off needed to recover the body.

a) Fit-ball

A medium to high intensity training in which the main role is played by the ball, a special ball. It varies in diameter between 35 and 85 centimeters, with a soft elastic structure. The muscles of the back and abdomen make a seat belt that helps maintain the spine and ensures a correct posture.

b) Circuit training

In one of the studies, an attempt was made to measure the effectiveness of a training by the Stages of Transtheoretical Method (STM). On the days they met, clients and instructors had specific conversations about the benefits of physical activity, impediments, and goals. All these discussions helped to motivate the clients and their involvement in this program.

5.3 Results

Test 1 took place in September 2014, on a number of 28 people, aged between 16 and 45 years (fulfilled), the average age being 29.80 years, and test 2 took place in December 2014 on the same 28 people.

Table 1. Descriptive analysis of body mass index (BMI) and comparison of means (N = 28)

Lot	Moment	Average	ES	Median	DS	Min	Max	*Statistical significance(p)*	
								T1-T2	I-II
I	**T1**	21,95	0,51	22,42	1,92	18	24	**0,00**	**T1**
	T2	21,07	0,52	21,37	1,96	17	23		0,54
II	**T1**	21,62	0,80	20,66	3,00	18	27	**0,02**	**T2**
	T2	21,22	0,72	20,47	2,68	18	27		0,86

No significant differences were observed between batches neither at time T1 nor at time T2 ($p > 0.05$) for unpaired samples of body surface area (SC) values, and for paired samples of SC values, between the two time points. very statistically significant differences

were observed in group I (p <0.01) and statistically significant differences in group II (p <0.05).

Table 2. Descriptive analysis of body surface area (SC) and comparison of means (N = 28)

Lot	Moment	Average	ES	Median	DS	Min	Max	*Statistical significance(p)*	
								T1-T2	I-II
I	**T1**	1,72	0,02	1,73	0,08	2	2	**0,01**	**T1**
	T2	1,68	0,02	1,67	0,08	2	2		0,30
II	**T1**	1,69	0,04	1,64	0,14	2	2	**0,04**	**T2**
	T2	1,67	0,03	1,64	0,13	2	2		0,46

For unpaired samples of adipose tissue (ATA) values, no significant differences were observed between groups at T1 (p> 0.05) but statistically significant differences were observed between the two groups at T2 (p <0.001). .

For paired samples of adipose tissue values, statistically significant differences were observed between the two time points in both groups (p <0.001).

No significant differences were observed between batches at either T1 or T2 (p> 0.05), at the statistical analysis for unpaired waist circumference (CT) values.

Table 3. Descriptive analysis of adipose tissue (ATA) and comparison of means (N = 28)

Lot	Moment	Average	ES	Median	DS	Min	Max	*Statistical significance(p)*	
								T1-T2	I-II
I	**T1**	33,8	0,93	33,53	3,48	28	38	**< 0,00**	**T1**
	T2	20,35	0,50	20,19	1,88	17	23		0,57
II	**T1**	32,76	1,55	30,62	5,80	24	42	**< 0,00**	**T2**
	T2	28,25	1,76	25,65	6,60	18	40		**0,00**

In the statistical analysis for paired samples of CT values, between the two time points were observed statistically significant differences in group I (p <0.001) and statistically very significant differences in group II (p <0.01).

Correlation analysis

Among the anthropometric indicators measured in the subjects participating in the pilot study, some relationships can be identified, determined by calculating the Pearson coefficient, due to the fact that the data for which the relationships are to be established were normally distributed. Out of the desire to find out the effect of training programs on the relationships between indicators, we considered only the final moment of the measurements (T2). Table 23 contains this information, and it can be observed, for example, that between

body mass and% of adipose tissue, waist and hip circumference are significant positive correlations (r = .63, p = .00; r = .607, p = .001; r = .597, p = .001), and the correlations between body mass and chest and thigh circumferences are weak, insignificant (r = .219, p = .268; r = .368, p = .058) or even missing. The correlations were significant, according to Table 23, for the confidence interval of 0.01 or 0.05.

Table 4. Correlations between body mass,% of adipose tissue and waist, hip, chest and thigh circumferences at the final measurements (N = 28)

Corelații

		Body weight (kg)	Adipose tissue (%)	C. Waist (cm)	C. Hip (cm)	C. Chest (cm)	C. Thigh (cm)
Body Weight (kg)	Pearson Correlation	1					
	Sig. (2-tailed)						
Adipose tissue(%)	Pearson Correlation	,629**	1				
	Sig. (2-tailed)	,000					
C.Waist (cm)	Pearson Correlation	,607**	,452*	1			
	Sig. (2-tailed)	,001	,016				
C.Hip (cm)	Pearson Correlation	,597**	,711**	,606**	1		
	Sig. (2-tailed)	,001	,000	,001			
C. Chest (cm)	Pearson Correlation	,219	,375*	,042	,354	1	
	Sig. (2-tailed)	,262	,049	,830	,065		
C. thigh(cm)	Pearson Correlation	,368	,176	,351	,186	,286	1
	Sig. (2-tailed)	,054	,371	,067	,343	,140	

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Significant positive correlations can also be observed between% of adipose tissue and waist, hip and chest circumference, as well as between waist and hip circumference (r = .606, p = .001). Among the other variables analyzed, the Person coefficient has low values, not statistically insignificant.

The relationship between the percentage of adipose tissue and the hip circumference can be seen in Figure 6, which represents the scatter plot, in which the coefficient of determination R2 can be calculated by squaring the Pearson coefficient and shows that for 51% (R2 =. 506) from the variation of the percentage of adipose tissue can also be explained by the increase of the hip circumference.

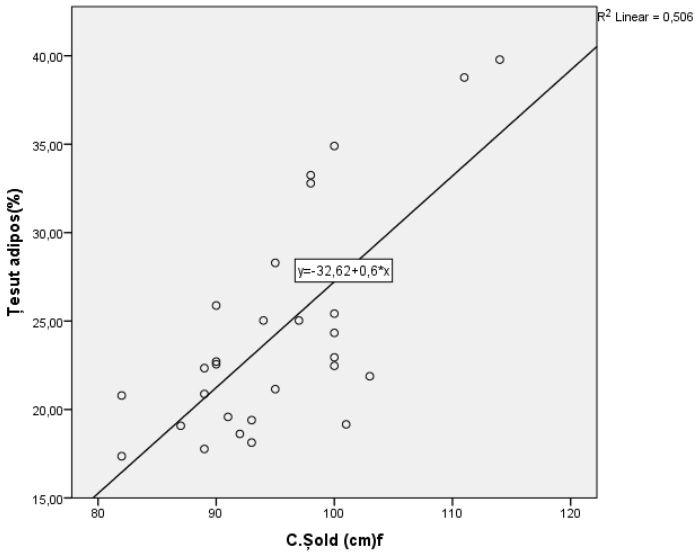


Figure 6. Relationship between adipose tissue percentage and hip circumference (N = 28)

Self-esteem analysis

To analyze the effect of intervention programs on self-esteem, the Self-Esteem Scale questionnaire (Rosenberg Scale) was applied, before and after the application of the programs. In order to use the appropriate tests, the distribution of the variable was verified using the Shapiro-Wilk test (Table 24), the result showing that the distribution is normal (Sig.> .05). Consequently, t-tests for independent samples and for paired samples will be used to compare the means.

Table 5. Distribution testing by group and time of evaluation (N = 28)

Tests of Normality[a]

Variable	Lot	Kolmogorov-Smirnov[b]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	Df	Sig.
Self esteem i	Fitball	,168	14	,200*	,936	14	,370
Self esteem f		,148	14	,200*	,919	14	,214
Self esteem i	Circuit	,217	14	,072	,897	14	,101
Self esteem f		,173	14	,200*	,955	14	,633

Following the comparison of the averages of the scores recorded after the completion of the questionnaire by the subjects, both before and after the application of the training programs (Table 6), the following resulted: both at the initial and at the final test between the two groups of subjects are not significant differences (t = -1.10, df = 26, p = .280 at the initial test, respectively t = -198, df = 26, p = .844 at the final one.

Table 6. Descriptive statistics and t test for independent samples at the self-esteem variable according to the time of evaluation and group (N = 28)

Test moment	Group	N	Average	Standard deviation	t	Df	p	D
T1	Fitball	14	18,000	5,6704	-1.10	26	.280	-.03
	Circuit	14	20,714	7,2476				
T2	Fitball	14	25,571	6,8017	-.198	26	.844	-.34
	Circuit	14	26,071	6,5453				

Regarding the comparison of the means for the paired samples, ie the comparison of the averages of the initial results with the final ones in each group of subjects, as a result of using the t-test for paired samples (Table 26) it was found that the differences between the initial and final scores both lots (t = -5.983, df = 26, p = .000, d = -1.60 for the fitball group, respectively t = -3.683, df = 26, p = .003, d = -.98 for the circuit group).

Table 7. Self-esteem in the studied groups and statistical significance in the paired samples (N = 28)

Pair	Pair statistics			t-test variable pairs			
	Moment	Medii	AS	t	Df	P	D
Fitball (N=14)	T1	18,000	5,6704	-5,983	13	,000	-1.60
	T2	25,571	6,8017				
Circuit (N=14)	T1	20,714	7,2476	-3,682	13	,003	-0.98
	T2	26,071	6,5453				

As can be seen in Table 8, the number of subjects who had low self-esteem at the initial test decreased from 8 to 2 at the final test, that of subjects with average self-esteem increased from 8 to 10, and 2 subjects they recorded a score that placed them in the area of high self-esteem.

Table 8. Frequency of the variable variable initial self-esteem test (N = 28)

Lot	Qualifying	Frequency	Percent	Valid Percent	Cumulative Percent
Fitball	Low self esteem	6	42,9	42,9	42,9
	Medium self esteem	8	57,1	57,1	100,0
	Total	14	100,0	100,0	
Circuit	Low self esteem	2	14,3	14,3	14,3
	Medium self esteem	10	71,4	71,4	85,7
	High self esteem	2	14,3	14,3	100,0
	Total	14	100,0	100,0	

5.4 Discussions

Due to the short duration of the pilot study, of only 3 months, we cannot say that we had significant results on the anthropometric indices. The purpose of the study was to verify some aspects on which the main study depends and not to obtain significant results, even if

results can be obtained in a much shorter time. Following the practice of physical activity programs, there were no significant differences in body mass between the two groups.

We can say that the value of anthropometric indices can change as a result of physical activity programs. Following the use of the Self-Esteem Scale questionnaire, it resulted that at the end of the pilot study all participants in the training programs had significantly increased self-esteem scores, but that there were no significant differences between the two groups.

It can be said that the physical activity performed at the gym positively influenced the self-esteem of the subjects, but that the type of physical activity did not influence this variable.

During the classes too many repetitions and series of exercises were performed so that the women were exhausted at the end of the class and we did not fit in the 60 minutes, the dosing of the effort being difficult in the first training sessions. Thus, we decreased the number of repetitions or series / exercise.

I started with the rhythm of the music of 132 beats per minute from the beginning of the training, but the rhythm from the beginning was too alert so I lowered the tempo to 120 beats per minute during the preparation of the body for effort, I increased so that the main part reaches 132 beats per minute, a rhythm that was sustained until the end, which ends with a relaxing piece of body and mind. I also set the breaks, at the beginning there were 2 breaks for hydration and a short rest of 2 minutes each, after 20 minutes and before the ground exercises, more precisely at minute 29-30 but, if I gradually started the effort, only one arrived. break at minute 28 until minute 30, after the end of the main part and the beginning of the ground exercises. The ground exercises included exercises for the abdominal and buttocks muscles, combined exercises in a single session, but being too short for exactly 15 minutes we decided not to intersperse the exercises, at each session to do the exercises for a main muscle group (abdomen or buttocks).

The exercises were simple, basic (knee bends, split step) and along the way I combined them in a light choreography of 2 maximum 4 related exercises, to be as easy to remember but at the same time effective.

5.5 Conclusions

All participants in the intervention group were eager to participate in the training sessions and almost half of the intervention group continued the training sessions for another 6 months. In addition, at the end of the study period, even half of the control group wanted to start the same training protocol.

Improving the psychological state, the external appearance, the physical fitness, the social association and the relaxation from the daily routine, lead more and more adults to the practice of the physical exercise. Modern gyms, in their quest to meet people's needs and tendencies, incorporate a wide variety of exercise programs. Since aerobic exercises were introduced in gyms, their popularity has expanded and music being an indispensable part of this form of exercise causes pleasant emotions, euphoria and positively influences the mentality of participants thus eliminating all negative emotions.

All the objectives of this stage were met and we managed to implement the weekly training programs, building the necessary sheets for starting the research stage in the gyms in Oradea.

PART III
RESEARCH ON THE EFFECT OF DIFFERENT TYPES OF PHYSICAL ACTIVITY ON ANTHROPOMETRIC INDICATORS AND SELF-ESTEEM
CHAPTER 6
Study 1 - The impact of physical activity on anthropometric indicators and self-esteem in adult women

6.1 Introduction

Physical activities are numerous and varied having a positive influence on well-being, the sources of stress so the mind frees itself from thoughts becoming more creative. (Roman, 2008, p. 5).

The present research aims to present the need to streamline the different types of physical activities practiced in a gym, activities with a major impact on fat loss. The American College of Sports Medicine supports the regular practice of physical activity because their contribution to the management of health, well-being and work productivity is obvious (Pate et al., 1995).

In general, much emphasis is placed on physical exercise, but not on their type. Physical activity is related to a healthy lifestyle and has a direct impact on health and body weight. Due to the sedentary lifestyle and its consequences, people in the field of sports propose to include physical inactivity in the category of medical problems. Physical inactivity affects the health of all people, not just the overweight.

6.1.1 Purpose of the research

This study was conducted to investigate the effects of physical activity programs in gyms on body fat and self-esteem in adult women. Self-discipline and healthy habits, but also the habit of being active, can be maintained throughout life. A number of studies support the claim that sport and other physical activities can contribute to the development of a positive self-image.

In a fitness room, different types of physical activities are practiced, and we set out to check which is the most effective type of physical activity for losing fat.

The research activity aims to produce knowledge. This study aims to find a solution suitable for the needs of the target group, consisting of female people practicing physical activities in gyms, with different occupations and ages between 19-51 years.

The research topic is one of importance and topicality due to the fact that more and more people are heading to the gyms, and females predominantly choose aerobics classes, compared to other activities.

6.1.2 Research objectives

In Sandu's (2012) view, the objectives of the research guide the research as a whole. A scientific study has one, maximum two general objectives.

In this part of the research the research objectives were:

- Identifying a female target group and evaluating the anthropometric indicators of the subjects;

- Development of exercise programs.

The people involved in the research were monitored throughout the project and contact was maintained with them for questions, suggestions, advice that may appear during the activity.

6.1.3 Research hypotheses

The research started from the following hypotheses:

1. Physical activities performed in gyms positively influence the anthropometric indicators of the subjects;

2. The influence of physical activities depends on the type of physical activity performed by the subjects;

3. There is a certain connection between the different types of physical activity and anthropometric indicators;

4. Physical activities performed by adult women in gyms have a positive impact on self-esteem.

6.2 Materials and methods

Subjects

The group of subjects included in the research consisted of people aged between 22 and 56, who volunteered to participate in the study and were the clients of the fitness room where the research was conducted. The number of subjects included in the research was 88, each subject participating in 3 trainings per week.

Research methods

In this study, the methods applied in the pilot research to verify the working tools and equipment used were used (Chapter 6.). The applied methods will not be presented in detail, as they have already been described in the pilot study.

Somatometric measurements of: waist, body weight, skin envelopes, body circumference were performed. Also, anthropometric indices of adiposity were calculated, which we proposed to use in evaluating the effectiveness of intervention programs.

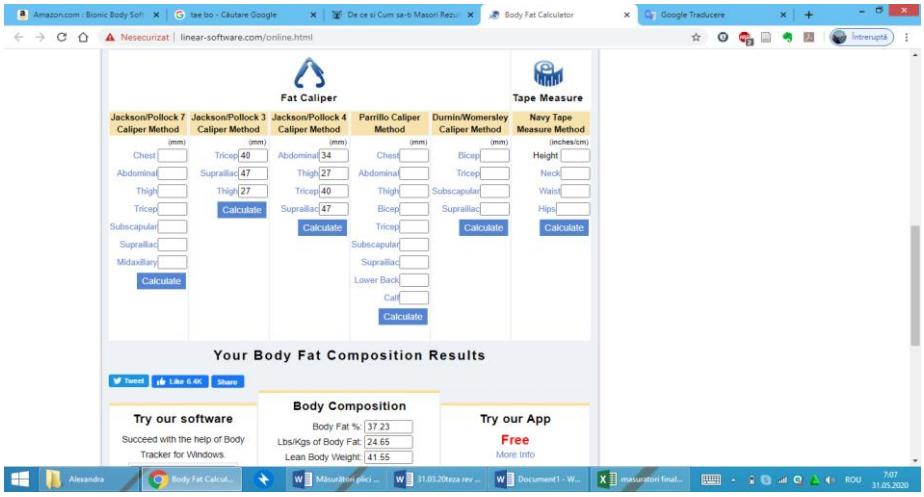


Figure 7. Online software for calculating body composition according to Jackson & Pollock methods 3,4

The method of measuring skin sachets was used to determine body composition. Given that there are several ways to calculate body fat, we resorted to three of them, respectively to use the measurement of three, four and five sachets. For the calculation of the body composition using 3 and 4 envelopes the online program Linear Software was used (Figure 7), available at http://www.linear-software.com/online.html, and for the use of 5 skin envelopes the recommended formula was used. by the Institute of Sports Medicine in Bucharest. These three calculation methods were used to analyze whether the results obtained differ significantly.

In order to assess the subjects' self-esteem, the Self-Esteem Scale questionnaire was applied at the beginning and end of the research.

Research stages

The physical activity programs lasted for 12 months, with three sessions per week. Test 1 took place in January 2015, before the start of physical activities, and the 2nd test in January 2016, after the end of physical activities.

After performing the first measurements in two gyms in the city of Oradea, the subjects were divided into 5 different groups.

Description of physical activity programs

Each training session lasted 60 minutes and had three parts:

Warming up the body for 10 minutes of effort; the breaks between exercises were 10 seconds, and the breaks between sets were 1 minute.

The main part, which lasted 45 minutes, while the body's return to the end of the physical program lasted 5 minutes.

a) Circuit training

It refers to a sequence of exercises, in this case 6, without a break between exercises.

b) Soft-ball

Emphasis is placed on toning large muscle groups: lower limbs, upper limbs, abdominal and back muscles. Toning the muscles not only helps to maintain a correct position but also to lose weight and increases overall mobility. The 2 kilogram ball is used as an accessory.

c) Fit-ball

A type of medium to high intensity training that is practiced with a special ball and the exercises are varied. The exercises can be static or dynamic and differ depending on the muscle group engaged in the effort.

d) Aerobic

In aerobic training, the optimal oxygenation of the body is aimed, so that it can transform it into energy. Aerobic exercise emphasizes the intense activity of the muscles of the lower and upper limbs, which cause, at the same time, an increased effort from the heart and lungs.

e) Aerobic boxing (Tae-Bo)

It derives from martial arts, as well as its variants (karate-aerobics, fitness-boxing). The intensity is medium to high and can be a continuous or interrupted workout. It includes fast hitting movements (punch and kick), does not require gloves, but if they are present, there is an additional external resistance that can increase the intensity (Grosu, 2012).

6.3 Results

The analysis of the data recorded at the two measurements will be differentiated, depending on the research hypotheses. Regarding the total number of subjects participating in the research, Figure 22 and Table 28 provide the following information: 88 people were involved in this research, who practiced different types of physical activity - circuit training, soft-ball, fit-ball , aerobics and tae-bo. The participation of the subjects in the physical activity

programs was the following: in the fit-ball and aerobics trainings 20 (22.73%) people each, 18 (20.45%) people practiced tae-bo, 17 (19.32%) in softball, and circuit training was attended by 13 (14.77%) subjects (Figure 8).

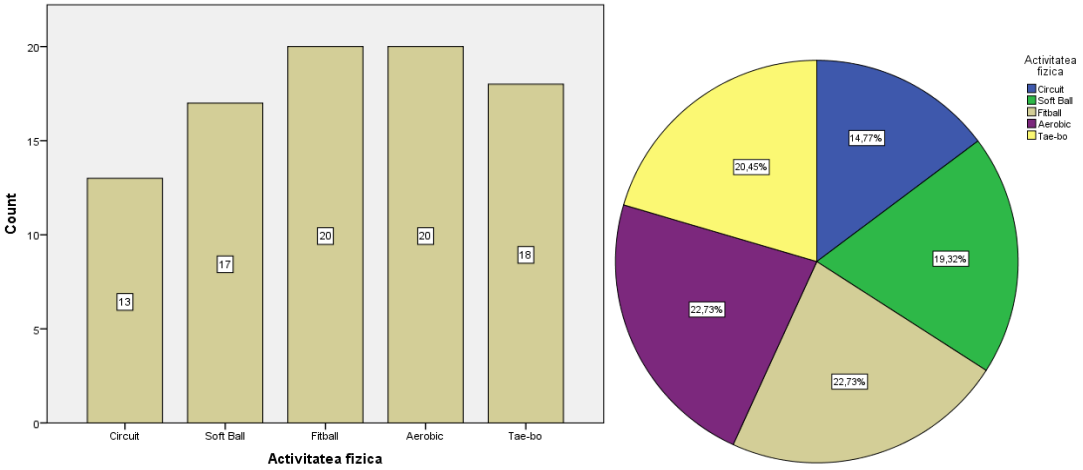


Fig. 8. Numerical distribution (A) and percentage (B) of the subjects according to the physical activity practiced

According to this table, for the variable body mass the lowest value was 47 kilograms and the highest value was 89 kilograms, the average value was 63.346, with a standard deviation of 9.29. We find that the samples were not homogeneous in terms of body mass.

Table 9. Descriptive analysis of research variables at initial measurements (N = 88)

Variable	N	Minimum	Maximum	Average	Standard deviation
Body weight (kg)	88	47,0	89,0	63,364	9,2912
Waist (cm)	88	158,0	176,0	167,614	4,1117
Body surface(m2)	88	1,00	2,00	1,9819	,11486
Adipose tissue (%)	88	11	40	25,15	5,727
Circumference waist (cm)	88	60	95	77,98	10,010
Circumference hip (cm)	88	87	120	101,56	7,899
Circumference brat în flexie (cm)	88	23	35	29,37	2,980
Circumference brat în extensie (cm)	88	23,0	36,0	28,489	2,7543
Circumference piept (cm)	88	77,00	112,00	94,1477	8,75797
Circumference coapsa (cm)	88	47,00	71,00	57,3636	5,66332
IMC	88	17,1	29,4	22,556	3,1353
Valid N (listwise)	87				

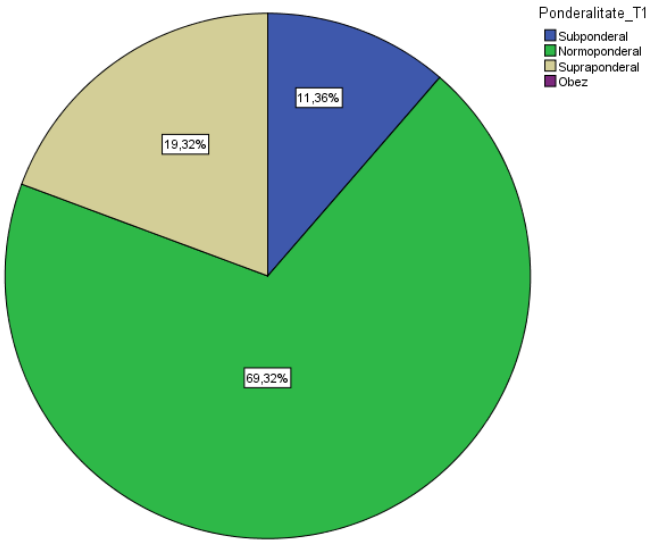


Figure 9. Percentage distribution of weight at the beginning of the research (N = 88)

Regarding the body mass index (BMI), the minimum value was 17.1, the maximum value was 29.4, the average was 22.556 and the standard deviation was 3.13.

Referring to the entire sample, we find that 11.36% of the subjects were underweight, 69.32% normal weight and 19.32% overweight (Figure 23).

BMI analysis by physical activity groups shows that neither at time T1 nor at time T2, for unpaired samples, no significant differences were observed (Table 32) between any of the groups (p> 0.05), but for paired samples (T1-T2) statistically significantly significant differences were observed between the two time points in all groups (p <0.001).

Table 10. Descriptive analysis of adipose tissue (ATA) and statistical significance (N = 88)

Lot	Moment	Average	ES	Median	DS	*Statistic significance*				
						T1-T2	T1		T2	
							I-II-III-IV-V	< 0,00	I-II-III-IV-V	< 0,00
I	**T1**	29,75	1,83	29,42	6,6	**0,00**	**I-II**	0,51	**I-II**	0,77
	T2	27,46	1,60	27,96	5,78		**I-III**	**0,03**	**I-III**	**0,00**
II	**T1**	31,22	1,51	29,95	6,22	**8,55 x 10^{-12}**	**I-IV**	0,18	**I-IV**	**0,00**
	T2	26,78	1,71	24,95	7,04		**I-V**	**0,01**	**I-V**	**< 0,00**
III	**T1**	23,94	1,14	24,4	5,08	**1,32 x 10^{-10}**	**II-III**	**0,00**	**II-III**	**0,00**
	T2	19,56	0,84	19,49	3,77		**II-IV**	0,30	**II-IV**	**0,00**
IV	**T1**	33,27	1,24	33,79	5,55	**1,2 x 10^{-13}**	**II-V**	**0,00**	**II-V**	**0,00**
	T2	19,88	0,59	19,58	2,65		**III-IV**	**2,37 x 10^{-6}**	**III-IV**	0,76
V	**T1**	23,78	0,97	22,46	4,13	**< 0,00**	**III-V**	0,66	**III-V**	0,48
	T2	18,92	0,66	18,28	2,81		**IV-V**	**< 0,00**	**IV-V**	0,23

At T1 for unpaired samples, no significant differences were observed between any of the lots (p> 0.05) but at T2 for unpaired samples, statistically significant differences were observed between lots III-IV (p <0.05).

For paired samples, statistically significantly significant differences were observed between the two time points in all groups (p <0.001). According to Table 34, observing the waist circumference (CT) values at the time of T1, no statistically significant differences were found between any of the groups (p> 0.05), taking into account all groups.

At time T2, statistically significant differences were observed between at least two groups (p <0.05). At T1 for unpaired samples, very statistically significant differences were observed between groups I-II (p <0.01) and significant between groups II-V (p <0.05). At T2 for unpaired samples, very statistically significant differences were observed between groups I-II and I-IV (p <0.01) and significant differences between groups III-IV and IV-V (p <0.05). For paired samples, statistically significantly significant differences were observed between the two time points in all groups (p <0.001).

Table 11. Descriptive analysis of adipose tissue (ATA) and statistical significance (N = 88)

Lot	**Moment**	**Average**	**Median**	**DS**	Statistical significance ***(p)***				
					T1			**T2**	
					T1-T2	**I-II-III-IV-V**	< 0,0001	**I-II-III-IV-V**	< 0,0001
I	**T1**	29,7	29,42	6,60	**0,0002**	**I-II**	0,50	**I-II**	0,77
	T2	27,46	27,96	5,77		**I-III**	0,0269	**I-III**	0,0003
II	**T1**	31,2	29,95	6,21	**$8{,}55 \times 10^{-12}$**	**I-IV**	0,1813	**I-IV**	0,0005
	T2	26,78	24,95	7,04		**I-V**	0,0073	**I-V**	< 0,0001
III	**T1**	23,94	24,40	5,07	**$1{,}32 \times 10^{-10}$**	**II-III**	0,0005	**II-III**	0,0009
	T2	19,56	19,49	3,77		**II-IV**	0,3010	**II-IV**	0,0011
IV	**T1**	33,27	33,79	5,54	**$1{,}2 \times 10^{-13}$**	**II-V**	0,0001	**II-V**	0,0003
	T2	19,88	19,58	2,64		**III-IV**	$2{,}37 \times 10^{-6}$	**III-IV**	0,7575
V	**T1**	23,78	22,46	4,12	**< 0,0001**	**III-V**	0,6595	**III-V**	0,4828
	T2	18,92	18,28	2,80		**IV-V**	< 0,0001	**IV-V**	0,2279

Following the statistical analysis of adipose tissue values (Table 11), both at time T1 and at time T2, taking into account all groups, statistically significant differences were observed between at least two groups (p <0.001). At T1 for unpaired samples, statistically significant differences were observed between groups II-III, II-V, III-IV and IV-V (p <0.001), statistically very significant differences between groups IV (p <0.01) and statistically significant differences between groups I-III (p <0.05).

At time T2, for unpaired samples, statistically significant differences were observed between groups I-III, I-IV, IV, II-III and II-V ($p < 0.001$) and statistically very significant differences between groups II-IV ($p < 0.01$).

For paired samples, statistically significantly significant differences were observed between the two time points in all groups ($p < 0.001$).

Analysis of body composition using methods for measuring 3 and 4 skin envelopes

Next, we aimed to analyze the effect of intervention programs on the percentage of adipose tissue, fat mass and lean mass in subjects participating in the research.

To see how this effect can be interpreted on the mentioned variables, we used three ways to analyze the measurement of skin envelopes, namely the analysis of the measurement of three skin envelopes (Jackson, Pollock & Ward method), four envelopes (Jackson & Pollock method) and five skin sachets (recommended by the Institute of Sports Medicine in Bucharest). We first present the effect of the intervention programs on the whole sample (N = 88). For the use of appropriate tests, the distribution of data to the variables we set out to analyze was verified (Table 11).

Table 12. Verification of data distribution for the variables percentage of adipose tissue, fat mass and lean mass in measurements of 3 and 4 sachets (N = 88)

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
TA1(%) 3 plici	,092	88	,062	,972	88	,058
TA2(%) 3 plici	,088	88	,091	,954	88	,003
MG1 (kg) 3 plici	,135	88	,000	,932	88	,000
MG2 (kg) 3 plici	,134	88	,000	,911	88	,000
MS1(kg) 3 plici	,084	88	,178	,962	88	,010
MS2(kg) 3 plici	,067	88	,200*	,982	88	,246
TA 1 (%) 4 plici	,091	88	,070	,969	88	,032
TA 2 (%) 4 plici	,072	88	,200*	,960	88	,009
MG1 (kg) 4 plici	,146	88	,000	,927	88	,000
MG2 (kg) 4 plici	,150	88	,000	,914	88	,000
MS1(kg) 4 plici	,073	88	,200*	,968	88	,029
MS2(kg) 4 plici	,050	88	,200*	,981	88	,208

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Given that the sample is larger than 50 subjects, the results of the Kolmogorav-Smirnov test are taken into account. Data are normally distributed ($p > .05$) for the fat percentage (TA%) and lean mass [MS (kg)] variables in both measurement methods, and are not normally distributed in the fat mass variable [MS (kg)]. .

Consequently, for normally distributed data we will use for comparison of averages at the initial (T1) and final (T2) measurements the t-test for pair variables and the Wilcoxon test, for those that are not normally distributed (Table 12).

Table 13. ANOVA analysis of variables before the intervention program (N = 88)

			ANOVA					Effect
Metod	Variable		Sum of Squares	df	Mean Square	F	Sig.	$\eta^2_{partial}$
Jackson, Pollock & Wade 3 plici	TA 1(%)	Between Groups	891,214	4	222,803			
		Within Groups	3044,721	83	36,683	6,074	,000	.23
		Total	3935,934	87				
	MS1(kg)	Between Groups	365,482	4	91,370	4,808	,002	.19
		Within Groups	1577,203	83	19,002			
		Total	1942,685	87				
Jackson & Pollock 4 plici	TA 1 (%)	Between Groups	580,626	4	145,156	4,024	,005	.16
		Within Groups	2993,928	83	36,071			
		Total	3574,554	87				
	MS1(kg)	Between Groups	350,870	4	87,718	5,097	,001	.20
		Within Groups	1428,330	83	17,209			
		Total	1779,200	87				

The analysis must be done according to the intervention program, because five categories of training were used (circuit, softball, fitball, aerobics and Tae Bo). The ANOVA analysis, which compares the averages recorded at the initial measurements (Table 43) by group, for the variables percentage of adipose tissue and lean mass, shows that there are significant differences between the five groups ($p < 0.05$), but that the effect size is very small. Regarding the fat mass, whose distribution is not normal, comparing the averages with the help of the Kruskal Wallis test shows that the differences are not significant ($\chi 2 = 9.09$, df = 4, $p = .059$).

The ANOVA analysis showed that there are significant differences between groups, and the magnitude of the effect that these differences are weak. To assess which of the groups there are differences, as well as their significance, we need a Post Hoc multiple comparison analysis and we chose the Tukey test.

Table 14 shows that there are significant differences between the averages of the percentage of adipose tissue from the training group in the circuit and those from the groups of fitball, aerobics and tae bo, between the other groups the differences are not significant. This explains why the size of the effect when comparing differences between groups was very small.

Regarding the low mass variable, the same table reveals that there are significant differences between the average values of the circuit group and the fitball group ($p = .047$), as well as of the softball group and those of the fitball groups ($p = .003$) and tae bo ($p = .022$).

Table 14. Multiple comparisons between fat percentage averages and lean mass at initial test at Jackson, Pollock & Wade measurements (3 sachets)

Multiple Comparisons

Tukey HSD

Variable dependentă	(I) Grupa	(J) Grupa	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
TA 1(%)	Circuit	Sofball	4,78	2,23	,212	-1,44	11,00
		Fitball	9,08*	2,15	,001	3,06	15,09
		Aerobic	8,88*	2,15	,001	2,86	14,89
		Tae bo	8,12*	2,20	,004	1,97	14,27
	Softball	Fitball	4,30	1,99	,208	-1,27	9,87
		Aerobic	4,10	1,99	,251	-1,47	9,67
		Tae bo	3,34	2,04	,481	-2,36	9,05
	Fitball	Aerobic	-,20	1,91	1,000	-5,54	5,14
		Tae bo	-,95	1,96	,988	-6,44	4,53
	Aerobic	Tae bo	-,75	1,96	,995	-6,24	4,73
MS1(kg)	Circuit	Sofball	,96	1,60	,975	-3,51	5,43
		Fitball	-4,36*	1,55	,047	-8,69	-,034
		Aerobic	-1,35	1,55	,905	-5,69	2,97
		Tae bo	-3,60	1,58	,165	-8,02	,82
	Sofball	Fitball	-5,32*	1,43	,003	-9,33	-1,31
		Aerobic	-2,32	1,43	,493	-6,33	1,69
		Tae bo	-4,56*	1,47	,022	-8,67	-,45
	Fitball	Aerobic	3,01	1,37	,197	-,83	6,84
		Tae bo	,76	1,41	,983	-3,18	4,71
	Aerobic	Tae bo	-2,24	1,41	,511	-6,19	1,70

*. The mean difference is significant at the 0.05 level.

We also find similar results in terms of data obtained as a result of using the Jackson & Pollock method with four measured envelopes. In the variable percentage of adipose tissue we find significant differences only between the circuit group and the fitball groups (p = .039) and aerobics (p = .027), and in the variable lean mass between the softball group and the fitball groups (p =. 001) and that of tae bo (p = .003).

As a result of these multiple comparisons, we can say that the subjects from the 5 groups of physical activities carried out in gyms have similar results to the variables percentage of adipose tissue, lean mass and fat mass.

Table 15. Descriptive analysis and comparison of means to paired variables in 3- and 4-envelope measurements (N = 88)

Measurement	Variable	**Descriptive Statistics** N	Minim	Maxim	Mean	St.dev.	t^a/Z^b	Sig.	**Efect** d/r*
Jackson $ Pollock 3 plici	TA 1 (%)	88	11,86	42,17	26,31	6,73	14.72[a]	.000	1.57
	TA 2 (%)	88	8,87	40,52	23,42	6,89			
	MG1 (kg)	88	6,420	35,130	17,12	6,55	-5,48[b]	.000	-.58
	MG2 (kg)	88	4,62	32,47	14,20	5,85			
	MS1(kg)	88	38,13	59,32	46,24	4,72	6.11[a]	.000	.65*
	MS2(kg)	88	35,67	57,58	44,91	4,73			
Jackson $ Pollock 4 plici	TA 1 (%)	88	12,80	41,88	26,54	6,41	20.18[a]	.000	2.15
	TA 2 (%)	88	9,60	40,31	23,71	6,74			
	MG1 (KG)	88	6,93	36,44	17,29	6,50	-6,00[b]	.000	-.64
	MG2 (KG)	88	5,00	34,26	14,38	5,845			

	MS1(kg)	88	38,48	58,30	46,10	4,52	7.11[a]	.000	.76*
	MS2(kg)	88	36,12	57,49	44,73	4,54			

In order to measure the effect of the intervention program on the research sample, the averages of the measurements at the two moments were compared using the t-test for even values, in the case of normally distributed data, and with the Wilcoxon test, when the data were not distributed normally. (Table 16). It can be seen in this table that for the three variables analyzed the differences between the averages of the initial and final measurements are significant, and the effect size (d and r) has a high value for all the analyzed situations.

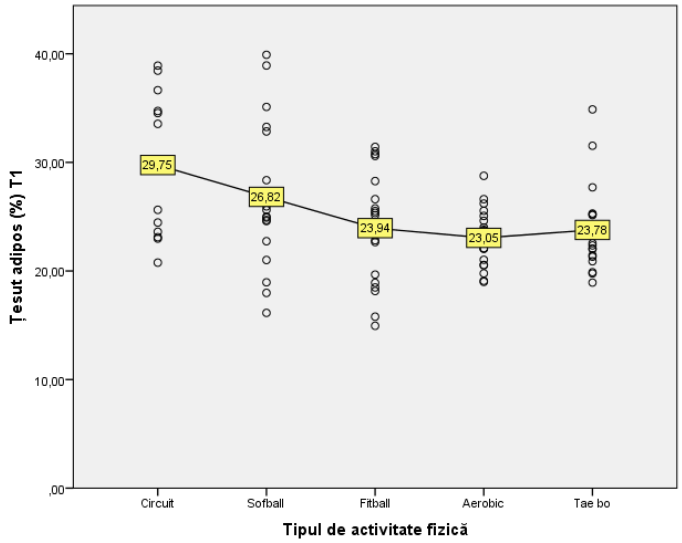


Figure 10. Adipose tissue dispersion diagram and mean interpolation line of adipose tissue before the intervention program, by groups

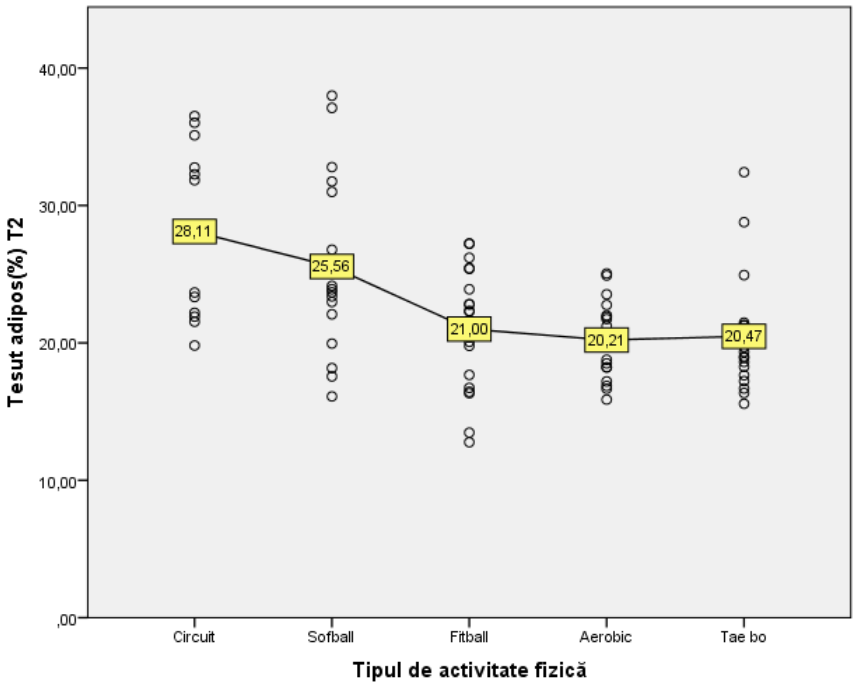


Figure 11. Adipose tissue dispersion diagram and mean interpolation line of adipose tissue by intervention program, by groups

In Figures 10 and 11, which show the dispersion diagrams for adipose tissue measured in the 5 groups, it can be seen that in all groups the percentage of adipose tissue decreased after the application of the intervention program, there are differences depending on the type of physical activity. practiced by subjects (1.64% in group 1 - Circuit, 1.26% in group 2 - Softball, 2.94% in group 3 - Fitball, 1.85% in group 4 - Aerobics and 3.31% in group 5 - Tae bo). The most important loss of adipose tissue was in group 5, in which the gym program included Tae bo exercises.

Although at the initial test there were differences between the groups of subjects in terms of the percentage of adipose tissue, and these differences were significant, we will further analyze whether at the final test there are such differences in the two ways of calculating the percentage of adipose tissue (Table 16). Analyzing the table we can see that the method of measuring the percentage of adipose tissue by measuring three sachets are significant differences between the circuit group and the groups of fitball, aerobics and tae bo, as well as between the group of softball and those of fitball, aerobics and tae bo. For the 4-envelope measurement method, the differences are significant between the circuit group and the fitball, aerobics and tae bo groups, but also between the softball group and the fitball, aerobics and tae bo groups. Taking into account all batches, statistically significant differences between at least two batches ($p < 0.05$) were observed in the statistical analysis of the values of the arm in extension (Pli.Tri) at the time of T1. At T2, statistically significant differences were observed between at least two groups ($p < 0.001$).

Table 16. ANOVA analysis of self-esteem before and after the intervention program (N = 88)

ANOVA

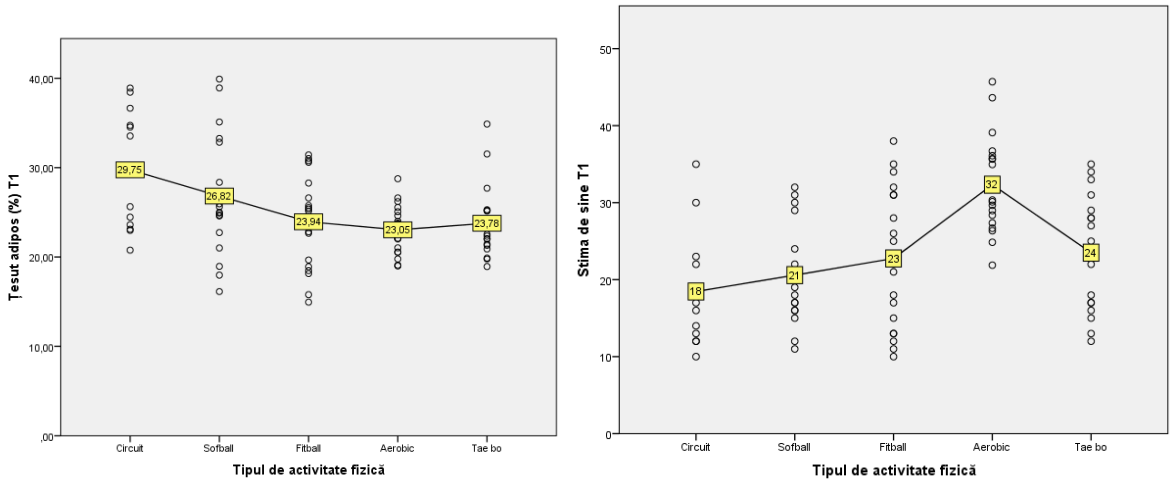
		Sum of Squares	Df	Mean Square	F	Sig.
Self esteem T1	Between Groups	70,083	4	17,521	,285	,887
	Within Groups	5171,108	84	61,561		
	Total	5241,191	88			
Self esteem T2	Between Groups	68,167	4	17,042	,367	,832
	Within Groups	3904,193	84	46,478		
	Total	3972,360	88			

Following the statistical interpretation of the scores for self-esteem (SS) in paired samples, statistically significant differences were observed between the two measurements in all groups ($p < 0.001$).

Table 17. Descriptive analysis and statistical significance of self-esteem by group and time of intervention (N = 88)

Lot	Moment	Average	Median	DS	Statistical significance ***(p)***				
					T1-T2	**T1**		**T2**	
						I-II-III-IV-V	0,4318	**I-II-III-IV-V**	0,4676
I	**T1**	18,46	17,00	7,37	**0,0005**	**I-II**	0,3347	**I-II**	0,1425
	T2	23,69	23,00	6,56		**I-III**	0,1963	**I-III**	0,2064
II	**T1**	20,59	19,00	6,54	**0,0003**	**I-IV**	0,4712	**I-IV**	0,9783
	T2	27,41	29,00	6,81		**I-V**	0,0828	**I-V**	0,1700
III	**T1**	22,75	22,50	8,88	**$7{,}15 \times 10^{-8}$**	**II-III**	0,4013	**II-III**	0,8672
	T2	27,00	29,00	8,04		**II-IV**	0,9699	**II-IV**	0,1790
IV	**T1**	20,75	20,00	8,52	**< 0,0001**	**II-V**	0,2300	**II-V**	0,8969
	T2	24,50	24,00	7,88		**III-IV**	0,5152	**III-IV**	0,3095
V	**T1**	23,50	24,00	7,5245	**0,0002**	**III-V**	0,7798	**III-V**	0,9635
	T2	27,11	27,00	6,7987		**IV-V**	0,2418	**IV-V**	0,2300

Links were found between self-esteem and other research variables depending on the type of activity performed. In Figure 12, which shows the diagrams of self-esteem dispersion by percentage of adipose tissue, it can be seen that at T2 testing the average percentage of adipose tissue decreased in all groups and the average self-esteem scores increased, except for the aerobics group. It can be said that reducing the percentage of adipose tissue can increase the self-esteem of participants in an exercise program.



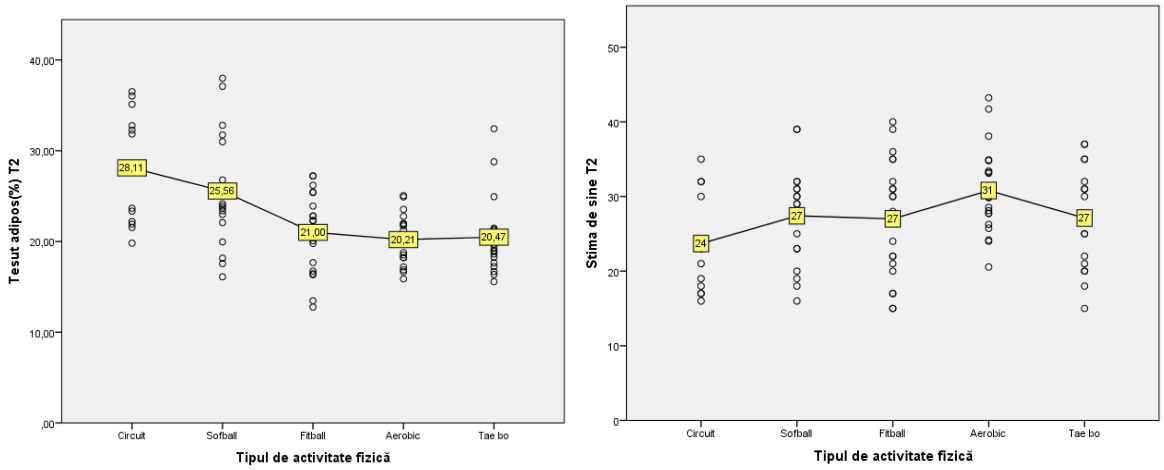


Figure 12. Dispersion diagrams and interpolation line of mean fat percentage and self-esteem by batch and evaluation time

6.4 Discussions

The results of this study were significant but not impactful, due to the fact that the approach of people in a gym, as it is currently done, is wrong because enrollment in aerobics programs (standard hours) is done accordingly. the person's daily schedule or his affinity for the sports instructor, without taking into account the effort capacity of each or other important characteristics such as weight, age, etc. Training should be adapted both physiologically and methodologically.

Through the study I tried to promote the need and benefits of physical activity. The feminine conformation is not identical with the masculine one and hence the need to treat the subject differently. But, more than that, women are different in form, habits and mentality and the need arises to build more detailed principles in the construction of training. The level of influence of exercise on the body is determined by intensity, duration and frequency.

Correlational analysis, based on the correlations between the researched variables, shows us the relationships between the variables under analysis.

According to Colton's rules, correlation coefficients between ± 0.75 and ± 1 indicate a very good correlation, those between ± 0.50 and ± 0.75 a good correlation, an acceptable correlation for those between ± 0.25 and ± 0.50 and a correlation poor or no correlation for those between one and ± 0.25.

In the initial test (T1), regarding the correlations between body mass and the percentage of adipose tissue, waist circumference, hip, chest, flexion arm, extension arm and thigh, in the group of subjects participating in circuit training we found a very correlation Hi; in the softball group, the correlation of body mass is very good with the percentage of adipose

tissue, the circumference of the waist, hip and thigh, and good with the circumference of the arm in flexion, the arm in extension and that of the chest; in the fitball group there is a very good correlation of body mass with the percentage of adipose tissue and waist circumference, a good correlation of hip and chest circumference, as well as an acceptable correlation of arm circumference in flexion, arm extension and thigh circumference.

Regarding the relationship between the percentage of adipose tissue and the measured circumferences, in the circuit group we observe a very good correlation with the waist circumference and a good one with the circumferences of the hip, arm in extension, arm in flexion, chest and thigh.

In fitball, we notice that it is good with the circumference of the waist and hip, but acceptable with the circumferences of the flexed arm, the extended arm, the chest and the thigh.

The correlations found in the aerobics group are very different. The correlation is very good between body mass and the percentage of adipose tissue, acceptable with the circumference of the thigh and very weak or there is no correlation with the circumferences of the waist, hip, flexion arm, extension arm and chest circumference (Table 18).

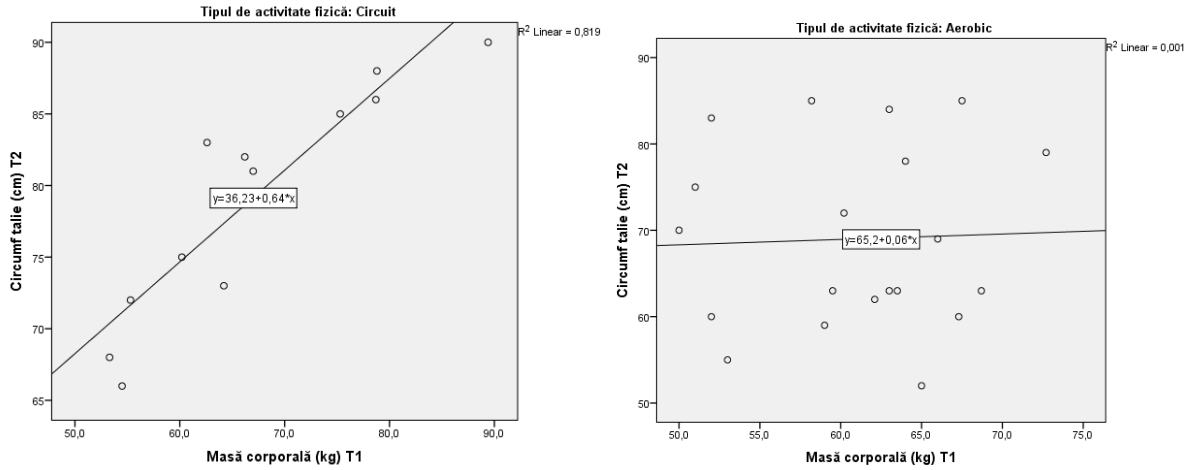


Figure 13. Dispersion diagrams of waist circumference and body mass scores at initial testing for circuit and aerobic lots

The scatter plot in Figure 13 shows the correlation between body mass and torso circumference in subjects in the circuit and aerobic groups. While in the subjects from the circuit group the value of the dispersion coefficient is R2 = .819, corresponding to a correlation r = .905, in the aerobics group R2 = .001, which means a correlation of r = .005. This explains why the value of the correlation coefficient in the whole sample was only r = .654, although in the other groups the correlation coefficient has much higher values.

6.5 Conclusions

88 people participated in this research, in 5 different activities. The minimum age of the participants was 22 years and the maximum 56 years with an average of 33, 01 and we can say that the groups formed were not homogeneous in terms of age.

Depending on the intervention program, adipose tissue decreased (1.64% in group 1 - Circuit, 1.26% in group 2 - Softball, 2.94% in group 3 - Fitball, 1.85% in group 4 - Aerobics and 3.31% in group 5 - Tae bo) in all groups. We can say that all training programs have an effect on the percentage of adipose tissue. The first hypothesis is confirmed so the physical activities carried out in gyms positively influence the anthropometric indicators of the subjects.

Links were found between self-esteem and other research variables depending on the type of activity performed. Dispersion diagrams of self-esteem show that depending on the percentage of adipose tissue, it can be seen that at the T2 test the average percentage of adipose tissue decreased in all groups and the average self-esteem scores increased, except for the aerobics group. It can be said that reducing the percentage of adipose tissue can lead to increased self-esteem of participants in an exercise program. We can say that the last hypothesis is confirmed, namely the physical activities performed by adult women in gyms have a positive impact on self-esteem. Following the statistical analysis, there is a link between the fat tissue that decreased and the self-esteem that increased and we can say that physical activity positively influences self-esteem.

From the first study it was observed the need to place people in certain groups for the best possible homogeneity. All hypotheses were confirmed, so we started the second study, the reply to study I. Even if the results of this study are not very significant, they serve as a step towards the next study topic, with a more careful selection of members of the participating group.

Therefore, the study confirmed the importance of joining a training program, as well as the positive results of this action for adult women in reducing adipose tissue and increasing self-esteem. Even if these results are not high enough, they helped us to identify a probable erroneous approach to building training programs.

Following the results of this study, we decided to start another study, with the same intervention program but the subjects should be grouped differently, with a sample of females, but the groups should be divided into physical activities so that they are homogeneous. in terms of age and body mass.

STUDY II -
IMPACT OF ADULT PHYSICAL ACTIVITIES ON ANTHROPOMETRIC AND SELF-ESTEEM INDICATORS (REPLY TO STUDY 1)

7.1. Introduction

Given the results and conclusions of study 1, we set out to repeat the research, but to eliminate some shortcomings found, this study being a replica of the previous study. In this sense, a new sample was selected, but we tried to make the distribution on groups to the recommendation of the instructor, so that they are homogeneous in terms of the number of subjects in the groups and the average body mass. The initial measurements were made (moment T1), then the subjects were divided into the 5 groups of physical activity and the training program was run for a period of 12 months, and finally the measurements were repeated (moment T2).

7.1.1 Purpose of the research

The aim of this research was to repeat the study dedicated to finding out the impact of physical activity practiced in gyms on anthropometric indicators and self-esteem of adult women. The topic is important and topical due to the growing number of people who enter a gym and practice different types of physical activities, but also of physically inactive people.

7.1.2. Research hypotheses

The hypotheses formulated in study 1 were kept in the research:

- the physical activities carried out in the fitness rooms positively influence the anthropometric indicators of the subjects;
- the impact of physical activities depends on the type of physical activity performed by the subjects;
- there is a certain connection between the different types of physical activity and anthropometric indicators;
- Physical activities performed by adult women in gyms have a positive impact on self-esteem.

7.2.Materials and methods

Place and duration of the research

The research took place for 12 months during 2016-2017 in the same fitness rooms in the city of Oradea where the first study took place. The subjects participated in 3 trainings per week, their content being identical to that of the first study.

subjects

The sample of subjects included in the research consisted of 89 women aged 23-57, who volunteered to take part in the study, clients of the gyms where the research was performed.

Research methods

In this study, the methods applied in the pilot research to verify the working tools and equipment used were used (Chapter 5.). The applied methods will not be presented in detail, as they have already been described in the pilot study.

Somatometric measurements of: waist, body weight, skin envelopes, body circumference were performed. Also, anthropometric indices of adiposity were calculated, which we proposed to use in evaluating the effectiveness of intervention programs.

In order to assess the subjects' self-esteem, the Self-Esteem Scale questionnaire was applied at the beginning and end of the research.

IBM SCSS Statistics 20.0 and StarDirect software were used for statistical analysis of the recorded data, performing descriptive analyzes, distribution tests, parametric and nonparametric tests for comparing averages and correlations.

7.3 Results

According to table no. 18 following the statistical analysis of body mass index (BMI) values taking into account all batches, no significant differences were observed between any of the batches at either T1 or T2 ($p > 0.05$).

For unpaired samples, no significant differences were observed between any of the groups at either T1 or T2 ($p > 0.05$). For paired samples, statistically significant differences were observed between the two time points in groups I, II and V ($p < 0.001$), statistically very significant differences in group III ($p < 0.01$) and statistically significant differences in group IV ($p < 0.05$).

Table 18. Descriptive analysis of body mass index (BMI) and statistical significance (N = 89)

Lot	Moment	Average	ES	Median	DS	Statistical significance *(p)*				
						T1-T2	T1		T2	
							I-II-III-IV-V	0,83	I-II-III-IV-V	0,90
I	T1	23,38	1,18	22,7	5,01	0,00	I-II	0,48	I-II	0,63
	T2	21,36	0,64	20,72	2,72		I-III	0,94	I-III	0,74
II	T1	23,56	0,83	24,54	3,51	<	I-IV	0,55	I-IV	0,72
	T2	21,78	0,60	22,01	2,54	0,0001	I-V	0,50	I-V	0,64
III	T1	23,31	1,21	23,23	5,12	0,00	II-III	0,52	II-III	0,90
	T2	21,65	0,80	21,55	3,38		II-IV	0,36	II-IV	0,48
IV	T1	22,92	1,30	21,76	5,52	0,01	II-V	0,35	II-V	0,40
	T2	21,58	0,88	19,94	3,72		III-IV	0,74	III-IV	0,89
V	T1	22,58	1,05	21,19	4,32	0,00	III-V	0,94	III-V	0,54
	T2	20,99	0,71	20,6	2,93		IV-V	0,88	IV-V	0,88

Table 19. Descriptive analysis of adipose tissue (ATA) and statistical significance (N = 89)

Lot	Moment	Average	ES	Median	DS	*Semnificaţia statistică (p)*				
						T1-T2	T1		T2	
							I-II-III-IV-V	0,90	I-II-III-IV-V	0,08
I	T1	23,17	0,68	23,02	2,88	< 0,0001	I-II	0,45	I-II	0,80
	T2	17,47	0,43	17,43	1,82		I-III	0,71	I-III	0,99
II	T1	22,47	0,63	22,86	2,65	< 0,0001	I-IV	0,61	I-IV	0,08
	T2	17,3	0,47	17,67	1,99		I-V	0,99	I-V	0,10
III	T1	22,85	0,53	22,26	2,23	< 0,0001	II-III	0,64	II-III	0,77
	T2	17,47	0,32	17,73	1,36		II-IV	0,69	II-IV	0,06
IV	T1	22,76	0,41	22,49	1,73	< 0,0001	II-V	0,44	II-V	0,07
	T2	18,39	0,29	18,16	1,21		III-IV	0,90	III-IV	**0,04**
V	T1	23,17	0,65	23,53	2,66	< 0,0001	III-V	0,70	III-V	0,08
	T2	18,76	0,63	19,92	2,61		IV-V	0,60	IV-V	0,59

Following the statistical analysis of waist circumference (CT) values taking into account all batches, no significant differences were observed between any of the batches at either T1 or T2 ($p > 0.05$).

No significant differences were observed between any of the groups at either T1 or T2 ($p > 0.05$) for unpaired samples but statistically significant differences were observed in all batches ($p < 0.001$) for paired samples, between the two moments of time.

Tables 76 and 77 present the descriptive analysis of body mass and self-esteem at the entire echelon, as well as the type of physical activity performed by the subjects. In both tables we can see that the averages recorded in the T2 test show reductions in body weight and increases in self-esteem, both in the whole echelon (Table 19) and in each group of subjects (Table 20).

Table 20. Descriptive analysis of body mass and self-esteem by evaluation time (N = 89)

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Body weight (kg) T1	89	48	114	65,62	13,769
Masa corporală (kg) T2	89	50	85	60,81	8,690
Self esteem T1	89	10	38	22,69	7,717
Self esteem T2	89	15	38	27,20	6,719
Valid N (listwise)	89				

Table 21. Descriptive analysis of body mass and self-esteem by assessment time and type of physical activity

Descriptive Statistics[a]

Tip activitate	Variable	N	Minimum	Maximum	Mean	Std. Deviation
Circuit	Body weight (kg) T1	18	48	114	66,17	17,379
	Body weight (kg) T2	18	51	85	60,24	9,769
	Self esteem T1	18	11	33	21,72	7,307
	Self esteem T2	18	17	36	28,28	7,258
Softball	Body weight (kg) T1	18	51	83	65,96	8,910
	Body weight (kg) T2	18	52	73	60,95	5,561
	Self esteem T1	18	11	34	22,61	7,064
	Self esteem T2	18	15	36	27,67	6,126
Fitball	Body weight (kg) T1	18	50	93	65,63	13,403
	Body weight (kg) T2	18	50	82	61,03	8,666
	Self esteem T1	18	10	37	24,17	8,169
	Self esteem T2	18	16	37	27,50	6,582
Aerobic	Body weight (kg) T1	18	48	107	65,30	16,044
	Body weight (kg) T2	18	50	85	61,42	10,894
	Self esteem T1	18	13	31	21,89	6,379
	Self esteem T2	18	17	35	25,72	6,397
Tae bo	Body weight (kg) T1	17	51	98	65,02	13,122
	Body weight (kg) T2	17	50	81	60,39	8,612
	Self esteem T1	17	11	38	23,06	9,965
	Self esteem T2	17	15	38	26,82	7,659

As for the relationship between body mass and self-esteem, it would be natural, we believe, for a reduction in body mass to increase self-esteem.

In reality this is not the case, from Table 21 it can be seen that, at the level of the whole echelon, the reduction of body mass by 4.81 kg also means the increase of self-esteem by 4.61 points, but that between body mass at the time of T2 and the estimate self at the same time (Table 22) the connection is almost non-existent ($r = .001$, $df = 89$, $p = .989$). At the level of physical activity groups, the situation is slightly different, presenting itself differently from one group to another (Table 23): in the circuit group the connection between the body masses and the self-esteem of the two moments is strong ($r = .985$, $p = .000$ and $r = .909$, $p = .000$); in the softball group the connection between the body masses and the self-esteem is strong in the two moments:

Table 22. Correlations between body mass and self-esteem by time of assessment (N = 89)

Correlations

		Body weight (kg) T1	Body weight (kg) T2	Self esteem T1	Self esteem T2
Body weight (kg) T1	Pearson Correlation	1	,967**	,049	,025
	Sig. (2-tailed)		,000	,651	,816
Body weight (kg) T2	Pearson Correlation	,967**	1	,032	,001
	Sig. (2-tailed)	,000		,765	,989
Self esteem T1	Pearson Correlation	,049	,032	1	,905**
	Sig. (2-tailed)	,651	,765		,000
Self esteem T2	Pearson Correlation	,025	,001	,905**	1
	Sig. (2-tailed)	,816	,989	,000	

**. Correlation is significant at the 0.01 level (2-tailed).

Table 23. Correlations between body mass and self-esteem by time of assessment by type of physical activity

Correlations[a]

Group	Variable		Body weight (kg) T1	Body weight (kg) T2	Self esteem T1	Self esteem T2
Circuit (N=18)	Body weight (kg) T1	Pearson Correlation	1	,985**	-,002	-,076
		Sig. (2-tailed)		,000	,994	,764
	Body weight (kg) T2	Pearson Correlation	,985**	1	-,052	-,125
		Sig. (2-tailed)	,000		,839	,620
	Self esteem T1	Pearson Correlation	-,002	-,052	1	,909**
		Sig. (2-tailed)	,994	,839		,000
	Self esteem T2	Pearson Correlation	-,076	-,125	,909**	1
		Sig. (2-tailed)	,764	,620	,000	
Softball (N=18)	Body weight (kg) T1	Pearson Correlation	1	,920**	,106	,224
		Sig. (2-tailed)		,000	,676	,372
	Body weight (kg) T2	Pearson Correlation	,920**	1	,087	,179
		Sig. (2-tailed)	,000		,732	,476
	Self esteem T1	Pearson Correlation	,106	,087	1	,815**
		Sig. (2-tailed)	,676	,732		,000
	Self esteem T2	Pearson Correlation	,224	,179	,815**	1
		Sig. (2-tailed)	,372	,476	,000	
Fitball (N=18)	Body weight (kg) T1	Pearson Correlation	1	,966**	-,350	-,401
		Sig. (2-tailed)		,000	,155	,099
	Body weight (kg) T2	Pearson Correlation	,966**	1	-,389	-,402
		Sig. (2-tailed)	,000		,110	,099
	Self esteem T1	Pearson Correlation	-,350	-,389	1	,979**
		Sig. (2-tailed)	,155	,110		,000
	Self esteem T2	Pearson Correlation	-,401	-,402	,979**	1
		Sig. (2-tailed)	,099	,099	,000	
Aerobic (N=18)	Body weight (kg) T1	Pearson Correlation	1	,974**	-,053	-,073
		Sig. (2-tailed)		,000	,835	,772
	Body weight (kg) T2	Pearson Correlation	,974**	1	-,030	-,039
		Sig. (2-tailed)	,000		,907	,879
	Self esteem T1	Pearson Correlation	-,053	-,030	1	,923**
		Sig. (2-tailed)	,835	,907		,000
	Self esteem T2	Pearson Correlation	-,073	-,039	,923**	1
		Sig. (2-tailed)	,772	,879	,000	
Tae bo (N=18)	Body weight (kg) T1	Pearson Correlation	1	,976**	,524*	,536*
		Sig. (2-tailed)		,000	,031	,027
	Body weight (kg) T2	Pearson Correlation	,976**	1	,506*	,485*
		Sig. (2-tailed)	,000		,038	,048
	Self esteem T1	Pearson Correlation	,524*	,506*	1	,955**
		Sig. (2-tailed)	,031	,038		,000
	Self esteem T2	Pearson Correlation	,536*	,485*	,955**	1

Sig. (2-tailed)	,027	,048	,000	

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

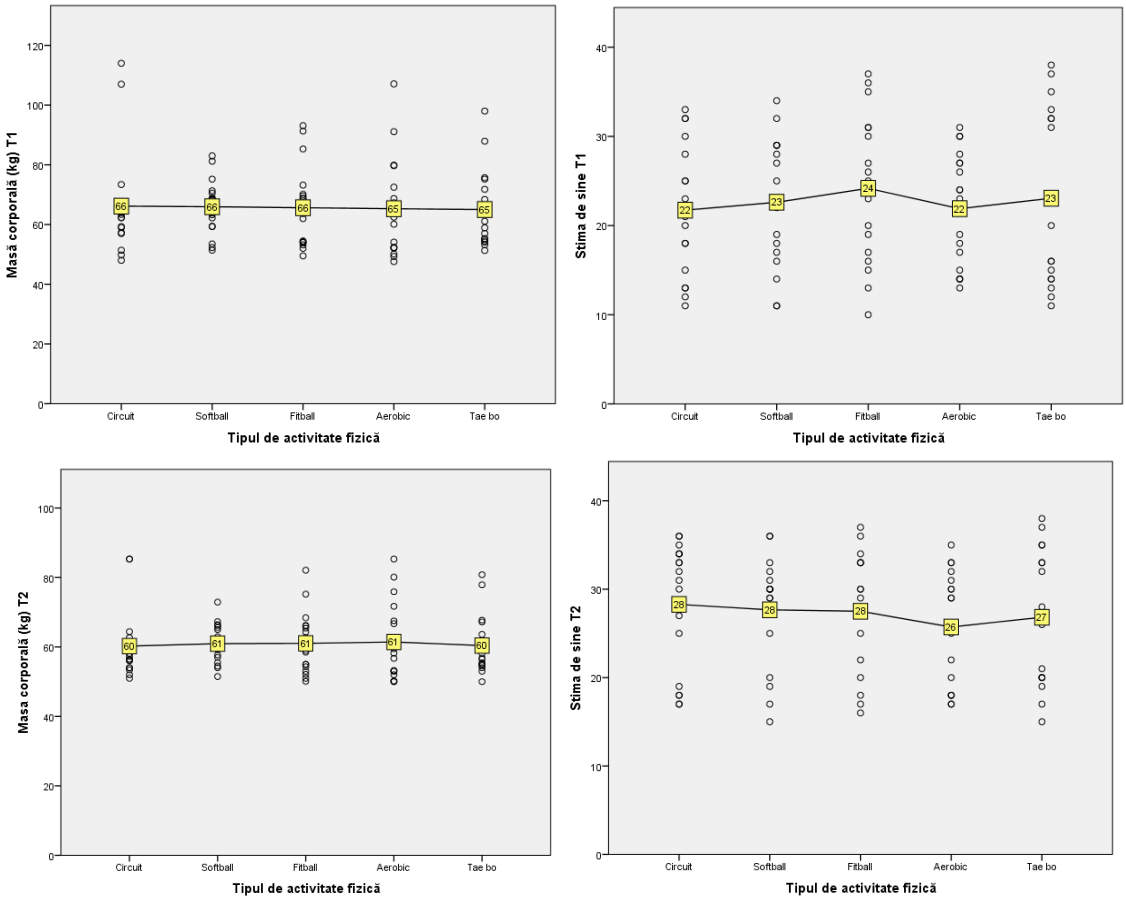


Figure 14. Dispersion diagrams and interpolation line of body mass and self-esteem averages by group and assessment time

There may be links between self-esteem and anthropometric indicators. From Figure 14, which shows the dispersion diagrams and the interpolation line of the body mass averages according to time and physical activity group, it can be seen that at the T1 test the body mass averages of the subjects from the 5 physical activity groups were 65 - 66 kg, and the averages of the self-esteem score of 22-24 points. In the 2nd test we observe the reduction of the body mass averages to 60-61kg (ie a reduction by 4-5 kg), and in the self-esteem an increase to 26-28 points.

This means that training programs have been effective in lowering body weight and increasing self-esteem.

7.4 Discussions

The results of this research show that constant physical activity plays an important role in maintaining overall health, and a higher level of physical demands can bring additional health benefits. In contrast to the many benefits that physical activity can bring, there is a risk that in case of inadequate demands they will produce effects contrary to those expected.

Following the application of the intervention programs, it resulted that in the subjects from the sample included in the research, in the variables body mass and percentage of adipose tissue, the differences between the averages were significantly smaller at the final measurements than at the initial measurements (Table 80). high for both variables (d = .95 for MC, respectively d = 3.26 for% ȚA). This means that the applied programs have achieved their goal, the subjects managing to significantly reduce their weight and fat percentage. Results similar to those obtained by us were recorded in other studies.

7.5 Conclusions

The current study based on a sample of 89 adult women over a 12-month period supports a direct link between increased training intensity, improved self-image and reduced body mass index (BMI). By constantly practicing a scientifically studied form of motion, such as the present one. self-image and self-perception, sub-aspects of self-esteem are positively outlined. The results confirm that the self-image and implicitly the self-esteem can be adjusted in active adult women by continuing the participation in trainings, obtaining the improvement of the physical and mental parameters of the participating women.

From the first study it was observed the need to place people in certain groups for the best possible homogeneity.

Because in the first study, the results were not intensely significant, one reason may be the enrollment of people in exercise programs depending on external factors.

We decided to start the second study, based on the same training programs, and the groups to be homogeneous in terms of average age and weight.

Chapter 8
General conclusions of the research

In recent years, aerobics classes have gained notoriety and women predominantly choose classes over workouts in the gym of the gym.

In the preliminary research it was wanted to check the working protocol, if the dosage is correct, the hydration breaks are sufficient, if the time allocated to complete the questionnaire is sufficient.

Therefore, in terms of the results of this study, the training programs used in this research favor the reduction of body fat mass.

In study 1, the first of the hypotheses was confirmed by data obtained from statistical analysis, the effect size was in all 5 groups, ie after participating for 8 months in training programs, self-esteem increased in groups involved in research.

In study 1 where the groups were not homogeneous in terms of age and weight, following the statistical analysis of body mass the largest difference was observed in group I, with a difference of 5.74 kg, after practicing circuit programs .

And in study 2 where the groups were homogeneous in terms of average age and weight, in the statistical analysis of body mass in group I, the difference was 5.93 kg in the second group 5.01 kg in the group the third 4.6 kg in the fourth group 3.99 kg and in the fifth group 4.63 kg. The biggest difference was in group I, where circuit training programs were practiced, the difference being 5.93 kg. In both studies, circuit training programs had the largest difference in body weight.

Regarding the body mass index, in both study I and study II, the biggest difference between the two time points was in group I (circuit).

The approach of people in a gym, as it is currently done, is wrong because the enrollment in aerobics programs (standard hours) is based on the person's daily schedule or his affinity for the sports instructor, without taking into account the physical condition of the person or other important characteristics such as weight, age, etc.

The originality of the thesis

We started from the idea that more and more people are going to the gyms, and women mainly choose aerobics classes instead of workouts in the gym. However, before concluding a subscription, it would be advisable to advise clients to find out the goals, objectives, affinities to certain types of physical activities, but in practice this does not happen

people choosing aerobics classes according to the daily schedule or affinity for the instructor and not always the results are what you want. Given this real situation, we considered that such a research topic would be interesting and original. This study aimed to detect the impact of physical activity on anthropometric indicators and self-esteem in adult women.

Limits of research

The experiment itself took place during a calendar year, including holidays and vacations, the period of the experiment being fragmented. In the end, everyone had a 2-week break, allocated for summer vacation, even if not at the same time. It is not excluded that they influenced the final results of the experiment.

Participation in the experiment was voluntary, so people were motivated and full of energy in class. The classes started after the work schedule, more precisely after 17:00, probably the fatigue accumulated during the day to have influenced the performance of physical activities. The research sample consisted only of females, practicing at 2 gyms in Oradea, participation being done on a voluntary basis, in the first study were 88 people and in the second 89 people, so we consider that the results of the studies they are not representative and cannot be generalized to the entire population of adult women in Romania.

Recommendations

Given the conclusions drawn from this study, we make the following recommendations:

- Counseling people before concluding a subscription, to assess the objectives and purpose of the person wishing to practice physical activities, the transition to be gradual, from easy to difficult, from simple to complex and even the introduction of classes for beginners and advanced;

Organizing groups to participate in aerobic training should be based on the effort capacity of each, the area in which they want to lose fat.

Selective Bibliography

Abou, E., Mohammed & Mossa, Abubakr & Sami, Manal & El-Marsafawy, Tamer & al jadaan, Omar., (2015). The Impact of Physical Activity Participation on the Self-Esteem of the Students. A Cross Sectional Study from RAKMHSU – RAK -UAE. International Journal of Physical Education, Sports and Health. 2015; 2(1). 87-91

Almeida, M. B., & Araújo, C. G. S., (2003). Effects of aerobic training on heart rate. *Revista Brasileira de Medicina do Esporte*, 9(2), 113-120. doi:10.1590/S1517-86922003000200006

Abou, E., Mohammed & Mossa, Abubakr & Sami, Manal & El-Marsafawy, Tamer & al jadaan, Omar., (2015). The Impact of Physical Activity Participation on the Self-Esteem of the Students. A Cross Sectional Study from RAKMHSU – RAK -UAE. International Journal of Physical Education, Sports and Health. 2015; 2(1). 87-91

Almeida, M. B., & Araújo, C. G. S., (2003). Effects of aerobic training on heart rate. *Revista Brasileira de Medicina do Esporte*, 9(2), 113-120. doi:10.1590/S1517-86922003000200006

Amosov, N.M., Muravov, I.V., (1985). *Inima și exercițiu*. Moscova: Centrele de Valeologie a Universităților Ruse

Azad, A., Gharakhanlou, R., Niknam, A., Ghanbari, A., (2011). Effects of aerobic exercise on lung function in overweight and obese students. *Tanaffos*. 10(3): 24 – 31. Retrieved from: httCS://www.ncbi.nlm.nih.gov/pubmed/25191372

Baltatescu, S., Cioară, F., Hatos, I., ș.a (2010). Educație și Schimbare Socială. Perspective Sociologice și Comunicaționale *Editura Universității din Oradea, ISBN 978-606-10-0045-6.* Available at SSRN: https://ssrn.com/abstract=2609408

Barrett, A.E., White H. R., (2002). Trajectories of gender role orientations in adolescence and early adulthood: a prospective study of the mental health effects of masculinity and femininity. *Journal of Health and Social Behavior*. Vol. 3, No. 4. pp. 451- 468

Berkowitz, B., Clark, P., (2014). The health Hazzards of Sitting. *The Washington Post*, p.1.

Berman, L. J., Weigensberg, M. J., & Spruijt-Metz, D., (2012). Physical activity is related to insulin sensitivity in children and adolescents, independent of adiposity: a review of the literature. *Diabetes/metabolism research and reviews*, 28(5), 395–408. doi :10.1002/dmrr.2292

Bess, H., Dubbert, M., Forsyth, H., (2000). Physical Activity Behavior Change: Issues in Adoption and Maintenance. *Health psychology*, *19*, 32-41. doi: 10.1037//0278-6133.19.1

Bicer, SY., (2013). The effect 12 weeks of aerobic training on social maturity development, selfesteem and body image among school students. *Int J Sport Stud*. 2013;3(1):59–66.

Carnethon, M., R., (2009). Physical Activity and Cardiovascular Disease: How Much is Enough? *American journal of lifestyle medicine, 3*(1 Suppl), 44S–49S. doi:10.1177/1559827609332737

Caspersen, C. J., Powell, K., E., & Christenson, G., M., (1985). Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public health reports. (Washington, DC: 1974, 100 (2), 126-131). Retrieved from* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1424733/

Caulfield, T., (2012). *The Cure for Everything: Untangling Twisted Messages about Health, Fitness, and Happiness.* U.S.A, Beacon Press.

Colditz, G., (1990). Patterns of weight change and their relation to diet in a cohort of healthy woman. *The American Journal of Clinical Nutrition, 51:*1100-5. doi: 10.1093/ajcn/51.6.1100

Cordun, M., (1999). *Postura corporală normală și patologică.* Editura ANEFS, Bucuresti.

Cornier, MA., Despres, JP., Davis, N., Grossniklaus, DA., Klein, S., Lamarche, B., et al. (2011). Assessing adiposity: a scientific statement from the *American Heart Association*. *Circulation* 124: 1996–2019. doi: 10.1161/CIR.0b013e318233bc6a PMID: 21947291.

Davis, JA., Vodak, P., Wilmore, J., Vodak, J., Kurtz, P., (2020). Anaerobic threshold and maximal aerobic power for three modes of exercise. *J. Appl. Physiol*. 1976;41:544–550. doi : 10.1152/jappl.1976.41.4.544

Davis, JA., (1985). Anaerobic threshold: review of the concept and directions for future research. *Med. Sci. Sports and Exer*. 1985;17:6–12. Retrieved from : https://www.ncbi.nlm.nih.gov/pubmed/3884961

Dijk, S., B., Takken, T., Prinsen, E., C., & Wittink, H., (2012). Different anthropometric adiposity measures and their association with cardiovascular disease risk factors: a meta-analysis. *Netherlands heart journal : monthly journal of the Netherlands Society of Cardiology and the Netherlands Heart Foundation, 20*(5), 208–218. https://doi.org/10.1007/s12471-011-0237-7

Dishman, RK., Hales, DP., Pfeiffer, KA., Felton, GA., Saunders, R., Ward, DS., et al., (2006). Physical self-concept and self-esteem mediate cross-sectional relations of physical activity and sport participation with depression symptoms among adolescent girls.

Health psychol. 2006;25(3):396– 407. doi: 10.1037/0278-6133.25.3.396. [PubMed: 16719612].

Drăgan, I., (2000). *Medicina sportivă.* București. Editura Sport-Turism

Du, Y., Liu, B., Sun, Y., Snetselaar, L., G., Wallace, R., B., & Bao, W., (2019). Trends in Adherence to the Physical Activity Guidelines for Americans for Aerobic Activity and Time Spent on Sedentary Behavior Among US Adults, 2007 to 2016. *JAMA network open*, *2*(7), e197597. https://doi.org/10.1001/jamanetworkopen.2019.7597

Duda, J., L., (1986a). A cross-cultural analysis of achievement motivation in sport and the classroom. In L. VanderVelden & J. Humphrey (Eds.), Current selected research in the psychology and sociology of sport (pp. 115-134). *New York: AMS Press*.

Efrem, C., (1981). *Îndrumar pentru educația fizică și sport în întreprinderi și instituții.* Editura politică, București

Ekeland, E., Heian, F., Hagen, KB., (2005). Can exercise improve self esteem in children and young people? A systematic review of randomised controlled trials. *Br J Sports Med.* 2005;39(11):792–8. doi: 10.1136/bjsm.2004.017707. [PubMed: 16244186] discussion 792-8

Enache, I., (2002). *Organizarea ergonomică a muncii în birou.* Bucuresti. Editura Universității din București

Farrell, P., A., Joyner, M., J., Caiozzo, V., (2012). Medicine, American College of Sports. *ACSM's advanced exercise physiology: ACSM. Ed:* Medicine & Health Science

Feltes, L., (1998). What Girls Say about Opportunities for Physical Activity. *Melpomene Journal, 17(2), 24-28.* SUA

Ferron, C., Narring, F., Cauderay, M., & Michaud, P., (1999). Sport Activity in Adolescence: Associations with Health Perceptions and Experimental Behaviours. *Health Education Research, 14(2), 225-233.*

Findlay, LC., Bowker, A., (2009). The link between competitive sport participation and self-concePT in early adolescence: a consideration of gender and sport orientation. *J Youth Adolesc.* 2009;38(1):29–40. doi: 10.1007/s10964-007-9244-9. [PubMed: 19636789]

Ghafari, FFZ., Mazloom, SR., (2007). The Effects of Groups Regular Training on Self-esteem in nurse student. *Med Sci Babol Univ J*. 2007;9(1):52–7

Gallagner, R., M., (2000). *Recapitulări prin diagrame – Educaţie fizică*. Bucureşti: All Educational.

González, K., Fuentes, J., & Márquez, J., L., (2017). Physical Inactivity, Sedentary Behavior and Chronic Diseases. *Korean journal of family medicine*, *38*(3), 111–115. doi:10.4082/kjfm.2017.38.3.111

Grosu, E., (2010). *Locul și rolul fitness-ului in știința sportului.* Cluj-Napoca. Editura: GMI

Hassmen, P., (2000). Physical Exercise and psychological Well Being, *Preventive Medicine, 30*, 17-25. doi: 10.1006/pmed.1999.0597

Haskell, W., L. Russell, L. Pate, R., (2007). Physical Activity and Public Health: Updated Recommendation for Adults From the *American College of Sports Medicine and the American Heart Association University of South Carolina – Columbia*. doi: 0.1249/mss.0b013e3180616b27

Heymsfield, SB., McManus, C., Smith, J., Stevens, V., Nixon, DW., (1982). Anthropometric measurement of muscle mass: revised equations for calculating bone-free arm muscle area. *Am J Clin Nutr.* 1982;36:680–690.

Hruby, A., & Hu, F., B., (2015). The Epidemiology of Obesity: A Big Picture. *PharmacoEconomics*, *33*(7), 673–689. https://doi.org/10.1007/s40273-014-0243-x

Hoyle, R., H., (1997). The Role of Parental Involvement in Youth Sport Participation and Performance. Adolescence, 32(1), 233-243

Institute of Well-being (2009). How are canadians really doing. *Australian Indigenous Health Bulletin.*

Ito, S., (2019). High-intensity interval training for health benefits and care of cardiac diseases - The key to an efficient exercise protocol. *World journal of cardiology*, *11*(7), 171–188. doi:10.4330/wjc.v11.i7.171

Jafee, L., & Peggy., (1996). After-School Activities and Self-Esteem in Adolescent Girls. *Melpomene Journal, 15(2), 18-25*

Kelly, T., Yang, W., Chen, C., S., Reynolds, K., & He, J., (2008). Global burden of obesity in 2005 and projections to 2030. *International journal of obesity (2005)*, *32*(9), 1431–1437. doi: 10.1038/ijo.2008.102

Kim, JH., So, WY., (2013). Associations between weight status and different types of physical fitness variables in Korean men: a community-based study. *J Men's Health*, 2013, 10: 60–64.

Klika, B., Jordan, C., (2013). High Intensity Circuit Training Using Body Weight: Maximum Results With Minimal Investment. *ACSM's Health & Fitness Journal*: May/June 2013 - Volume 17 - Issue 3 - p 8-13. doi: 10.1249/FIT.0b013e31828cb1e8

Krautblatt, C., (2011). *Training manual&fitness instructor certification course*. Orlando

Kwon, HR., Han, KA., Ku, YH., Ahn, HJ., Koo, BK., Min, KW., (2009). Relationship of maximal muscle strength with body mass index and aerobics capacity in type 2 diabetic patients. *Korean Diabetes J*. 2009;33:511–517.

Kwon, H., R., Han, K., A., Ahn, H., J., Lee, J., H., Park, G., S., & Min, K., W., (2011). The Correlations between Extremity Circumferences with Total and Regional Amounts of Skeletal Muscle and Muscle Strength in Obese Women with Type 2 Diabetes. *Diabetes & metabolism journal*, *35*(4), 374–383. https://doi.org/10.4093/dmj.2011.35.4.374

Liang, Y., J., Xi, B., Song, A., Q., Liu, J., X., & Mi, J., (2012). Trends in general and abdominal obesity among Chinese children and adolescents 1993-2009. *Pediatric obesity*, *7*(5), 355–364. Doi: 10.1111/j.2047-6310.2012.00066.x

Lindgren, T., E., Fridlund, U., & Bengt., (2000). The Impact of Sport on Young Women's Attitude to Physical Activity in Adult Life. *Women in Sport & Physical Activity Journal*, *9(1), 75-81*

Mansour, M., Memar, E., Azmoudeh, M., (2013). The relationship between self-esteem and self-efficacy with persuasion in educational managers. *Soc Cogn.* 2013;1(2):92–100

Margareta, A., (2007). *Teoria antrenamentului sportiv*. București, Editura Universității din București

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.

Maslow, AH., (2000). Self Actualization and Beyond in GFT challenges of Humanistic psychology. *New York: Mc Graw press*; 2000

MCHugh, MP. Cosgrave, CH., (2010). To stretch or not to stretch: the role of stretching in injury prevention and performance. *Scand J Med Sci Sports.* doi: 10.1111/j.1600-0838.2009.01058

Mendelson, K. B., Mendelson, J. M., & White, R. D., (1996). Self-Esteem and Body Esteem: Effects of Gender, Age, and Weight. Journal of Applied Developmental CSychology, 17(1), 321-346

Miller, S. Akram, H. Lagrata, S. Hariz, M. Zrinzo, L. Matharu, M., (2016). Ventral tegmental area deep brain stimulation in refractory short-lasting unilateral neuralgiform headache attacks *brain* 139 2631–2640. doi: 10.1093/brain/aww204

Mondal, H., & Mishra, S. P., (2017). Effect of BMI, Body Fat Percentage and Fat Free Mass on Maximal Oxygen Consumption in Healthy Young Adults. *Journal of clinical and diagnostic research: JCDR*, *11*(6), CC17–CC20. httCS://doi.org/10.7860/JCDR/2017/25465.10039

Myers, T., R., Schneider, M., G., Schmale, M., S., Hazell, T, J, (2015). Whole-Body Aerobic Resistance Training Circuit Improves Aerobic Fitness and Muscle Strength in Sedentary Young Females, *The Journal of Strength & Conditioning Research*: June 2015 - Volume 29 - Issue 6 - p 1592-1600 doi: 10.1519/JSC.0000000000000790

Nevill, M., Holmyard., D.,J., Hall, G.,M., *et al*. (1996). Growth hormone responses to treadmill sprinting in sprint- and endurance-trained athletes. *Eur J Appl Physiol* 72**,** 460–467 (1996). doi:10.1007/BF00242276

Oscai, L. Holloszy, O., (1969). Effects of Weight Changes Produced by Exercise , Food Restriction, or Overeating on Body Composition. *The Journal of Clinical Investigation*, *48*, 2124-2128. doi: 10.1172/JCI106179

Osuka, Y., Matsubara, M., Hamasaki, A., Hiramatsu, Y., Ohshima, H., & Tanaka, K., (2017). Development of low-volume, high-intensity, aerobic-type interval training for elderly Japanese men: a feasibility study. *European review of aging and physical activity : official journal of the European Group for Research into Elderly and Physical Activity*, *14*. doi:10.1186/s11556-017-0184-4

Owen, N., Sparling, P., B., Healy, G., N., Dunstan, D., W., Matthews, C., E., (2010). Sedentary Behavior: Emerging Evidence for a New Health Risk. *Mayo Clin Proc*. doi: 10.4065/mcp.2010.0444

Pangrazi, R., (1982). Physical education, self-concept, and achievement. *J Phys Educ Recreat Dance*. 1982;53(9):16–8

Park, H., K., Jung, M., K., Park, E., Lee, C., Y., Jee, Y., S., Eun, D., Cha, J., Y., & Yoo, J., (2018). The effect of warm-ups with stretching on the isokinetic moments of collegiate men. *Journal of exercise rehabilitation*, *14*(1), 78–82. doi:10.12965/jer.1835210.605

Pate, RR., Pratt, M., Blair, SN., Haskell, WL., Macera, CA., Bouchard, C., et al. (1995). Physical activity and public health: a recommendation from the Centers for Disease Control and Prevention and the *American College of Sports Medicine*. JAMA. 1995;273:402–407 doi: 10.1001/jama.273.5.402

Patel, H., Alkhawam, H., Madanieh, R., Shah, N., Kosmas, C., E., & Vittorio, T., J., (2017). Aerobic *vs* anaerobic exercise training effects on the cardiovascular system. *World journal of cardiology*, *9*(2), 134–138. doi:10.4330/wjc.v9.i2.134

Pavlou, K., William, P., (1985). Effects of dieting and exercise on lean body mass, oxygen uptake, and strength, *American College of Sports Medicine*, *17*, 466-471. doi: 10.1249/00005768-198508000-00011

Physical Activity and Women. (2020, February 20). *Physiopedia*, . Retrieved 05:58, May 25, 2020
from https://www.physioedia.com/index.php?title=Physical_Activity_and_Women&oldid=231447

Roman, Gh., (2008). A*ctivităţi sportive pentru populaţia de vârstă adultă.* Editura Napoca-Star, Cluj-Napoca.

Rosenberg, M., (1979). *Conceiving the Self.* New York: Basic Books.

von Ruesten, A., Steffen, A., Floegel, A., van der A, D. L., Masala, G., Tjønneland, A., Halkjaer,
J., Palli, D., Wareham, N. J., Loos, R. J., Sørensen, T. I., & Boeing, H., (2011). Trend in obesity prevalence in European adult cohort populations during follow-up since 1996
and their preedictions to 2015. *PlosS one*, 6(11), e 27455. doi:10.1371/journal.pone.0027455

Sandu, A., (2012). *Metode de cercetare în ştiinţa comunicării*, Universitatea Mihail Kogalniceanu. Facultatea de Drept, Editurii Lumen, Iasi.

Sawyer, B., J., Bhammar, D., M., Angadi, S., S., Ryan, D., M., Ryder, J., R., Sussman, E., J., Bertmann, F., M., & Gaesser, G., A., (2015). Predictors of fat mass changes in response to aerobic exercise training in women. *Journal of strength and conditioning research*, *29*(2), 297–304. httCS://doi.org/10.1519/JSC.0000000000000726

Scheuer, J., Tipton, CM., (1977). Cardiovascular adaptations to training. *Annual reviews of physiology.* 39: 221 – 251. doi: 10.1146/annurev.ph.39.030177.001253

Seals, DR., Silverman, HG., Reiling, MJ., Davy, KP., (1997). Effect of regular exercise on elevated blood pressure in postmenopausal women. *Am J Cardiol. Elsevier*. 80(1): 49 – 55. doi: 10.1016/s0002-9149(97)00282-8

Sepherd, RJ., (1989). Adolphe Abrahams memorial lecture. Exercise and life style change. *British journal of sports and medicine*. 23(1): 11 – 22. doi: 10.1136/bjsm.23.1.11

Sonstroem, RJ., (1998). 6 Physical Self-Concept: Assessment and External Validity. *Exerc Sport Sci Rev*. 1998;26(1):133–64.

Spencer, S., (2013). *The Diet Dropout's Guide to Natural Weight Loss: Find Your Easiest Path to Naturally Thin.* U.S.A.: Fine Life Books, SUA

Stevens, G., A., Singh, G., M., Lu, Y., Danaei, G., Lin, J. K., Finucane, M., M., Bahalim, A., N., McIntire, R., K., Gutierrez, H., R., Cowan, M., Paciorek, C., J., Farzadfar, F., Riley, L., Ezzati, M., & Global Burden of Metabolic Risk Factors of Chronic Diseases Collaborating Group (Body Mass Index) (2012). National, regional, and global trends in adult overweight and obesity prevalences. *Population health metrics, 10*(1), 22. doi: 10.1186/1478-7954-10-22

Steven, R., (2003). *The Effectiveness of Personal Training on Changing Attitudes Towards Physical Activity*. Volume 595, Issue 21. Issue Publication:1 November 2017, Wiley-Blackwell on behalf of The Physiological Society.

Stiegler, P., Cunliffe, A., (2006). The role of diet and exercise for the maintenance of fat-free mass and resting metabolic rate during weight loss. *Sports Med*. 2006;36(3):239–262. doi: 10.2165/00007256-200636030-00005

Stockbrugger, BA., Haennel, RG., (2001). Validity and reliability of a medicine ball explosive power test. J Strength Cond Res, 2001, 15: 431–438

Strelan, P., Mehaffey, S., & Tiggeman, M., (2003). Self-Objectification and Esteem in Young Women: The Mediating Role of Reasons for Exercise. Sex Roles, 48(1), 89-95.

Taylor, C., B., Sallis, J., F., Needle, R., (1985). The relation of physical activity and exercise to mental health. *Public Health Rep*. 1985 Mar-Apr; 100(2): 195–202. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1424736/

Trifa, I., (2007). Activitatea fizică și starea de sănătate. Available from https://fefsoradea.ro/fisiere/cadre/Activitatea_fizica_si_starea_de_sanatate-INDRUMAR_STUDENTI.pdf

Trost, S., G., Owen, N., Bauman, A., E., Sallis, J., F., Brown, W., (2002). Correlates of adults' participation in physical activity: review and update. *Medicine & Science in Sports & Exercise*: December 2002 - Volume 34 - Issue 12 - p 1996-2001. doi: 10.1097/00005768-200212000-00020

Tufts, Sharon A., (1969). The Effects of Diet and Physical Activity on Selected Measures of College Women. Doctoral Dissertation, University of Iowa, 1969. Retrieved from htttps://files.eric.ed.gov/fulltext/ED104880.pdf

Thyfault, J., P., Du, M., Kraus, W., E., Levine, J., A., & Booth, F., W. (2015). Physiology of sedentary behavior and its relationship to health outcomes. *Medicine and science in sports and exercise*, *47*(6), 1301–1305. doi: 10.1249/MSS.0000000000000518

Yeager, S. A., & Brynteson, P. (1970). Effects of varying training periods on the development of cardiovascular efficiency of college women. *Research quarterly*, *41*(4), 589–592.

Yu, W., Cha, S., & Seo, S., (2017). The effect of ball exercise on the balance ability of young adults. *Journal of physical therapy science*, *29*(12), 2087–2089. https://doi.org/10.1589/jCTs.29.2087

Voicu, V., A., (2009). *Suport de curs pentru aprofundarea cunoştinţelor în culturism şi fitness.* Cluj-Napoca

Weinheimer, EM., Sands, LP., Campbell, WW., (2010). A systematic review of the separate and combined effects of energy restriction and exercise on fat-free mass in middle-aged and older adults: implications for sarcopenic obesity. *Nutr Rev 68*: 375–388. doi: 10.1111/j.1753-4887.2010.00298.x

Wiley - Blackwell. (2010, March 12). High-intensity interval training is time-efficient and effective, study suggests. *ScienceDaily*. Retrieved April 30, 2020 from www.sciencedaily.com/releases/2010/03/100311123639.htm

Zamani, S., S., H., Fathirezaie, Z., Brand, S., Pühse, U., Holsboer-Trachsler, E., Gerber, M., & Talepasand, S., (2016). Physical activity and self-esteem: testing direct and indirect relationships associated with psychological and physical mechanisms. *Neuropsychiatric disease and treatment*, *12*, 2617–2625. httCS://doi.org/10.2147/NDT.S116811

Zamora, E., (1996). *Igiena educaţiei fizice şi a sportului.* Editura Stadion: Cluj-Napoca

https://www.who.int/nutrition/publications/obesity/WHO_TRS_894/en/ accesat la 16.03.2020

World Health Organization. 1998:1–276. Obesity: Preventing and managing the global epidemic

https://www.who.int/dietphysicalactivity/physical-activity-recommendations-18-64years.pdf?ua=1 accesat la 05.06.2020