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## STUDY ON THE APPLICATION OF FITNESS PROGRAMS FOR IMPROVING PHYSICAL FITNESS IN OVERWEIGHT AND OBESE MIDDLE SCHOOL STUDENTS

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### Abstract

*Aim.* Obesity is a current issue with a high percentage among the new generations.

*Methods.* I implemented a fitness program for four final-year students in the 8th grade, with the main goal of improving their physical condition. The program is based on cardio exercises in which the students work with their own body weight.

*Results.* After applying the exercise program over a period of two months, the students lost an average of 4 kg.

*Conclusions.* In conclusion, physical activity plays an extremely important role in improving and combating these current issues overweight and obesity especially in the case of children and adolescents.

*Keywords:* Fitness, physical condition, overweight students, middle school level.

### Introduction

By presenting this topic, "Study on the Application of Fitness Programs to Improve the Physical Condition of Overweight and Obese Students at the Middle School Level," we aim to highlight the importance of fitness and sports participation not only among adults but especially among children and students. Childhood obesity represents one of the most alarming problems of contemporary society, and its impact on middle school children is increasingly visible on physical, psychological, and social levels.

The lack of physical activity, unbalanced nutrition, and the rise of sedentary behavior lead to the early onset of imbalances that affect the harmonious development of students. In this context, school becomes an essential environment for implementing adapted fitness programs that can contribute to improving physical condition and to developing a healthy lifestyle.

"Regular participation in physical activity (PA) has numerous physical benefits in adolescents, promoting bone and muscle growth, helping maintain proper weight and body composition, and contributing to disease prevention such as high blood pressure, diabetes, and obesity" (Lonsdale et. al., 2013).

Studies in the field of physical education highlight the fundamental role of physical activity in preventing and reducing obesity. However, the effectiveness of any program depends not only on the content of the exercises but also on the students motivation. In this regard, the philosophy of David Goggins—an elite athlete and advocate of mental discipline—provides a valuable inspirational framework. One of his central ideas states that "progress occurs when the individual deliberately confronts discomfort and goes beyond the comfort zone, emphasizing the need for a persevering attitude and self-transcendence." (Goggins, 2018).

The implementation of progressive, accessible fitness programs tailored to individual needs can lead to significant improvements in physical parameters—strength, endurance, mobility, and body composition—as well as in emotional and motivational aspects. Integrating these programs with principles inspired by Goggins' motivational philosophy can enhance student engagement and transform physical activity into a process of self-discovery and personal commitment.

School-based physical activity programs can improve important cardio-metabolic health indicators in obese children and adolescents, including aerobic capacity (e.g., VO<sub>2</sub>max) and blood pressure, even though effects on body weight or BMI may vary across studies. Overall, the evidence supports the role of physical exercise as an effective intervention for improving cardiorespiratory fitness and reducing certain obesity-related risk factors in school-aged populations (Wang et al., 2023).

Meta-analyses focusing on school-based physical activity interventions indicate that exercise alone, without a nutritional component, does not consistently lead to significant reductions in BMI. This inconsistency is largely due to variations in program duration, intensity, and exercise modality. Nevertheless, such interventions remain highly relevant for improving physical fitness and preventing further deterioration of weight status among children (Guerra et al., 2013).

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A practical school implementation model involves combining structured counseling or educational support with an after-school exercise program. These types of interventions are particularly suitable because schools provide an accessible environment where students can be consistently engaged in physical activity and behavioral change strategies (Pbert et al., 2016).

Middle school-based physical activity classes specifically designed to increase daily levels of moderate-to-vigorous physical activity have demonstrated measurable effects on standardized BMI (BMI z-score) compared with non-participating students. However, real-world implementation often encounters participation barriers, such as student transfers, competing activities, and dropout, which must be addressed during program design (Eichner et al., 2016). Among adolescents aged 11–18 years, high-intensity interval training (HIIT) has been associated with moderate improvements in cardiorespiratory fitness. Evidence suggests that even shorter HIIT protocols may be effective, which is particularly relevant for school settings where time for physical activity is limited and must be integrated into physical education lessons (Martin-Smith et al., 2020).

In a school-based intervention, the integration of HIIT into physical education classes, combined with nutritional education, was associated with improvements in body composition and performance outcomes such as strength, jumping ability, and aerobic capacity in overweight adolescent girls. This type of intervention is especially relevant when the primary objective is to improve physical fitness within a relatively short time frame (Bogataj et al., 2021).

For pediatric populations with obesity, comparative evidence suggests that combined aerobic and resistance training programs tend to produce broader benefits in body composition and health markers than aerobic training alone. This combined approach may also be better tolerated and more effective for the overall development of physical fitness (García-Hermoso et al., 2018).

School-based concurrent training interventions (e.g., sprint intervals combined with aerobic or resistance components), implemented over several weeks, have been shown to improve both body composition and cardiorespiratory fitness in obese students compared with control groups. These findings support the effectiveness of short, intense, and well-standardized exercise structures within educational contexts (Gao et al., 2025).

Before-school physical activity programs have been associated with improved BMI trajectories and a reduced risk of obesity progression, without competing with academic instructional time. This model is particularly useful in schools where after-school schedules are crowded and student participation in extracurricular physical activity tends to decline (Whooten et al., 2018).

The present study aims to analyze the effectiveness of fitness programs applied to overweight and obese middle-school students, evaluating the changes produced in the sphere of physical development. The World Health Organization (WHO) recommends MVPA for children and adolescents for at least 60 min per day. Despite the importance of regular PA, PA levels have started to decrease together with the new tools such as smartphones, computers, tablets, video games and social media, that have come into our lives in relation to technology (Chaddha et. al., 2017).

## Methods

Over a period of two months, I implemented a fitness program for four 8th-grade students, with the main goals of improving their physical condition and reducing their weight. "Resistance training alone is unlikely to produce a sufficient negative energy balance to result in clinically significant weight loss compared to aerobic training. Aerobic training sessions generally have a higher total energy expenditure compared to resistance training." (The effects of exercise and physical activity on weight loss and maintenance by Damon L. Swift et al., 2018).

"Exercise and weight management are important components of a healthy lifestyle. Regular exercise has benefits for overall health, for mood, and for maintaining a healthy weight". (Appearance vs health motives for exercises and for weight loss by Lenny B. Vartanian, Christopher M. Wharton, Erica B. Green, 2012).

The program is based on cardio exercises in which the students work with their own body weight. Given their increased weight and a low fitness level for their age, I consider that exercises using their body weight are very useful and beneficial.

This program was conducted three times a week, specifically on Monday, Wednesday, and Friday, after school hours. During these two months, the training sessions were held outdoors to achieve the most efficient development of the cardiorespiratory system. "Cardio" is short for the cardiovascular system, a term that refers to the heart.

Aerobic exercises are exercises that stimulate the heart rate and maintain it at an elevated level for a period of time. These exercises are also referred to as aerobic exercises. "The types of exercises associated with cardiovascular training include jogging, brisk walking, swimming, as well as exercises that increase a person's flexibility and endurance ("Sfatul Medicului", How Cardio Exercises Work, 2011).

Tabel 1. Initial measurement

Nr.	Name	Age	Weight	Height	BMI(Body Mass Index)
1.	G. C.	14	102 kg	1,78m	32.19- Grade 1 Obesity
2.	M. E.	14	109kg	1,80m	33.64- Grade 1 Obesity
3.	P. T.	14	105 kg	1,80m	32.41- Grade 1 Obesity
4.	T. R.	14	95 kg	1.80m	29.32- Overweight



### *Physical exercises used in the applied program:*

The participants will perform a circuit of four exercises, and every two weeks the exercises will be changed, aiming to diversify the way of working to avoid monotony and boredom during the training sessions. After completing each set of exercises, the students will have a two-minute break for hydration.

At the end of each training session, we will do five minutes of stretching to relax the muscles and prevent potential issues that may arise after an exhausting workout that has engaged all the major muscle groups of the body.

- Week 1-2

1. Stand with arms slightly bent forward. The student will perform running in place with knees to chest, aiming to touch the palms with the knees. (3 sets of 30–40 seconds)

2. Squats (3 sets of 12 repetitions)

3. From a standing position, perform lunges on the right leg (12 repetitions), then on the left leg (12 repetitions). (3 sets)

4. From a push-up position, bring the knees to the chest / Mountain climbers (3 sets of 30 seconds)

- Week 3-4

1. From a standing position, each participant jumps laterally on each leg with a slight knee bend (3 sets of 10 repetitions per leg)

2. From a prone position, supported on hands and knees, perform push-ups (3 sets of 8–10 push-ups)

3. From a push-up position, the students will alternately bring one hand to the opposite shoulder (3 sets of 10 repetitions per hand)

4. Prone position supported on hands, holding the position for 25 seconds (3 sets)

- Week 5-6

1. Lying on the back, knees bent with feet on the floor, perform crunches (3 sets of 12 repetitions)

2. Lying on the back, legs extended and raised to 45 degrees, perform scissor kicks (3 sets of 15 repetitions per leg)

3. Lying on the back, the students will raise their legs to 90 degrees by flexing at the hip joint (3 sets of 12 repetitions)

4. Lying face down, supported on the forearms, perform a plank (3 sets of 20–25 seconds)

- Week 7-8

1. From a standing position, perform jump squats (3 sets of 10 repetitions)

2. Jumping jacks (3 sets of 30 seconds)

3. Running in place with knees to chest (3 sets of 30 seconds)

4. Burpees

Tabel 2. Comparative Table – Goggins' Concepts and Their Application in Physical Education for Overweight Students (Goggins, 2018; Goggins, 2022)

Goggins Concept	Short Description	Application in the life of overweight students
40% Rule	False perception of exhaustion	Explaining that initial fatigue is normal; exercises like “10 more seconds / 2 more reps”
Callousing the Mind	Strengthening the mind through repeated exposure	Progressive programs with gradually increasing difficulty for step-by-step adaptation to effort
Accountability Mirror	Self-evaluation and personal responsibility	Simple individual goals, monitored weekly; progress sheets
Cookie Jar	Reservoir of personal achievements	Highlighting small successes; a journal of student achievements

## Results

Tabel 3. Finale measurement

Nr.	Name	Age	Weight	Height	Body Mass Index (BMI)
1.	G. C.	14	98 kg	1,78cm	30.93- Obesity grade 1
2.	M. E.	14	105 kg	1,80cm	32.41- Obesity grade 1
3.	P. T.	14	102 kg	1,80cm	31.48- Obesity grade 1
4.	T. R.	14	90 kg	1,80cm	27.78- Overweight

After the two months of training, a varied decrease in body weight can be observed. G.C. recorded a weight loss of 4 kilograms, M.E. lost 4 kilograms, P.T. lost 4 kilograms, and T.R. lost 5 kilograms. Although the differences are not very large, the results demonstrate that the application of fitness programs can lead to

weight loss and to an improvement in physical condition among middle school students. Maintaining this lifestyle over a longer period may lead to significant weight loss and to a much better development of physical fitness.

### Discussions

A consistent pattern across school-based intervention research is that fitness outcomes (e.g., cardiorespiratory fitness and waist circumference) often improve more reliably than BMI, partly because body mass is influenced by growth, diet, and compensation behaviors outside school. Consequently, interventions may produce clinically meaningful health-related fitness changes even when BMI reductions are modest or inconsistent, which supports framing program success around fitness and cardiometabolic markers rather than weight alone (Guerra et al., 2013; Brown & Summerbell, 2009).

Evidence specifically highlights HIIT as a time-efficient strategy that can be embedded into school routines and still generate significant improvements in health indicators. A large systematic review and meta-analysis of school-based HIIT reported improvements in waist circumference, body fat percentage, BMI (as standardized effects), and cardiorespiratory fitness compared with control conditions, even though many included studies had high risk of bias—suggesting both promise and a need for stronger trial designs (Duncombe et al., 2022).

Importantly, recent school-based experimental work indicates that small “structural” modifications inside PE lessons—for example, replacing only the warm-up with HIIT—can still lead to greater gains in shuttle-run performance/estimated VO<sub>2</sub>max and jumping performance than traditional warm-ups. This is particularly relevant for middle schools where curriculum time is constrained and feasibility is critical (Jovanović et al., 2024).

Beyond HIIT alone, emerging trials support concurrent training models (e.g., sprint intervals followed by brief aerobic or strength segments) as highly scalable options. In a randomized controlled trial, two short weekly sessions over eight weeks improved VO<sub>2</sub>max and reduced BMI and fat mass in obese children, with some outcomes differing by whether the post-sprint component was aerobic or strength—suggesting that program composition can be tuned to target specific outcomes such as visceral adiposity or waist circumference (Gao et al., 2025).

A particularly compelling direction is shifting from “exercise dose” alone to physical literacy (PL) as a mechanism for sustained engagement—especially in overweight/obese adolescents who may experience low confidence and low motivation for physical activity. The CAPACITES 64 intervention explicitly targeted overweight/obese and inactive middle school students and framed PA through PL development and education, illustrating how school and community environments can be leveraged to promote longer-term behavioral change rather than only short-term fitness gains (Nezondet et al., 2023).

Psychological outcomes matter in “Discussion” because they help explain adherence and long-term maintenance. A meta-analysis found that PA-based interventions can produce small-to-moderate improvements in physical self-concept and related subdomains (e.g., perceived sport competence, physical fitness, and physical appearance). These changes may be especially relevant for overweight/obese students, for whom improving self-perceptions can reduce avoidance behaviors and support sustained participation in school-based fitness programs (Zamorano-García et al., 2021).

Interventions also increasingly recognize that obesity prevention is not only about exercise sessions but about multi-component school ecosystems, including health education, family context, and school climate. The SI! Program for Secondary Schools illustrates this broader model by addressing diet, physical activity/sedentary patterns, and—distinctively—emotion management as a supportive component for health behavior uptake in adolescents (Fernandez-Jimenez et al., 2019).

However, implementation research cautions that effectiveness depends heavily on real-world delivery. Qualitative and mixed evidence consistently identifies barriers such as limited time in the school day, competing academic priorities, staff workload, insufficient training, and environmental constraints; conversely, leadership support and clear policy-to-practice translation function as key facilitators. These factors can directly influence reach, fidelity, and sustainability—critical issues when designing fitness programs specifically for overweight/obese middle school students (Almutairi et al., 2022).

Finally, the discussion should acknowledge that sedentary time is an additional target in school settings. Reviews suggest multi-component approaches (including classroom/environmental changes) can reduce sedentary behavior, although longer-term trials are needed to confirm sustained effects. For overweight/obese middle school students, this supports a combined strategy: structured fitness sessions plus school-day design choices that reduce prolonged sitting (Hegarty et al., 2016).

### Conclusions

The present study highlighted the importance and effectiveness of implementing adapted fitness programs for improving physical condition and reducing body weight among overweight and obese middle school students.

Overall, international evidence supports the application of school-based fitness programs—including HIIT and concurrent training—as feasible and potentially effective strategies for improving cardiorespiratory fitness and other health-related fitness indicators in overweight/obese youth, with BMI effects being more variable and dependent on program design and contextual factors (Duncombe et al., 2022; Guerra et al., 2013).

For publication-quality conclusions, it is also justified to emphasize that optimizing interventions for overweight/obese middle school students may require: (1) time-efficient protocols integrated into PE; (2) motivational frameworks such as physical literacy; (3) attention to psychosocial outcomes (self-concept); and (4) robust implementation planning to overcome school-level barriers and sustain program delivery (Nezondet et al., 2023; Zamorano-García et al., 2021; Almutairi et al., 2022).

Childhood obesity represents a major contemporary issue, strongly influenced by sedentary behavior, insufficient physical activity, and unbalanced nutrition. In this context, school plays a fundamental role in promoting an active lifestyle and in preventing health-related problems from an early age.

The fitness program applied over a period of two months to four 8th-grade students was based primarily on cardio exercises using body weight, adapted to their level of physical preparation.

The program was conducted three times per week and included progressive, varied, and accessible exercises aimed at improving cardiovascular endurance, muscular strength, mobility, and overall physical fitness. Outdoor training sessions further contributed to the efficient development of the cardiorespiratory system. The results showed a noticeable decrease in body weight for all participants, with an average loss of approximately 4–5 kilograms. Although the differences were not very large, the outcomes clearly demonstrate that even short-term, well-structured fitness interventions can lead to positive changes in body composition and physical condition among middle school students.

These findings support the idea that consistency and gradual progression are key factors in achieving sustainable results. Integrating motivational principles inspired by David Goggins' philosophy—such as perseverance, overcoming perceived limits, personal responsibility, and gradual adaptation to effort—helped enhance student engagement and motivation.

This approach contributed to developing a more positive attitude toward physical activity and effort, transforming exercise into a process of self-improvement rather than obligation. In conclusion, the study confirms that adapted fitness programs implemented in the school environment can play a crucial role in combating overweight and obesity among students. Maintaining such an active lifestyle over a longer period may lead to significant weight loss, improved physical fitness, and the development of healthy habits that can positively influence long-term health and quality of life.

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