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MEDICAL
INNOVATION

10-Weeks TABATA workout in repetition and its effect on Body Mass Index and waist circumference of undergraduate students

10-tygodniowy trening TABATA w powtórzeniach i jego wpływ na wskaźnik masy ciała oraz obwód talii studentów studiów licencjackich

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Abstract

The TABATA workout has been praised in a number of research articles for its value to young adults. However, no research involving college students in the Philippines' higher education context was located or carried out. The purpose of this research was to determine whether or not college students may benefit from the TABATA exercise program. Finally, it hoped to see if this exercise could assist reduce participants' body mass index and waist circumference. Using an experimental design, this study examined the effects of a 10-week TABATA training program in repetition on college students. After the 10-week exercise performed by the participants in general, it was found that there is a reduction and improvement on participants' BMI. Additionally, a significant improvement was observed in the participants' WC. However, based on sex, no significant variance in both genders' BMI. Fascinatingly, a significant improvement was observed in the WC of both sexes. Based on the general findings, participating in the TABATA program is effective and may partially improve students' BMI and significantly enhance WC. To conclude, this study did not take into account other factors which may also affect the result of this study. Therefore, comparable experiments may be conducted while taking into account other variables aforementioned to this study's limitation.

Keywords

Body Mass Index, HIIT, TABATA workout, waist circumference

Streszczenie

Trening TABATA został doceniony w wielu artykułach badawczych ze względu na korzyści dla młodych dorosłych. Jednak nie znaleziono ani nie przeprowadzono badań dotyczących studentów uczelni wyższych na Filipinach. Celem tego badania było ustalenie, czy studenci mogą odnieść korzyści z programu ćwiczeń TABATA. Ostatecznie badanie miało na celu sprawdzenie, czy ten trening może pomóc w redukcji wskaźnika masy ciała i obwodu talii uczestników. Wykorzystując projekt eksperymentalny, badanie to analizowało efekty 10-tygodniowego programu treningowego TABATA w powtórzeniach na studentach. Po 10-tygodniowych ćwiczeniach przeprowadzonych przez uczestników stwierdzono, że nastąpiła poprawa wskaźnika BMI. Ponadto zaobserwowano znaczącą poprawę w obwodzie talii uczestników. Jednakże w oparciu o płeć nie stwierdzono znaczących różnic w BMI obu płci. Zaskakująco, znacząca poprawa została zaobserwowana w obwodzie talii obu płci. Na podstawie ogólnych wyników uczestnictwo w programie TABATA jest skuteczne i może częściowo poprawić wskaźnik BMI studentów oraz znacząco poprawić obwód talii. Podsumowując, to badanie nie uwzględniało innych czynników, które mogą wpłynąć na jego wynik. Dlatego podobne eksperymenty mogą być przeprowadzane, uwzględniając inne zmienne odnoszące się do ograniczeń tego badania.

Słowa kluczowe

wskaźnik masy ciała, BMI, HIIT, trening TABATA, obwód talii

Introduction

TABATA training is widely regarded as one of the high-intensity 'interval or intermittent' training (HIIT) approaches, which differs in terms of the characteristics of the training exercise (i.e., the exercise mode, intensity, and durations of exercise and rest) [1,2]. Training like this is designed to maximize results with minimal investment of time. In one common example, a workout routine might consist of eight repetitions of 20 seconds of intense work followed by 10 seconds of rest. As defined by [3], HIIT is the 'near maximal' (in other term, 'submaximal') effort which is generally performed at intensity that elicits $> 80\%$ (sometimes 85-95%) of the maximal heart rate. On the one hand, [4] suggested a broader definition of HIIT in which it typically involves short bursts of high-intensity exercise to which a short period of rest and recovery will follow which approximately takes < 30 min to execute. In the exercise physiology discipline, the level of intensity of a specific exercise has been defined relative to the VO_{2max} as 'submaximal,' 'maximal,' and 'supramaximal' when the oxygen demand is less than, equal to, and greater than VO_{2max} , respectively. Since TABATA training is higher than the VO_{2max} (i.e., $170\% VO_{2max}$), the original training is 'supramaximal intensity intermittent training.' Furthermore, in terms of exercise:recovery ratio, TABATA is different from other exercises such as sprint interval training (SIT). In this regard, this training is an original and unique training method that can be described by either the classic but familiar term 'interval training' or the modern and "cool" term 'HIIT,' which includes a variety of training methods using intermittent/interval high-intensity exercise [1].

TABATA Workout in the improvement of Body Mass Index and Waist Circumference

The prevalence of overweight and obesity is correlated with an increased risk of developing cardiovascular disease (CVD), diabetes, musculoskeletal disorders, and even some forms of cancer [5,6]. Furthermore, there is strong evidence linking metabolic problems and cardiovascular disease to excessive abdominal obesity [7, 8]. As a long practice, Body Mass Index (BMI) is widely use in the diagnosis of overweight and obesity [9–11], whilst Waist Circumference (WC) and indices based on WC-such as waist-to-hip ratio (WHR), and waist-to-height ratio (WThR) are utilized as surrogate indicators of visceral obesity in predicting morbidity and mortality at the population level [12–14]. Because of their convenience and low cost, these anthropometric indices are frequently used in epidemiological research for population surveillance of risk factors for chronic diseases [15, 16]. For example, the study of Tran et al. (2018) in Vietnam, it was found that the measurements of BMI and WC are highly correlated (men $r = 0.80$, women, $r = 0.77$). For men, WC or an index based on WC is predominantly and highly associated with blood pressure, glucose, and total cholesterol, compared to their counterpart which is highly associated with glucose but highly important for BP and TC. In this regard, avoiding these possibilities by taking into consideration the BMI and WC of individuals in a young age, is highly recommended.

The college environment is crucial for the development of

unhealthy eating habits and an increased risk of overweight and obesity, as well as anemia, which is characterized by an intake of foods high in saturated fat and deficient in essential minerals like iron and folic acid [17]. In the previous few decades, the percentage of people who are overweight or obese has doubled; now, it affects nearly a third of the global population [18], such as Philippines. Additionally, there has been a strike on the percentage of college students who are not physically active [19, 20] which is highly evident in a global scale due to some reasons such as academic workloads, lack of self-discipline, and poor access to sport facilities [21–23]. In this regard, the aforementioned reasons above are considered as public health problem and a pandemic [24, 25].

It has long been recognized that educational institutions, including universities, are crucial settings for the provision of physical activities, particularly during physical education sessions [26]. Undergraduate students in particular spend a great deal of time in school, making universities a prime location for interventions that encourage healthy, physically active living [27]. Several researchers have pointed out that schools and PE in particular can play a significant role in combating obesity and the "obesity epidemic" [26, 28, 29]. Different countries have produced educational materials, programs, and specialized teaching tactics to inspire young adolescents to adopt a healthy, physically active lifestyle in an effort to reduce the prevalence of overweight and obesity [30, 31].

High-intensity interval training (HIIT) exercises like the TABATA workout are among those made available to college students. Numerous research have been done in recent years on the benefits of TABATA exercise for the enhancement of the general well-being of individuals [32–34]. It was also found out that such workouts may be of great benefit in the improvement of body mass index and waist circumference of students [35–38]. Importantly, certain scientific papers have shown that improvements are highly successful for overweight and obese individuals after seeing the effects of multiweek HIIT, such as the TABATA workout, in both overweight young adults and those with normal body mass index and waist circumference [39–42]. Additionally, there have been recent studies that have mentioned the effectiveness of TABATA training in the virtual environment. The findings of [43] have observed that virtual TABATA training is highly effective in the improvement on the level of physical fitness and psychological well-being of student-athletes. Likewise, the study of [44] have also observed that online TABATA workout had a positive effect on the improvement of muscle mass, ankle strength (dorsiflexion), hip strength (abduction, flexion, extension, and external rotation), knee strength (extension and flexion), and balance (Y-balance test) in adolescents. However, these studies have not focused on the Body Mass Index and Waist Circumference, instead they have focused on other physical fitness components (i.e., VO_{2max} , endurance, speed, power, and strength), and psychological well-being. However, after conducting a comprehensive search of academic works published on the issue and related to college students in the Philippines, no studies were located. Furthermore, inquiries concerning the effectiveness of TABATA workout to college students in the improvement of their body mass index and waist circumference is still undiscovered.

Tertiary education physical education teachers in the Philippines would benefit greatly from an evaluation of its efficacy in improving students' body mass index and waist circumference in order to avoid or reduce the present rates of overweight and obesity among their students. In this regard, this study compared the pre-test and post-test results of male and female college students who participated in a 10-week TABATA exercise program in repetition.

Methods and materials

Research Design

This study used an experimental design to assess the impact of a 10-week TABATA workout program on the Body Mass Index (BMI) and Waist Circumference (WC) of college students who participated in the program. It's a scientific approach in which research is carried out in a systematic way with a keen eye towards reaching precision and drawing the clearest pos-

sible conclusions [45]. As mentioned earlier, this study has used a sampling technique to which the participants are selected based on their characteristics that are highly suitable for this kind of investigation. In this regard, a selection criterion was formulated to obtain the most reliable and accurate data from the participants:

- Enrolled in the course Physical Education 2 (Fitness Exercises Exercise Program-based)
- Must be at least 19 years old.
- Can be either male or female.
- No medical history.

Table 1 below illustrates the TABATA workout program that is designed based on the curriculum of the course to which students are asked to undergo. It also provides the step-by-step process where students are expected to perform in class. The said workout program will be performed by the students in a repetitive manner for the duration of 10-weeks.

Table 1. 10-week repetition TABATA workout program

Workout	Instructions
High Knees	<ol style="list-style-type: none"> 1. Start standing. 2. Run in place, driving the knees towards the chest. 3. Use arms and try and go as fast as you can. Complete as many reps as possible in 20 seconds at maximum effort, followed by 10 seconds of rest. Repeat eight times. Rest for one minute then continue on to the next move.
Sprawl	<ol style="list-style-type: none"> 1. Start in a plank position. 2. Jump feet toward hands, dropping butt below knees and lifting torso up, and raising hands to chest level. 3. Jump feet back to plank position. That's one rep. Complete as many reps as possible in 20 seconds at maximum effort, followed by 10 seconds of rest. Repeat eight times. Rest for one minute then continue on to the next move.
Skaters	<ol style="list-style-type: none"> 1. Start standing with feet hip-distance apart. 2. Jump to the right, landing on right foot and bringing your left leg behind body. 3. Jump back to the left, landing on left foot and bringing right foot behind body. That's one rep. Complete as many reps as possible in 20 seconds at maximum effort, followed by 10 seconds of rest. Repeat eight times. Rest for one minute then continue on to the next move.
Knee Tuck to Pushup	<ol style="list-style-type: none"> 1. Start in a high plank position. 2. Jump knees between hands (or place sliders under feet, and pull knees forward in line with hands). 3. Return feet to plank position. 4. Bend elbows and lower into a pushup with control. That's one rep. Complete as many reps as possible in 20 seconds at maximum effort, followed by 10 seconds of rest. Repeat eight times. Rest for one minute then continue on to the next move.
Tuck Jumps	<ol style="list-style-type: none"> 1. Start standing. 2. Jump straight up, tucking knees to your chest. 3. Land softly, and immediately repeat that move. That's one rep. Complete 20 seconds at maximum effort, followed by 10 seconds of rest. Repeat eight times. Rest for one minute.
Mountain Climbers	<ol style="list-style-type: none"> 1. Start in a plank position. 2. Drive your knees toward chest, one at a time, as quick as you can. That's one rep. Complete as many reps as possible in 20 seconds at maximum effort, followed by 10 seconds of rest. Repeat eight times. Rest for one minute then continue on to the next move.
Squat Jump	<ol style="list-style-type: none"> 1. Start standing with feet shoulder width apart, toes pointed forward, and weight in heels. 2. Lower down into a squat, and then drive through heels to reverse movement and jump up as high as possible. 3. Land softly back into the squat position. That's one rep. Complete as many reps as possible in 20 seconds at maximum effort, followed by 10 seconds of rest. Repeat eight times. Rest for one minute then continue on to the next move.
Burpees	<ol style="list-style-type: none"> 1. Start standing. 2. Squat down to plant palms on mat. 3. Immediately, jump feet back into a plank position. 4. Perform a pushup. 5. Jump feet toward hands. 6. Push down through heels to rise up and jump into the air, bringing hands over head. 7. Land softly back on mat. That's one rep. Complete as many reps as possible in 20 seconds at maximum effort, followed by 10 seconds of rest. Repeat eight times. Rest for one minute then continue on to the next move.

Population and sampling technique

The participants for the study are selected via Judgmental Sampling Technique from one (1) section of first year undergraduate students from a college in the Philippines enrolled in the Physical Education 2 (Fitness Exercises [Exercise Program-based]) course for the 2nd Semester, A.Y. 2022-2023. It is a non-probability sampling technique in which people take part in the study based on the researcher's subjective assessment of who

will produce the most useful data for meeting the goals of the research [46]. Table 2 illustrates the demographic characteristics of the participants. Based on the table, most of the participants are female compared to male [$N_{\text{female}} = 21$ (60.0%), $N_{\text{male}} = 14$ (40.0%)]. In terms of age, most participants are 19 years old, followed by 20 and 21 years old [$N_{19\text{yo}} = 18$ (51.43%), $N_{20\text{yo}} = 13$ (40.0%), $N_{21\text{yo}} = 3$ (8.57%)], respectively with a mean of 19.57 years old.

Table 2. Demographic characteristics

Variuables	Items	N (%)
Gender	Male	14 (40.0%)
	Female	21 (60.0%)
Age (Mean = 19.57)	19 years old	18 (51.43%)
	20 years old	14 (40.0%)
	21 years old	3 (8.57%)

Instruments and data gathering

The collection of data from the participants was successfully obtained by utilizing a two-parts questionnaire. The first part is focused on gathering the participants' demographic profile both sex, age, body mass index (BMI – for both pre- and post-test scores) and waist circumference (WC – for both pre- and post-test scores). Lastly, the Physical Activity Readiness Questionnaire (PAR-Q) was also utilized to determine the participants' current health status in order to identify and exclude the participants based on the selection criterion formulated for the investigation.

Data analysis

Obtained data from the participants were processed via IBM Statistical Package for the Social Sciences version 27 (IBM SPSS 27). The demographic characteristics of the participants (i.e., age, gender, BMI and WC) were interpreted using descriptive statistical analyses such as frequency (f), mean (M) and percentage (%). Lastly, Paired samples t-test was performed to evaluate the significant variance in terms of BMI and WC based on gender after performing a set of TABATA workout in repetition for ten consecutive weeks [47].

Ethical considerations

The participants for this experiment were provided a background concerning the study such as its objectives, the instruments to be used, and the variables that will be measured in the entire duration of the investigation. Furthermore, minor risks in participating in the study were also enumerated. Participants were asked to provide their written consent by agreeing on the statement provided on the questionnaire.

Results

Table 3 depicts the pre-test reports in terms of body mass index and waist circumference of the participants with respect to sex. In terms of body mass index, most male participants are under the normal classification followed by underweight and obese [$(N_{\text{male(normal)}} = 9(64.29\%), N_{\text{male(underweight)}} = 3(21.42\%)$, $N_{\text{male(obese)}} = 2(14.29\%)$], while most female participants are under normal classification followed by underweight [$(N_{\text{female(normal)}} = 14(66.67\%), N_{\text{female(underweight)}} = 7(33.33\%)$]. For waist circumference, most male participants are under low risk followed by high risk [$(N_{\text{male(low risk)}} = 13(92.86\%), N_{\text{male(high risk)}} = 1(7.14\%)$], while most female participants are under low risk followed by moderate risk [$(N_{\text{female(low risk)}} = 20(95.24\%), N_{\text{female(moderate risk)}} = 1(4.76\%)$].

Table 3. Pre-test report in terms of sex vis-à-vis Body mass index and waist circumference

Gender	Body Mass Index Classification		
	Underweight (%)	Normal (%)	Obese (%)
Male	3 (21.42%)	9 (64.29%)	2 (14.29%)
Female	7 (33.33%)	14 (66.67%)	0 (0.00%)
	Waist Circumference		
	Low Risk (%)	Moderate Risk (%)	High Risk (%)
Male	13 (92.86%)	0 (0.00%)	1 (7.14%)
Female	20 (95.24%)	1 (4.76%)	0 (0.00%)

Table 4 displays the post-test reports in terms of body mass index and waist circumference of the participants with respect to sex after performing the TABATA exercise. In terms of body mass index, most male participants are under the normal classification followed by underweight and obese [$N_{\text{male(normal)}} = 8$ (57.14%), $N_{\text{male(underweight)}} = 4$ (28.57%), $N_{\text{male(obese)}} = 2$ (14.29%)]. For female participants are mostly under normal classification followed by underweight [$N_{\text{female(normal)}} = 13$ (61.90%), $N_{\text{female(underweight)}} = 8$ (38.10%)]. Alarmingly, two participants (one male and female) who are originally under normal we-

ight became underweight after performing the exercise. Furthermore, concerning waist circumference, most of the male participants are under the low-risk followed by high risk [$N_{\text{male(low risk)}} = 13$ (92.86%), $N_{\text{male(high risk)}} = 1$ (7.14%)]. Comparing these findings from the pre-test report in Table 3, no changes were observed after performing the TABATA workout. Lastly, all female participants are under the low risk [$N_{\text{female(low risk)}} = 22$ (100.00%)], indicating that out of the 21 original participants under this category, one from the moderate risk successfully improved her waist circumference by performing the TABATA workout.

Table 4. Post-test report in terms of sex vis-à-vis Body mass index and waist circumference

Gender	Body Mass Index Classification		
	Underweight (%)	Normal (%)	Obese (%)
Male	4 (28.57%)	8 (57.14%)	2 (14.29%)
Female	8 (38.10%)	13 (61.90%)	0 (0.00%)
	Waist Circumference		
	Low Risk (%)	Moderate Risk (%)	High Risk (%)
Male	13 (92.86%)	0 (0.00%)	1 (7.14%)
Female	21 (100.00%)	0 (0.00%)	0 (0.00%)

Table 5 demonstrates the results of the paired t-test analysis. Overall, in the pre-test and post-test scores, a significant variance was observed which indicates that there is a slight reduction and improvement in the Body Mass Index (BMI) of the participants after performing the TABATA workout [pre-test (19.92 ± 2.76) and post-test (19.65 ± 2.66), $t(34) = 2.240$, $p = 0.032$]. Lastly, concerning the waist circumference of the participants, a significant difference was observed which indicates that after performing the TABATA workout, there is a reduction and improvement in the waist circumference of the participants [WC^a (28.08 ± 3.79) and WC^b (26.99 ± 3.28), $t(34) = 4.440$, $p < 0.05$]. Moreover, the study has also examined the variance specifically the individuality of each sex. Concerning male participants, no significant variance was observed concerning their pre-test and post-test scores [pre-test_{male} ($20.75 \pm$

3.75) and post-test_{male} (20.48 ± 3.38), $t(13) = 1.260$, $p = 0.230$]; on one hand, a significant variance was observed in terms of their waist circumference, indicating that there is a significant reduction and improvement in their WC after performing the TABATA workout [WC_{male}^a (29.29 ± 5.05) and WC_{male}^b (27.71 ± 4.27), $t(13) = 5.397$, $p < 0.05$]. For female participants, no significant difference was observed in their pre-test and post-test scores [pre-test_{female} (19.36 ± 1.73) and post-test_{female} (19.09 ± 1.94), $t(20) = 1.854$, $p = 0.078$]; lastly, a significant variance was observed in terms of their waist circumference, positing that there is a slight reduction and improvement in their WC after performing the TABATA workout [WC_{female}^a (27.28 ± 2.49) and WC_{female}^b (26.52 ± 2.42), $t(20) = 2.199$, $p = 0.040$].

Table 5. Difference between pre-test and post-test, and waist circumference of participants

	M ± SD	SE	Paired Differences		t	df	Sig.
			95% Confidence Interval of the Difference				
Overall							
Pre-test – post-test	0.27 ±.71	0.119	0.02481	0.51119	2.240	34	0.032
WC ^a – WC ^b	1.08 ±.144	0.243	0.58726	1.57845	4.440	34	0.000
Male Participants							
Pre-test – post-test	0.27 ±.80	0.214	–0.19289	0.73289	1.260	13	0.230
WC ^a – WC ^b	1.57 ± 1.09	0.291	0.9424	2.2004	5.397	13	0.000
Female Participants							
Pre-test – post-test	0.27 ±.66	0.144	–0.03329	0.56662	1.854	20	0.078
WC ^a – WC ^b	0.77 ± 1.58	0.344	0.03906	1.47522	2.199	20	0.040

Discussion

The purpose of this research was to evaluate the impact of a ten-week TABATA exercise program in repetition on the participants' ability to reduce their Body Mass Index and Waist Circumference. When the results were analyzed holistically, it was discovered that the participants' body mass index had decreased and gotten better. The finding of this study has been supported by the study of [35] which reported that a significant difference was observed in the BMI of the participants who joined the 10-week TABATA program after performing the two-way ANOVA [BMI($F = 120.30, p < 0.001$)], however, it is only effective for overweight individuals. Likewise, the findings of [36] also reported that BMI and body fat mass decreased (BMI: -1.8 kg/m^2 vs. -1.2 kg/m^2 , $P < 0.01$; FM: -1.6 kg , $P < 0.05$ vs. -3.7 kg , $P < 0.01$) in HIIT following the TABATA program for twelve weeks. Similarly with the study findings of [37], it was reported that a 12-week low-volume TABATA style functional HIIT was highly effective to female university students to improve cardiorespiratory fitness, body fat, cardio-metabolic health outcomes, and habitual PA. Contrary to the findings of [48], based on their experimental study focusing on a 10-week PE curriculum supplemented by TABATA training program to secondary school students, it was observed that male students of the intervention group has significantly reduced their body fat (1.77%, $p < 0.05$) compared to their counterparts. Additionally, the study of [49] has revealed that the high-intensity strength interval training program, when carried out over the course of ten weeks, leads to a favourable effect that is not statistically significant on the decrease of body fat but is statistically significant on the gain of muscle mass. From these data, we may infer that the TABATA program is beneficial, and it may help reduce students' body mass index.

On the other hand, for male participants, it was found that TABATA workout has no significant effect on the improvement of their BMIs. On a positive note, the said training has a significant and positive effect on the reduction of their WCs. Likewise for female participants, no significant changes were observed on their BMIs, but a significant reduction on WCs. The findings are dissimilar based on the observation of [50], in which a significant improvement on male soccer players' body fat percentage after performing TABATA training. Additionally, the findings of [37] also revealed that female university students who undergone TABATA training has a slight improvement with their body fat percentage. But if these findings are seen in a holistic perspective, there is a slight improvement to the participants' BMI. As have mentioned earlier, both male and female participants have a significant reduction and improvement in their waist circumferences. The findings of this study has been supported by the published work of [38], in which they reported that TABATA training shows significant improvement in reducing the waist circumference of the female participants. Furthermore, in the systematic review and meta-analysis performed by [51], it was revealed that Studies averaged 10 weeks \times 3 sessions per week training in which both HIIT and MICT elicited significant ($p < 0.05$) reductions in waist circumference. While the TABATA training program showed some promise in reducing waist size, its success would likely increase with more individualized attention

and careful consideration of sex differences. In general, there have also been various studies in relation to the effectiveness of TABATA program as HIIT in decreasing and improving waist circumference. Such as the findings of [52], it was found that after training, both the HIIT and Abdominal groups saw a substantial reduction in body fat percentage ($p < 0.05$). However, only the HIIT and Abdominal groups saw a reduction in their combined abdominal skinfold, waist circumference, and waist-to-hip ratio after training ($p < 0.05$). Likewise, the study of [53] has found that children who are overweight or obese can benefit from HIIT protocols with work-to-rest ratios of 1:1 or 2:1 regardless of the overall amount of time spent exercising. In this regard, it can be posited that the TABATA workout may effectively reduce and improve the waist circumference of the participants for those falls under the overweight and obese. Notably, multiple studies have confirmed that TABATA workouts are extremely beneficial, especially for those who are overweight, or obese. Such as the study of [41], it was reported that a 12-week HIIT is significantly effective for obese adults. Similarly with the findings of [54], observed that TABATA method represents an effective way in reducing body weight and fat, most especially to those overweight and obese individuals. However, based on the results of the study, TABATA training program is not highly suggested to introduce, most especially for students that falls under the underweight and slightly normal category as this may cause detrimental issues concerning their health. On a positive note, the training program may be suggested to underweight students if combined with proper caloric food intake.

Conclusion

The results suggest that a 10-week TABATA training routine in repetition can help students reduce their body mass index and greatly improve their waist circumference. This means that college PE teachers might use this method on a regular basis to help their students engage in a beneficial, healthy, and pleasant activity that could help them reduce their body mass index and waist circumference. In addition, the HIIT training has shown promise as a viable means of improving the health and wellness of both male and female undergraduates. However, the study found that its findings were most applicable to students who were classified as overweight or obese, and that it was not advised for students who were underweight and to those who are slightly in the normal classification. As was also indicated before in the discussion section, it is important to take into account sex differences while designing this type of exercise regimen. Finally, the study's results may not be generalizable because researchers did not account for the participants' individual diets, lifestyles, and other characteristics. In light of this, it is strongly recommended that similar experiments be undertaken while also considering the aforementioned contributing variables. In sum, this research adds additional information to the cannon by revealing that a 10-week TABATA fitness routine delivered repeatedly to undergraduate students in the Philippines is effective.

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