

The Enjoyment in Physical Education Class and Body Fat Percentage among Adolescents: A Correlational Study

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Abstract: Overweight and obesity incidences have increased globally, including in Malaysia. Adolescents often become obese due to imbalances in energy intake and expenditure, low physical activity, and unhealthy diets. Schools are crucial in promoting physical activity (PA) to combat obesity. The main reason for overweight and obesity among adolescents is the imbalance between energy intake and expenditure due to low physical activity. As being overweight and obese contributes to chronic diseases, adolescents should combat it through PA. In this regard, schools play a crucial role in enhancing interest in PE due to the subject's potential to enhance the level of PA. Several studies found that enjoyment in PE will motivate adolescents to engage in PA as it promotes activities that incite excitement, enjoyment, and interest. Thus, the present study explored the correlation between the level of enjoyment and body fat percentage among adolescents and involved 152 adolescents aged 15-17 and found a negative relationship between enjoyment and body fat percentage $r = -.474$, $p = .000$, with 22.5% of the variance in body fat percentage being attributed to enjoyment in PE. This highlights the importance of incorporating various teaching methods and activities in PE to improve students' engagement.

Keywords: Body Fat Percentage, Enjoyment, Physical Activity, Physical Education

Introduction

Obesity, attributed to excessive calorie intake without adequate energy expenditure, is a significant global public health issue affecting people of all ages, including children and adolescents. Obesity persists throughout adulthood and is linked to chronic diseases (Horesh et al., 2021; Jebeile et al., 2021; Kansra et al., 2021). The World Health Organization defines overweight or obesity as excessive body fat and presenting potential health issues (Jebeile et al., 2022). Over the past decade, overweight and obesity have increased globally, with Malaysia experiencing a significant increase in overweight among children and adolescents, with boys increasing from 20% to 26% and girls from 19% to 24% between 2006 and 2015 (Mohamad et al., 2021). Furthermore, in a recent study (Lai et al., 2022), childhood obesity has grown to 14.8%, with 17% of secondary school children in Negeri Sembilan, Malaysia, classified as overweight. Adolescents in Malaysia need to engage in more physical activities (PA) to combat obesity, with schools playing a crucial role in enhancing interest in Physical Education (PE).

The increase in overweight and obese individuals is due to the shift in lifestyles resulting from better socio-economic status and frequent sedentary behaviours, including screen time that has

replaced outdoor activities and social engagement. Obesity typically results from the long-term impact of dietary habits and physical inactivity acquired throughout the early stages of life. Adolescence is an important transition period from childhood to early adulthood (Nelson et al., 2009). It is essential for fostering healthy development and growth, mainly through adopting a healthy lifestyle among individuals in this age group. Being physically active typically improves physical and psychological well-being. However, data showed adolescents in Malaysia did not participate sufficiently in physical activity (PA) (Wong et al., 2016; Cheah et al., 2018). Recent findings showed Malaysian children and adolescents experience an "inactivity epidemic" due to low physical activity and sedentary behaviours (Shahril et al., 2023) that may increase the prevalence of obesity or overweight. Several studies have shown that a sedentary lifestyle increases BMI. Hence, PA is a practical approach to address this issue (Fonseca et al., 2018; Florido et al., 2017; Riddiford-Harland et al., 2016; Graff et al., 2016; Hruby et al., 2015). Studies like Dong et al. (2021) recommended that adolescents engage in physical activity based on the World Health Organisation's suggestion of 60 minutes of moderate to high-intensity daily exercise.

Regardless of its significance, having a normal BMI and being active is necessary. However, scholars have debated the suitability of BMI in determining overweight and obesity as it may not accurately indicate body fat in adolescents with a higher proportion of muscle mass or fat (Rothman, 2008), leading to misclassification of body weight status. It has been argued that body fat measurement percentage is more accurate than BMI as it measures lean or fat mass (Rothman, 2008; Radley et al., 2005; Costa-Urrutia et al., 2019). Moreover, as Etchison et al. (2011) explained, BMI, as a measurement tool, may not be appropriate for individuals of Asian descent due to several factors; the BMI calculation relies on the link between weight and height, which may not accurately reflect the body composition of Asians and there are constraints associated with variations in lean and fat mass across individuals, particularly in adolescents (Etchison et al., 2011). However, previous studies revealed a significant correlation between BMI and body fat (Sathiarajan et al., 2023; Saikia et al., 2018; Jain & Bhatt, 2016). Therefore, it seems most effective to determine overweight or obesity by measuring body fat percentage to achieve more accurate outcomes.

Adolescents in Malaysia need to engage in more physical activities (PA) to combat obesity, with schools playing a crucial role in enhancing interest in Physical Education (PE). Participation in PE class may indicate the importance of PA among adolescents. According to Cheah et al. (2018), adding additional PE classes has the potential to enhance the probability of engaging in PA due to the study's findings that attending PE classes contributes to the promotion of PA (Tudor-Locke et al., 2006; Cheah et al., 2018). However, a recent study (van Sluijs et al., 2021) has revealed that efforts to promote PA in schools have mostly been unsuccessful in changing positive PA behaviour. Similar to Mehmeti (2015), among the problems related to the decrease in student engagement in PE are PE teachers focusing more on traditional and team sports, PE not being prioritised in schools, lack of enjoyment, low-quality PE, limited variety of activities, (Mohammadi et al., 2020; Chen & Hypnar, 2015; Phillips & Silverman, 2015). Meanwhile, Martins et al. (2022) reported that 18.2 % of adolescents do not participate in any PE class, which may increase their sedentary behaviour. Similar to other recent study, students' participation in PE was minimal, and some chose not to participate in the activities even though they attended the class (Mohammadi et al., 2020).

Several studies found that enjoyment in PE will motivate adolescents to engage (Camacho-Minano et al., 2011; Murillo Pardo et al., 2013) in PA since they often prefer activities that create excitement, enjoyment, and interest. Over a decade, scholars in Malaysia and other countries have explored enjoyment in physical activity (PE), including associations between BMI and PA, teaching games for enjoyment, the role of PA, the relationship between PA and exercise habits, and gender characteristics (Hairul Anuar Hashim et al., 2008; Romaguera et al., 2011; Baharudin et al., 2014; Navarro-Patón et al., 2019; Rahman et al., 2020; Heng & Koh, 2021; Berki & Tarjányi, 2022; Oya & Ishihara, 2022). Nevertheless, certain crucial domains still need enough data and findings. To the best of our knowledge, no research conducted in Malaysia has examined the body fat percentage and student enjoyment in PE. Thus, to fill the literature gap, the present study aims to investigate the correlation between body fat percentage and enjoyment in PE among students in Selangor. This study is essential due to the importance of PE and PA in overcoming the obesity issue and cultivating lifelong healthy lifestyles, especially among adolescents. Due to the lack of literature on the domains, the present study may provide valuable insight about enjoyment and the relevance of PE in school to

provide healthy adolescents, eventually contributing to themselves, family, community, and civil society.

Literature Review

Research has indicated the vital role the experience of enjoyment has in encouraging adolescents' sustained participation and positive involvement in both PA and PE (Woods et al., 2012; Sami Yli-Piipari et al., 2009; Prochaska et al., 2003). Enjoying PE class activities can significantly affect student participation and enhance the interest in doing PA. Self-Determination Theory (Deci and Ryan (1985) highlights three psychological needs: autonomy, competence, and social relatedness, which contribute to greater enjoyment in PE (Sanchez-Oliva et al., 2014; Mouratidis et al., 2011; Ntoumanis, 2005). The need for competence usually refers to students' ability to perform PE skills that may lead to their satisfaction. The achievement of competence creates a positive feeling of satisfaction and interest (Deci & Ryan, 2008) that promotes students' enjoyment and interest in PE. Therefore, the significance of experiencing enjoyment is essential in facilitating the ongoing participation of adolescents in PE, ultimately fostering a positive mindset toward PA. Previous studies have reported the strongest correlation of enjoyment in PE that will enhance the level of PA among adolescents (Dishman et al., 2005; Sallis et al., 2000). In contrast, failing to perform the skills may lead to demotivation and reduced interest and enjoyment in participating in PE activities.

The term body fat percentage indicates the amount of body fat mass calculated as the total body weight percentage (Kitchlew et al., 2017), while Messiah, S. (2013) defined BMI as an individual's body weight divided by the square of height (the standard unit of measure is kg/m²). The body fat percentage cut-off for children and adolescents as overweight ranged from 18% to 23% (boys) and 20% to 34% (girls), for obese is 24–36% (boys) and 26–46% (girls) (Taylor et al., 2002). Skinfold Test and Bio Impedance Analysis are the most popular body fat percentage tests due to affordability, mobile equipment, low technical skill requirements, suitability for large populations compared to costly laboratory methods and often chosen by researchers to measure body fat (Hashim et al., 2018)

BMI is a simple tool for estimating adiposity based on weight and height, estimating adiposity based on average body composition. Identifying body weight status using BMI is related to the five categories of body weight: underweight, normal weight, overweight, and obese individuals. Studies show a correlation between BMI and heart disease risk; regular physical activity can reduce BMI (Frank et al., 2020; Canoy et al., 2013). Research has linked BMI and body fat to fitness, highlighting poor physical fitness among underweight, overweight, and obese college students. Hence, measuring BMI and body fat is essential for gaining insights into health, fitness, and physical activity, especially for children and adolescents. BMI and body fat percentage measurement can be used interchangeably to assess an individual's body weight status and evaluate body composition. Although each method has advantages and limitations, they serve the same function. Therefore, one can use either method to obtain accurate results. Evaluating the results from both approaches can provide a more comprehensive understanding of an individual's body composition, which can help achieve and maintain a healthy body weight.

BMI and PA are closely connected aspects critical in PE (Hwang & Kim, 2013; Reilly et al., 2000). El Zoghbi et al. (2022) found that individuals with higher BMI often show lower levels of PA and increased body mass during the pandemic. Delgado Floody (2018) found a decline in participation in PE among obese students due to exclusion. Thus, establishing inclusive classrooms enhances overall satisfaction (Barr-Anderson et al., 2008) and can help overweight and obese children enjoy exercise (Olaya-Contreras et al., 2016). An exciting view among overweight and obese adolescent students highlighted that issues with PE are caused by inappropriate lesson planning, a lack of enjoyment, and a lack of choices for activities (Li et al., 2012). A recent study also found that being overweight and obese are reasons for low engagement in PE classes (Sayar et al., 2022). The study also suggested the importance of effective teaching strategies to ensure overweight and obese students are involved in PE. This might explain why these adolescents are less likely to participate in PE and may lead to low levels of PA. In this light, overweight and obese students feel reluctant to participate in PE activities due to discrimination, exclusive methodology, and the lack of enjoyment in PE class. However, a study by (Fernández et al., 2016) revealed contrary results, where adolescents who were

overweight enjoyed doing PA, showing that overweight adolescents are interested in the activities and the barrier of being overweight and obese is not the issue of participating in PA and PE. Furthermore, Pal. (2017) discovered that overweight and PA levels were not significantly correlated with enjoyment, with 30.8% of students liking PE, indicating that overweight students may participate.

Heng and Koh (2021) revealed a significant link between gender, age, and BMI and the amount of enjoyment. This study observed that children who fall within the normal weight range and those underweight tend to experience greater satisfaction during PA than their overweight or obese children. This disparity in enjoyment can be attributed to the challenges faced by overweight or obese children, who may struggle to participate fully in PA due to their larger frames and heavier stature. A recent study also found that increased participation in PE class may positively impact students' body fat percentage (Ugowska & Kolanowski, 2022). Another study found that boys' enjoyment of physical activity was significantly impacted by their body composition, as measured by their BMI (Zheng et al., 2023). The significance of enjoyment as an essential indicator of physical activity (PA) has been emphasised in prior research. Remarkably, studies have shown a direct correlation between enjoyment in physical education (PE) and the level of participation in PA among young individuals (Dishman et al., 2005). Accordingly, enjoyment in PE significantly influences students' level of engagement with the subject. Active participation in PE can assist adolescents in achieving the suggested levels of PA and increase their awareness of the advantages of engaging in PA. Research has indicated that the enjoyment of physical activity is a significant predictor of long-term participation in physical activity (Labbrozzi et al., 2013; Taylor et al., 2010). Therefore, individuals who derive greater enjoyment from PA during PE sessions are more inclined to consistently engage in PA and sustain their participation in such activities over an extended period. Consequently, this increased involvement in PA enables them to effectively regulate their body fat levels, reducing the risk of experiencing adverse health consequences.

Methodology

This quantitative study involved 152 adolescents aged 15-17 from two secondary schools in Kuala Selangor, Malaysia. They were randomly selected. PA enjoyment was measured using a modified Physical Activity Enjoyment Scale (PACES; Kendzierski & DeCarlo, 1991) and revised by Motl et al. (2001) to ensure students in primary schools could readily understand the questionnaire. The questionnaire contains 16 items with a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). A higher composite score indicates greater enjoyment. The PACES questionnaire is valid and reliable for measuring physical activity enjoyment among school-aged children and adolescents. However, researchers conducted content validity to ensure the questionnaire's language, grammar, and content were appropriate for the respondents. Four experts were selected, including two experts in PA and PE and two in language. All the experts have at least ten years of experience in the constructs of interest. Using the formula proposed by Sidek Mohd. Noah and Ahmad (2005), the content validity is good at $r = .82$.

The body fat percentage of the respondents was estimated using two Tanita SC 240 Bio Impedance Analysis (BIA) devices. Respondents were instructed to wear lightweight attire, remove accessories, and empty their pockets. The assessor cleaned the equipment, and the respondents stood barefoot on the electron panel platform. The assessor conducted three readings and calculated the mean value for scores. The two certified PE teachers act as assessors in administering the body fat test.

Data were analysed using Statistical Package for Social Sciences (SPSS, IBM Corp., 2017, Version 25.0). Descriptive statistics were used to describe the respondents' sociodemographic characteristics and the level of enjoyment in PE. Inferential statistics Pearson correlation to identify the relationship between body fat percentage and enjoyment in PE. A simple linear regression was utilised to investigate whether enjoyment in PE is relevant in predicting body fat percentage in the target population.

The inclusion criteria for the current study are: 1) The study participants must be aged between 15 and 17, boys and girls from schools in Kuala Selangor District; 2) the participants were enrolled in PE class; the participants are healthy. The study will be excluded if the participants are 3) unhealthy or special population; 4) never join PE class; 5) no permission from schools and parents.

This study received approval from the UiTM Research Ethics Committee (REC) with reference number ED/REC/F/10284. Informed consent was obtained from all participants.

Findings and Discussion

Pilot Study

The pilot study was performed with two purposes. First, to determine the inter-device reliability of the two BIA devices used. Second, to identify the internal consistency of the PACES in the target population. The inter-device reliability assessment involved computing the inter-rater correlation coefficient (ICC) for each set of measurements. In this pilot study, forty respondents aged 15 to 17 were selected using simple random sampling (boys = 20, girls = 20).

Table 1. Inter Device Reliability

	Device 1	Device 2
BIA	1	.978**
Sig. (2-tailed)		.000
N		40

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

Table 1 presents the coefficient correlation value between devices 1 and 2. Findings show that Tanita SC 240 BIA has a high inter-device reliability value of $r = .97$, as Miller (2019) suggested. The internal consistency was assessed by examining Cronbach's alpha coefficient. The acceptable alpha value should be between 0.70 and 0.90 (Streiner, 2003; Tavakol & Dennick, 2011).

Table 2. Internal consistency PACES

	Cronbach's Alpha	Items
Positive Enjoyment	.88	1,4, 6,8,9,10, 11,14,15 = 9
Negative Enjoyment	.83	2,3,5,7, 12,13,16 = 7

The researchers determined the internal consistency using two questionnaire dimensions, positive and negative enjoyment, as Fuentesal-García et al. (2019) suggested. The Alpha Cronbach's results in Table 2 indicated good internal consistency, with Cronbach's alpha ranging from 0.83 to 0.88.

Field Study

One hundred fifty-two adolescents aged between 15 and 17 agreed to participate in this study. Table 3 shows the characteristics of the respondents. Boys represent 49.3% and were similar to girls 50.7%. The mean body fat percentage distribution for boys ($M=24.1$, $SD = 5.81$) was less than for girls ($M=27.3$, $SD = 5.19$). The mean level of enjoyment in PE class for boys ($M= 51.0$, $SD = 2.70$) was higher than for girls ($M=41.2$, $SD = 4.05$).

Table 3. Descriptive Statistics of Respondents

Variables / Gender	Boys		Girls	
	%	N	%	N
Age				
15	12.5	19	19.7	30
16	19.7	30	14.4	22
17	17.1	26	16.4	25
Total	49.3	75	50.7	77
Body Fat Percentage	Boys		Girls	
	Mean	SD	Mean	SD
15	25.4	6.01	29.1	5.40
16	24.33	5.82	27.9	4.45
17	22.82	5.43	24.9	5.10
Total	24.1	5.81	27.3	5.19
Level of Enjoyment	Boys		Girls	
	Mean	SD	Mean	SD
15	50.3	2.60	41.4	2.80
16	51.3	2.46	41.1	4.67
17	51.4	2.96	40.8	4.53
Total	51.0	2.70	41.2	4.05

SD standard deviation, N ample size

Table 4. Normality Test

Variables	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
Level of Enjoyment in PE	-.764	.197	.756	.391
Body Fat Percentage	.455	.197	-.272	.391

Normal data distribution is a fundamental assumption for statistical analyses like the two-way analysis of variance. The present study used Skewness and Kurtosis to test for normality (Hair Jr. et al., 2010; Kline, 2023; Tabachnick & Fidell, 2019). Kline (2023) indicated that absolute values of Skewness and Kurtosis greater than 3 and 10 may indicate a potential problem. Therefore, the absolute values of Skewness and Kurtosis in this study are within the acceptable range of < 3 and < 10, which means the data is normally distributed, as shown in Table 4.

Table 5. Pearson Correlations Percentage Body Fat and Level of Enjoyment

	Level of Enjoyment	
Pearson	Body Fat Percentage	-.474
Correlation	Sig. (2-tailed)	.000
	N	152

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

Table 5 shows the correlation between enjoyment in PE class and body fat percentage. The Pearson correlation coefficient shows a statistically significant and negative relationship between the level of enjoyment and body fat percentage [$r(152) = -.474, p = .000$]. Hence, the level of enjoyment increases as the body fat percentage decreases.

Table 6. Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.474 ^a	.225	.220	5.32500

a. Predictors: (Constant), Enjoyment

b. Dependant Variable: Body Fat Percentage

Table 6 shows the model summary. R-square shows that independent variables or predictors explain the per cent of the variance in the dependent variable. The result shows $R^2 = 0.225$, which indicates that 22.5% of the variance in percentage body fat is linked to the level of enjoyment in PE.

Table 7: ANOVA^a Simple Linear Regression

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1234.857	1	1234.857	43.549	.000 ^b
	Residual	4253.347	150	28.356		
	Total	5488.204	151			

a. Dependent Variable: Body Fat Percentage

b. Predictors: (Constant), Enjoyment

Table 8: Simple Linear Regression for Body Fat Percentage and Level of Enjoyment in PE Class

Model		Unstandardized Coefficients	Unstandardised Coefficients	t	sig	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	Constant	57.962	1.853	31.285	.000	1.000	1.00
	Level of Enjoyment	-.492	.074	-.492	.000		

a. Dependent Variable: Body Fat Percentage

b. Predictors; (Constant), Enjoyment

A simple linear regression analysis was computed to determine whether the enjoyment level predicts the body fat percentage level in a sample of 152 students ($N = 152$). The result shows a significant relationship between the PE class enjoyment level and body fat percentage. $R^2 = .225$, $F(1, 150) = 43.549$, $p = .000$. Level of enjoyment in PE is a predictor ($\beta = -.492$, $t = -6.599$, $p = 0.00$). This means the level of enjoyment in PE class significantly predicts the body fat percentage in PE class. Therefore, the equation for the regression based on B weights = level of enjoyment + 57.962. The Variance Inflation Factor (VIF) is between the $1 < VIF < 5$ range, indicating an acceptable degree of correlation between the variables. The small values of the VIF associated with the variables indicate the absence of collinearity issues.

This study examined the correlation between the level of enjoyment in PE class and the percentage of body fat in adolescents aged 15 to 17 in the Kuala Selangor district. The study found that the level of enjoyment has a negative moderate correlation with the percentage of body fat among 15 to 17-year-olds. As Miller (2019) stipulated, a correlation coefficient value between .40 and .59 represents a moderate relationship. In the meantime, the inverse correlation indicates that body fat percentage will decrease as enjoyment increases. At the same time, the linear regression revealed that only 22.5% of the variance in the percentage of body fat might be explained by the level of enjoyment, demonstrating that several other factors might influence body fat percentage.

The correlation between the two variables is an indirect effect, where enjoyment in PE class will lead to positive PA behaviour for adolescents. PE is a subject that emphasises psychomotor skills that require all students to participate in structured PA. In Malaysia, PE typically involves various types of physical activities, including gymnastics, rhythm movement, games, athletics, and fitness (Rahman et al., 2020; Pate et al., 2006) and is scheduled 60 minutes per week. Exposure to PA in PE class may create positive behaviour and awareness of the importance of PA to one's physical and psychological well-being. Thus, active participation in PE provides opportunities for students to experience moderate to high intensity of PA, besides creating positive behaviour toward PA. These two elements indirectly influence the percentage of body fat among adolescents. However, active involvement in PE will rely on the students' experience with PE, whether they feel enjoy, fun, and satisfied. The hedonic theory claims that individuals may engage in activities they find enjoyable and avoid boring and uninteresting activities (Williams, 2008; Kahneman et al., 1999).

Previous studies have presented similar findings. Fong et al. (2014) demonstrated a significant correlation between PA enjoyment and BMI. The study's regression analysis indicated enjoyment in PA explained 17.2 % of the variance in BMI. Despite the difference in the variables employed, with the present study employing body fat percentage and BMI in previous research, the primary objective remains to highlight the significance of body weight and enjoyment in PA through PE. Another study by Yan et al. (2023) asserts that a lack of enjoyment in PA may reduce adolescents' participation in PA or PE, potentially resulting in increased BMI (Aydi et al., 2023), associated with a higher body fat percentage. Nevertheless, a study (Berger et al., 2010) on obese adults found no significant association between exercise enjoyment and body fat percentage or BMI, suggesting additional challenges may counteract the potential positive effects of exercise enjoyment on their decision to engage in planned physical activity.

The present study demonstrated that only 22.5 % of the variance in body fat percentage is explained by the level of enjoyment in PE. This finding is not entirely surprising because the changes in body fat percentage have been due to other factors such as diet, sleep behaviour, gender, age, ethnic groups, and screen time. On the other hand, Lemura & Maziekas (2002) found that exercise is the most effective method to reduce body weight among children and adolescents, while another study (Mendonça et al., 2022) reported that aerobic exercise combined with high-repetition resistance training is most apt. Consequently, to ensure adolescents adopt the PA daily, enjoyment in PE is the most crucial element. PE teachers should play an important role in creating awareness and exposing adolescents to the essentials of PA for physical and psychological health. The ability of PE teachers to design meaningful and creative lessons that provide enjoyment to the students will enhance the active and maximum involvement in PE class.

Moreover, several studies confirmed that students' engagement in PE enhances the PA recommendations (Uddin et al., 2020; Mooses et al., 2017; Chen et al., 2014). In this light, students may participate in PE if they perceive the activities in PE as fun; otherwise, they may refuse to attend the class. Another study (Lewis et al., 2015) agreed that enjoyment in PA is a leading factor in promoting positive PA behaviour, indirectly influencing body fat percentage.

Conclusion

This study's main finding indicates that the enjoyment of PE class is significantly associated with body fat percentage, accounting for 22.5% of its variance. It has important implications, especially for PE teachers, schools, and other stakeholders; "enjoyment" should be considered important when planning PE lessons. The related parties should know PE is the best setting to increase the level of PA among adolescents, so incorporating various activities and teaching methodologies that meet the students' physical and mental abilities will create an enjoyable and positive learning environment in PE. Creative teaching and planning need to be considered by PE teachers; for example, using Teaching Games for understanding will enhance enjoyment and creativity (Rahman et al., 2020; Batez et al., 2021; Nugroho Susanto, 2021), cooperative learning (Engels & Freund, 2020), the use of music may increase motivation and enjoyment in PE (Cools et al., 2023; Gangrade, 2011), gamification and interactive teaching videos may enhance the student's attention and competitiveness (Ismail & Khalid, 2022). Meanwhile, PE teachers must be aware that the primary purpose of PE is to provide fundamental psychomotor skills and encourage students to adopt healthy lifestyles. PE instruction

must be beneficial to the students, and teachers should plan lessons with suitable activities, duration, suitability, and teaching methodology to enhance the enjoyment of PE and improve positive behaviour towards PA.

It is important to note that the element of enjoyment in PA and PE is a factor that contributes to adolescents engaging and developing positive PA behaviour (Bradbury et al., 2017; Cox et al., 2008), which can lead to a decrease in body fat and other health benefits. There are a few limitations to the present study. For example, several factors contribute to body fat percentage as mentioned above. According to the study, 22.5 % enjoyment in PE predicts the changes in body fat in the target population. Hence, future studies should determine the main factors attributing to changes in body fat percentage. Another limitation is the measurement methods used to estimate the body fat percentage.

Suggestions for Future Research

Future studies may use a specific method to measure body fat rather than a conversion formula from BMI. Among the methods such as lab or field methods, future studies may employ the lab method that provides more accurate findings compared to the field method. Include additional variable/parameter involves such as mention in the discussion: such as gender, age, screen time etc. Furthermore, other related variables should be included, for example, gender, age, diet, sleep behaviour, ethnic groups, and screen time to have meaningful discussion and results.

Co-Author Contribution

The authors confirmed that there is no conflict of interest in this article. Author 1 and author 3 prepared the literature review. Author 2 dan author 4 analyse the statistical analysis. Author 4 provides the concept of study and wrote the results, discussion, and conclusion. Author 6 conducted the field work, collect the data, and key in all the data into Statistical Package for Social Sciences

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