KNOWLEDGE, ATTITUDE, AND PRACTICE REGARDING EXERCISE AND EXERGAMES' EXPERIENCES AMONG HIGH-SCHOOL STUDENTS IN PULAU PINANG, MALAYSIA

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Abstract
This cross-sectional study aims to investigate high-school students' experiences with exergames, their knowledge, attitudes, and practice of exercise in Pulau Pinang, Malaysia. A relevant questionnaire has been effectively adapted by inserting another section to assess the respondents' experiences regarding exergames. The modified questionnaire was used as the research instrument in this study. The sampling size consisted of 377 Malaysian high-school students in Pulau Pinang, Malaysia. The five-section questionnaire provided statements and questions about the respondents' sociodemographic data and exergames' experiences, as well as their knowledge, attitude, and practice of exercise. The time frame was between October 2021 and January 2022. Data were analysed by using descriptive statistics of frequency and percentages. The association between gender, age and experience, knowledge, and attitude was examined using the chi-square test. p value of < 0.05 considered as statistically significant. Based on the quantitative results, 97.9% of the respondents have had adequate knowledge about exercise and 83.6% of the respondents displayed positive exercise attitudes. Approximately, half of the students allocated between 30 and 60 minutes daily to perform moderate-to-vigorous intensity workouts. However, a statistically significant difference was perceived in their experiences of exergames. Specifically, female respondents demonstrated that they have more experience than their male counterparts. Holistic efforts are essential to raise high-school students' awareness of exercise given its outstanding potential to enable children and adolescents' physical activity engagement.

Keywords**:** High-school students, Knowledge, Attitude, Physical activity, Exergames

Introduction

The popularity of childhood and adolescent obesity can be seen as a global pandemic that financially burdens healthcare systems worldwide (1). Young obese individuals commonly suffer from cardiometabolic risks, diabetes, liver and joint diseases, hypertension, oral health problems, asthma, depression and anxiety, attention deficit hyperactivity disorders, sleep-related issues, and low life quality (2). Childhood and adolescent obesity can help instigate acute and long-term adverse impacts on physical morbidity and early mortality in adulthood (3).

Following empirical outcomes, physical activity between periods of childhood and adolescence potentially prevents obesity by (i) the practice of physical activity in childhood and adolescence, which helps maintain the energy balance and, consequently, aids in the prevention and treatment of obesity and obesity-related diseases during these important stages of someone's life, (ii) active young individuals tend to become active adults, increasing energy expenditure throughout the life cycle, and (iii) active young individuals are less likely to develop obesity and obesity-related diseases in adulthood (4, 5). Children, however, tend to engage in sedentary behaviour and physical inactivity (6, 7). The World Health Organization (WHO) reported that 81% of adolescents (from 11-17 years old) are physically inactive with 85%

females and 78% males, failing to meet the global WHO standards of a daily 60-minute moderate-to-vigorous intensity exercise (8). Most teenagers have depicted a primarily sedentary lifestyle due to several factors. Despite a generally insignificant correlation, the amount of screen time in front of TVs, computers, etc. could be occasionally linked to obesity and physical inactivity (9).

Exergaming implies a technology that encourages people to exercise with interactive games. Video games and different auditory or visual stimuli could be integrated into a wide range of exercise activities and tools for individuals to be engaged in physical activity via playing games; visual, or auditory stimulation (10). Accordingly, computer games that have garnered much popularity among youths could be incorporated into different physical activities. Because children spend much time playing video games (11), it could be a very difficult task (if not impossible) to convince them to give up screen-oriented games (12). Activities that integrate computer games can potentially trigger adolescents' physical awareness (13). This study was conducted in a number of high schools in Pulau Pinang, Malaysia to investigate high-school students' experiences with exergames and determine their knowledge, attitudes, and their practice level of exercise.

Materials and methods

This cross-sectional study aims to investigate the high-school students' knowledge, attitudes, and practice of exercise and exergames experiences. The study was conducted among 13- and 16-year-old students in Pulau Pinang, Malaysia using an adapted, five-section questionnaire. The questionnaire has been written in English and disseminated to the respondents in their schools. Students, who suffered from concomitant diseases (renal failure, cardiovascular diseases, and hepatic dysfunction), were excluded from this study. A question about the student's health status was added to the sociodemographic data section to check the participant's eligibility. Students and their guardians signed an informed consent form to participate in the survey. Official consent was also obtained from the Malaysian Ministry of Education, the Human Research Ethics Committee of Universiti Sains Malaysia (reference No. USM/JEPeM/21050380), and school principals' pre-study commencement. In terms of the sampling method, the Raosoft software was employed for the sample size computation (5% as a margin error and 95% as a confidence interval) with a 50% response distribution estimate. Overall, 377 students were selected for this study. The questionnaire was distributed online between October 2021 and January 2022. Many Malaysian high schools participated in this study, including SMK SAINS KEPALA BATAS, SMK Bertam Perdana, SMKA AL-IRSHAD, etc.

The survey questionnaire was adapted from Fabunmi et al. (14) and subsequently modified by incorporating an additional section to measure the students' exergames experiences. The modified version of the questionnaire comprises 23 questions with five sections that present different statements, as well as questions concerning the students' sociodemographic data, exercise-related knowledge, attitudes, practice level, and exergames' experiences. This questionnaire used the well-known Likert scale for the knowledge and attitude section, open- and close-ended questions for the practice section, in addition to open-ended questions for the exergames section. A pilot study was conducted, including 188 high-school students to substantiate the questionnaire's validity and reliability. Regarding the questionnaire's content validity, it was comprehensively reviewed by six experts. Most of the questions had a CVI of more than 0.75. The experts suggested minor amendments to some questions with low CVI to improve the questionnaire. The pilot study was completed by removing some items from the questionnaire and improving other statements, as shown by the statistical analysis results. Concerning data analysis, the quantitative data, which was obtained from the questionnaire, was analysed using the well-established SPSS software (V. 26). Data were analysed by using descriptive statistics of frequency and percentages. The association between gender, age and experience, knowledge, and attitude was examined using the chi-square test. p value of < 0.05 considered as statistically significant.

Results

A total of 377 students from various high schools in Pulau Pinang, Malaysia participated in this study. The mean age of 106 (28.1%) male students and 271 (71.9%) female counterparts was 15.08 ± 1.121 years. Most students (87.3%) acknowledged the necessity of exercise for maintaining good health. Based on two questions about students' familiarity with exercise types, about 70% of the participants have correctly chosen the provided answer, while over 80% of them have correctly chosen the three administered questions about regular exercise. Meanwhile, the respondents claimed to acknowledge the benefits of regular exercise in maintaining flexibility, increasing muscular strength, and keeping normal blood pressure levels at 75.1%, 79.3%, and 77.5%, respectively (Table 1).

As provided in Tables 1 and 2, the frequency results (39.3% and 50.2%) showed that the participants of the study agreed that they can find enough time for a daily exercise routine. They added that doing exercise does not exhaust the person's energy. Some respondents (44.3%, 44%, and 22.3%) expressed their disagreement with these statements: "*I use little soreness from previous exercises or being tired as an excuse to keep away yourself from further exercises or exercise more*", "*I give up on exercising owing to a difficulty of sticking to a schedule*", and "*Household chores such as dishwashing is an exercise good enough to maintain health*". Therefore, according to the respondents' frequency results, 68.1% showed that they do not think that exercise does more harm than good, whereas 27.3% of them stated that they do not need someone to keep reminding them to exercise.

Table 1: Knowledge of participants regarding exercise

Statements	Agree	Neutral	Disagree
Exercise is necessary to maintain good health.	329 (87.3%)	42 (11.1%)	6 (1.6%)
Exercise can be aerobic or anaerobic.	270 (71.6%)	100 (26.5%)	7 (1.9%)
Aerobic exercise includes jogging, swimming, biking, running, brisk walking.	261 (69.2%)	93 (24.7%)	23 (6.1%)
Exercise should be done continually throughout life for good health.	304 (80.6%)	72 (19.1%)	1 (0.3%)
I should exercise regularly for my health.	306 (81.2%)	66 (17.5%)	5 (1.3%)
Doing regular exercise is good for my fitness and health.	331 (87.8%)	45 (11.9%)	1 (0.3%)
Regular exercise increasing and maintaining flexibility.	382 (75.1%)	90 (23.9%)	4 (1.1%)
Regular exercise increasing and maintaining muscular strength and endurance.	299 (79.3%)	74 (19.6%)	4 (1.1%)
Regular exercise maintaining a normal blood pressure range.	292 (77.5%)	82 (21.8%)	3 (0.8%)

Data presented as n (%)

Table 2: Attitudes of participants regarding exercise

Statements	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I feel that I have no time of my own and daily exercises take a way my valuable time.	22 (5.8%)	63 (16.7%)	144 (38.2%)	81 (21.5%)	67 (17.8%)
I feel that exercise takes away most of my energy.	13 (3.4%)	65 (17.2%)	110 (29.2%)	107 (28.4%)	82 (21.8%)
I use little soreness from previous exercises or being tired as an excuse to keep away yourself from further exercises exercising more.	11 (2.9%)	59 (15.6%)	140 (37.1%)	94 (24.9%)	73 (19.4%)
I give up on exercising owing to a difficulty of sticking to a schedule.	28 (7.4%)	61 (16.2%)	122 (32.4%)	97 (25.7%)	69 (18.3%)
Household chores such as dishwashing is an exercise good enough to maintain health.	52 (13.8%)	111 (29.4%)	130 (34.5%)	56 (14.9%)	28 (7.4%)
Exercise does more harm than good.	14 (3.7%)	40 (10.6%)	66 (17.5%)	71 (18.8%)	186 (49.3%)
I need someone to keep reminding me to exercise.	78 (20.7%)	101 (26.8%)	95 (25.2%)	51 (13.5%)	52 (13.8%)

Data presented as n (%)

According to the frequency results in Table 3, 44.3% of the respondents often walk for at least 10 minutes once to thrice weekly, 26.8% of the respondents walk four-to-six days weekly, and 22.8% of them walk daily to commute between places. Approximately, half of the study respondents (54.1%) claimed to perform moderate-intensity exercise between 30 and 60 minutes daily, whereas 10.9% of them spend over 60 minutes of exercise daily. In terms of performing vigorous-intensity exercise, 48.8% of the respondents often exercise 30-to-60 minutes daily, while 15.6% of them exercise for more than 60 minutes daily.

Table 3: Participation of respondents in physical activity

Question	**Never**	**1-3 days**	**4-6 days**	**Everyday**
In a typical week, on how many days do you walk for at least 10 minutes continuously to get to and from places?	23 (6.1%)	167 (44.3%)	101 (26.8%)	86 (22.8%)
Question	**Never**	**Less than 30 minutes**	**30- 60 minutes**	**Above than 60 minutes**
How much time do you spend doing moderate-intensity sports, fitness, or recreational (leisure) activities on a typical day?	37(9.8%)	95 (25.2%)	204 (54.1%)	41 (10.9%)
How much time do you spend doing vigorous-intensity sports, fitness, or recreational activities on a typical day?	31 (8.2%)	103 (27.3%)	184 (48.8%)	59 (15.6%)

Data presented as n (%)

Parallel to the frequency results in Table 4, 62.1% of the respondents were familiar with exergames, 37.1% have attempted to play exergames, 64.7% have seen someone playing exergames, and 35.5% received advice to play exergames.

Gender-wise, a statistically significant discrepancy was observed among the respondents' experiences of exergames as female students' experiences were more than their male counterparts.

Table 4: Exergames experiences of participants

Statements	**Yes**	**No**
Did you know what exergames are, such as Xbox 360 and Nintendo Wii?	234 (62.1%)	143 (37.9%)
Did you try to play exergames?	140 (37.1%)	237 (62.9%)
Have you seen anyone playing exergames?	244 (64.7%)	133 (35.3%)
Has anyone suggested to you exergames?	134 (35.5%)	243 (64.5%)

Data presented as n (%)

Table 5: Categorization of the participants' knowledge, attitudes, and experiences

	Variable	**Knowledge**		**P-value**	**Attitude**			**P-value**	**Awareness**		**P-value**
		Good	**Poor**		**Good**	**Fair**	**Poor**		**Good**	**Poor**	
Gender	Male	105	1	0.321	42	46	18	0.910	61	45	*< 0.05
	Female	264	7		114	113	44		100	171	
Age	13	54	1	0.948	28	21	6	0.116	26	29	0.647
	14	57	1		28	21	9		23	35	
	15	66	1		32	28	7		25	42	
	16	192	5		68	89	40		87	110	

***P < 0.05 was set as statistically significant

Discussion

Several studies were conducted to investigate people's knowledge about exercise and their attitudes about physical activity, as well as their participation (KAP) in exercise in various geographical areas (14, 15). It is difficult to compare the results of this research with the previous results due to the different objectives, instruments, and techniques that were utilized. There are few studies with significant results. Earlier studies did not utilise a validated questionnaire to assess KAP among children, and most of those studies did not measure the exergames' experiences. An individual's knowledge can change related perspectives and viewpoints, adapting corresponding behaviours under the KAP model (16). Relevant health behaviour studies on smoking (17), eating habits (18), and weight control regimes (19), and the results of the current study provided additional evidence in relation to supporting the suggested model of KAP because better understanding can lead to better attitudes towards physical activity.

Previous studies reported that school-aged children and adolescents in Malaysia are engaged in low physical activity and prolonged screen time (20). Obesity is potentially associated with physical exercise and screen time activities among local children (21). Based on statistics from National Health and Morbidity Survey (NHMS) in Malaysia, childhood obesity has risen from 2011 at 6.1% to 11.9% and 14.8% in 2015 and 2019, respectively (22). Given that most of the youth population is engaged in playing video games, utilizing exergames (also known as active video games or exergames) can provide an opportunity to boost physical activity levels or exercise participation among young people and reduce childhood obesity in Malaysia. Raising awareness among the young population about the usefulness of exergames guides health practitioners to design, train, and adopt this system as part of lifestyle intervention for combatting childhood obesity. Therefore, the current study differs from the previous studies (14, 15) because it emphasizes the importance of exergames and the significance of the participants' experiences toward exergames.

The attitude of someone's intention to engage in exercise is influenced by their knowledge. Exercise participation is based on recognizing the various health advantages of exercise (23). Therefore, gaining knowledge about exercise, and how it relates to health and fitness may be the first step in establishing the groundwork for a favourable attitude toward exercise. The findings of this study demonstrated that most of the study respondents (97.9%) had adequate knowledge about exercise, while 83.6% of them portrayed a positive attitude towards exercise. This study also showed that 68.1% of them agreed that exercise provides more advantages than disadvantages, and the majority of the respondents agreed that regular exercise boosts flexibility, and muscular strength, and maintains blood pressure. In addition, approximately half of the survey respondents performed moderate-to-vigorous intensity exercise between 30 and 60 minutes daily, whereas 15.6% of them exercise daily for over 60 minutes. The World Health Organization (WHO) asserted that children and adolescents between 5 and 17 years old should perform at least 60 minutes of daily moderate-to-vigorous intensity physical exercise on average (8).

Based on previous studies, gender represented a more indicative predictor of playing video games compared to ethnicity and socioeconomic status (24) with boys who engage in computer games more frequently compared to girls (25). Although boys were also more physically active compared to girls in playing exergames (24, 26, 27), Tuomas *et al*. (28) highlighted the absence of a significant difference between women and men in the popularity of exergaming. Therefore, the results of this study emphasized the need to raise students' awareness of exergames as a contemporary means of promoting physical activity among children and adolescents.

Conclusion

High-school students in Pulau Pinang, Malaysia have shown adequate knowledge about exercise, and they have demonstrated a positive attitude towards them. Nevertheless, much effort is needed to raise the student' awareness level about the importance of exergames to ensure effective engagement in more physical activities with the use of technology for a healthier life.

Competing interests

No conflict of interests

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