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The relationship between self-reported physical activity level and physical activity self-efficacy among undergraduates in a private university

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ABSTRACT

Physical inactivity among undergraduates has become a much debate health and well-being issues. In recognizing physical activity self-efficacy (PASE) as a crucial influencing factor for physical activity (PA) behaviour, this study explores the relationship between PASE and physical activity level (PAL) among undergraduates. Overall, 317 undergraduates (mean Age = 20.82+1.86 years) completed PASE Scale, and Physical Activity Index which measured PAL. PASE scores ranged from 8 to 40, with a mean of 23.98 (±6.22), indicating low to average levels SE. In terms of PAL, 57.4% of the participants only achieved fair to need improvement levels indicating insufficient physical activity. PAL was lowly correlated with PASE (0.333, p=0.01). Research findings stress that self-efficacy as an essential variable to enhance PA and overall well-being among undergraduates. Enhancing self-efficacy could be used as a strategy to improve PAL as well as promoting undergraduates' healthy lifestyle and well-being.

1. INTRODUCTION

Globally, insufficient physical activity (IPA) remains a major public health concern. Approximately 81% of adolescents do not meet the recommendation of at least 60 minutes of moderate-to-vigorous physical activity (MVPA) per day (Guthold et al., 2020), while approximately 43% of adults worldwide are overweight, reflecting the broader consequences associated with inactive lifestyles (Phelps et al., 2024). IPA is also estimated to contribute to 3.2 million deaths annually and is recognized as an important risk

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factor for global mortality (Zayed & Elshaer, 2022). In response to this growing concern, the World Health Assembly endorsed the Global Action Plan on Physical Activity (GAPPA) 2018–2030, which established a global target of reducing physical inactivity by 15% by 2030 (Bull et al., 2020). These global trends highlight the urgent need for effective strategies to promote regular physical activity across the lifespan, particularly among young people.

Insufficient PA has also been a global health concern among university students. The shift from high school to university influences the students' work environment, leisure time, and home environment, potentially decreasing their PA. Consequently, most university students engage more in sedentary activities like studying, and attending lecturers than PA (Edelmann et al., 2022). Numerous factors influence university students' participation in physical activity, including sedentary behaviour, academic and life pressures, lack of time, insufficient social support, and limited exercise experience (Bertrand et al., 2021; Welford et al., 2023), limited access to sports facilities, and lack of motivation (Wang et al., 2022), as well as prioritizing their studies over physical activity due to intense psychological, and employment pressures (Belle et al., 2022).

Research in Malaysia by Wee et al. (2023) revealed that physical activity level (PAL) of undergraduates to be in the fair and average level (66.8%) with only 20% achieved good and excellent level, while 13% needs improvement. In another study, Wee et al. (2022) examined PAL of undergraduates and reported that almost 50% of them was in the fair and average levels with 15.4% in the need improvement level. Earlier report by Wee et al. (2012) revealed that 56% of undergraduates in a private university, Kuala Lumpur was in the fair and average levels while 22.3% was in the need improvement level. On the contrary, Azmi et al. (2021) reported that undergraduates had high PAL (45%) and 15% of undergraduates had low PAL. However, contrasting findings demonstrate that PAL may differ substantially according to the university population, measurement approach, and undergraduates, Sutan et al. (2022) found that 82.2% of undergraduates met the study's threshold for overall physical activity (≥600 MET-min/week), with leisure activity being the most prevalent domain. Male undergraduates were also more likely to report overall and leisure physical activity.

Self-efficacy plays a prominent role in individuals' physical activity participation. Bandura et al. (1999) recognized self-efficacy as an essential component that relate to an individual's willingness to participate in PA. Individuals with high self-efficacy are more likely to perceive PA as a challenge that can be managed and overcome (Luszczynska & Schwarzer, 2015). Self-efficacy especially mastery experience where individuals assess their own abilities and performance through their own experiences, and the experience could significantly influence their sense of self-efficacy (Myyry et al., 2022). Numerous studies have reported notable relationship between PASE and the students' PA behaviour (Sheikh, 2021, 2022).

Even though the association between PASE and PA beliefs is widely researched, varied results of the relationship have been reported. Some researchers such as McAuley et al. (2011) reported that individuals with higher PASE are more likely to hold adaptive beliefs about exercise (manageable and rewarding daily tasks) while Loumidis and Wells (1998) revealed that individuals with low self-efficacy may develop maladaptive beliefs, (fearing negatives consequences of lack of ability to exercise effectively and achieving exercise goals). However, self-efficacy is not the only factor that influence PA participation and is itself influenced by motivation, enjoyment, mastery experience and other elements (social support,

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environmental factors, and intrinsic enjoyment). Further, type of PA such as aerobic workout, strength-building exercises, and mind-body practices (example: Tai Chi and yoga) could be the determining factor that help increase self-efficacy. Thus, the relationship between PASE and PAL is worth examining, especially when PAL is measured using physical activity index.

1.1 Theoretical framework of the study

The study is grounded primarily in Bandura's Social Cognitive Theory (SCT)(Bandura, 1986). SCT proposes that human behaviour is influenced by the reciprocal interaction of personal factors, behaviour, and environmental influences. Within this framework, self-efficacy (an individual's belief in their capability to successfully perform a particular behaviour) is a central determinant of behavioural engagement.

Applied to physical activity, undergraduates who have stronger beliefs in their ability to overcome barriers, maintain exercise routines, and participate in physical activity are expected to demonstrate higher levels of physical activity. Therefore, Physical Activity Self-Efficacy (PASE) serves as the principal psychological construct, while self-reported Physical Activity Level (PAL) represents the behavioural outcome.

The theoretical relationship can therefore be expressed as:

Physical Activity Self-Efficacy → Self-Reported Physical Activity Level

2. METHODS

2.1 Participants

The participants of this study consisted of 317 private university undergraduates from a private university in Kota Damansara, Selangor, Malaysia. Majority of the participants were female (60.6%). The participants were distributed almost equally within the three age groups (18-19, 20-21, and 22 and above years old) with most participants from the age group of 20-21 years old (37.2%) (mean age = 20.82+1.86 **years).**

2.2 Instrumentation

Physical activity level (PAL)

PAL was measured using a three items scale developed by Griffin (2006). Total PAL score was determined based on three dimensions of exercise: intensity, duration, and frequency. Each dimension was assessed using a five-point Likert scale, with scores ranging from 1 (lowest) to 5 (highest). Exercise intensity was rated as very heavy (5), heavy (4), moderate (3), light (2), and minimal (1). Exercise duration was categorized as 35 minutes or more (5), 25–34 minutes (4), 15–24 minutes (3), 5–14 minutes (2), and less than 5 minutes (1). Exercise frequency was assessed as daily (5), 3–6 times per week (4), 1–2 times per week (3), 1–3 times per month (2), and less than once per month (1).

The PAL score was calculated by multiplying the scores for exercise intensity, duration, and frequency, resulting in a possible score ranging from 1 to 125 points. Higher scores indicated a higher level of physical activity. In addition, the resulting PAL scores were categorized into five levels of physical activity: Excellent, Good, Average, Fair, and Needs Improvement.

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Physical Activity Self-Efficacy (PASE) Scale

PASE was examined through a scale with eight items which measure the confidence of one's ability to be physically active. Based on the work of an earlier 17-item measure developed by Saunders et al. (1997), Motl et al. (2000) subsequently refined PASE through confirmatory factor analysis into an eight-item, unidimensional measure of physical activity self-efficacy. The validity of the scale was also reported and confirmed by Chung and Leung (2019). PASE was considered a reliable scale based on Motl et al. (2000) ($\alpha = 0.78$), Chung and Leung (2019) (composite reliability = 0.91), and the pilot study ($\alpha = 0.815$; composite reliability = 0.826). Each item was assessed using a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree).

2.3 Procedure

Approval to conduct the research was obtained from the University Ethics Committee (SEGiEC/StR/FOELPM/189/2023-2024) prior to data collection. The questionnaires were distributed on campus through the class representatives of each participating class, who assisted in recruiting potential participants. Participants were invited to complete the questionnaire, which consisted of three sections: Section A, covering demographic information; Section B, assessing physical activity level using the Physical Activity Index (PAI); and Section C, measuring physical activity self-efficacy using the Physical Activity Self-Efficacy Scale (PASE).

2.4 Data collection and analysis

Upon agreeing to participate in the study, participants were required to complete the informed consent form. They were provided with an explanation of the study's purpose, objectives, and expected outcomes, as well as information regarding the voluntary nature of their participation. Participants were informed that they had the right to withdraw from the study at any time without providing a reason and without fear of any negative consequences or repercussions. They were also assured that all information and data collected would be treated confidentially and used solely for research purposes. Participants were encouraged to contact the researcher if they required further information or clarification regarding the study before, during, or after their participation.

Data analysis included descriptive and inferential statistics. Descriptive statistics comprised of frequency, and percentages and were used to communicate the details on gender, age, PAI category, and PASE. Inferential statistics were determined using Chi-square analysis.

The Physical Activity Index (PAI) score was calculated by multiplying the scores for exercise intensity, duration, and frequency. Based on the total PAI score, physical activity level (PAL) was classified into five categories: Excellent (PAI score $\geq$ 100), Good (60–99), Average (40–59), Fair (20–39), and Needs Improvement (PAI score $<$ 20).

For the physical self-efficacy (PASE) scale, the 8-item scale uses a 5-point Likert response format, with responses ranging from 1 (not at all confident) to 5 (extremely confident). The total score can therefore range from 8 to 40, with higher scores indicating greater physical activity self-efficacy.

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3. RESULT AND DISCUSSION

3.1 Descriptive statistics of physical activity level, and physical self-efficacy

Based on the 317 data, descriptive statistics for total physical activity level (PAL) and total PASE scores were tabulated in Table 1. PAL scores ranged from 1.00 to 125.00, with a mean of 37.96 (SD = 26.56). The PASE scores ranged from 8.00 to 40.00 with a mean of 23.98 (SD=6.17).

Relationship between PAL and PASE was determined using Chi-square analysis and Cramer's V correlation. Cramer's V (Rea & Parker, 2014) was used as an alternative to phi in tables bigger than 2 × 2 tabulation. For Cramer's V, a value of 0.00-0.10 is considered negligible relationship, 0.10-0.20 is weak, 0.20-0.40 is moderate, 0.40-0.60 is relatively strong, 0.60-0.80 is strong, and 0.80-1.00 is very strong (Rea & Parker, 2014).

Table 1. Descriptive statistics of physical activity level, and physical self-efficacy (N=317)

Variable	Mean	SD	Median	Minimum	Maximum
Total PAL	37.96	26.56	32.00	1.00	125.00
Total PASE	23.98	6.17	24.00	8.00	40.00

The mean and median scores revealed that for PAL, the data distribution was positively skewed with most participants had low physical activity. As for PASE, the data was normally distributed with low and high PASE equally distributed. Additionally, 68% of the PASE participants had their self-efficacy scores ranged from 17.81 to 30.15.

3.2 Physical activity of the participants

Table 2 presents the participants' involvement in various types of physical activities. Approximately 66% of the participants reported engaging in exercise activities, making this the most common form of physical activity, followed by individual sports (34%) and team sports (18%). Smaller proportions of participants reported participating in outdoor leisure activities (15%) and outdoor challenge activities (11%).

Table 2. Physical activity of the participants

Type of physical activity	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Exercise Activities (Example: Aerobic, Jogging)	209	65.9	108	34.1
Individual sport (Example: Badminton, Tennis)	107	33.8	210	66.2
Team sport (Example: Football, Volleyball)	58	18.3	259	81.7
Outdoor Leisure (Example: Kayaking, fishing)	46	14.5	271	85.5
Outdoor Challenge (Example: Hunting, Trekking)	34	10.7	283	89.3

Results in Table 3 indicate that nearly 48% of participants had low PASE scores, while 40% recorded high scores. In terms of gender distribution, females made up 68% of the low PASE group and 53% of the high

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PASE group. For age, participants aged 20–21 years represented the largest proportion in both categories, accounting for 36.8% of the low PASE group and 39.8% of the high PASE group. Examination of the PAI categories shows that 67.1% of participants with low PASE scores fell within the "needs improvement" and "fair" categories, compared with 43% of those with high PASE scores. Notably, 16% of participants in the "good" and "excellent" PAI categories had low PASE scores, whereas 37.5% had high PASE scores.

Table 3. Physical Activity Self-efficacy level according to gender, age, and PAI category

Characteristics		PASE Level Frequency			Total (%)
		Low PASE <24	Neutral 24	High PASE >24	
Gender					
Male		48	17	60	125 (39.4)
Female		104	20	68	192 (60.6)
	Total	152	37	128	317 (100.0)
Age					
18 – 19 years		47	15	34	96 (30.3)
20 – 21 years		56	11	51	118 (37.2)
22 years & above		49	11	43	103 (32.5)
	Total	152	37	128	317 (100.0)
PAI Category					
<20 needs improvements		53	10	30	93 (29.3)
20-39 fair		49	15	25	89 (28.1)
40-59 average		26	6	25	57 (18.0)
60-99 good		21	5	34	60 (18.9)
100 or more excellent		3	1	14	18 (5.7)
	Total	152	37	128	317(100.0)

3.3 Relationship between PAL and PASE

The relationship between PAL and PASE was determined by using chi-square test. The chi-square (χ^2) test revealed a significant relationship between PAL and PASE ($\chi^2 = 26.88$, $df = 8$, $N = 317$, $p < .001$). A follow up Monte Carlo estimation revealed Fisher-Freeman-Halton Exact Test value of 25.719 (p= <.001), and Cramer's V value of 0.206 demonstrated a moderate relationship (Rea & Parker, 2014) between PAL and PASE.

When contingency crosstabulation table was examined, for need improvement (<20 score) category, almost 35% of the low PASE (<24) participants contributed to this category. Similarly, 32% low PASE (<24) participants contributed to the fair category (20-39). Where else almost 27% and 11% of the high PASE participants contributed to good category and excellent categories respectively. Percentage of low PASE participants decreased from 34.9% (need improvement category) to 2% (excellent category). On the contrary, 23.4% of the high PASE participants had need improvement PAL.

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3.2 Discussion

Physical activity involvement of the participants

The findings of this study revealed that exercise activities were the most common form of physical activity involvement among undergraduates, with 66% of participants reporting participation, followed by individual sports (34%). This pattern suggests that exercise-based activities may be a preferred form of physical activity among undergraduates, potentially because they offer greater flexibility in terms of scheduling, intensity, and mode of participation. The present findings are consistent with Wee et al. (2022), who reported that 70.3% of undergraduates participated in exercise activities. Similarly, Wee et al. (2023) found that 74% of participants engaged in exercise activities, followed by individual sports (37.4%). The consistency across these studies indicates that exercise activities constitute an important and commonly preferred form of physical activity among undergraduates.

The high participation in exercise activities may reflect their flexibility and accessibility, particularly for undergraduates managing academic demands and limited time. Brown et al. (2024) identified environmental resources, social influences, goals, and time constraints as key factors influencing students' physical activity. Thus, flexible and independently performed exercise activities may be more feasible than structured or competitive sports.

The 34% participation in individual sports may reflect students' preference for autonomy and activities suited to their interests and abilities. However, participation may be influenced by access to facilities, equipment, and opportunities to develop relevant skills. Glasgow et al. (2023) highlighted that psychological and environmental factors can affect the use of university fitness facilities, emphasising the need for accessible and supportive physical activity environments.

The findings are consistent with the Malaysian context, where Othman et al. (2022) identified health benefits, enjoyment, social interaction, and stress reduction as key exercise motivators, while lack of motivation, time constraints, and inadequate facilities were major barriers. Flexible, convenient, and enjoyable exercise programmes may therefore encourage greater participation among university students.

Furthermore, the predominance of exercise activities in the present study suggests that universities should not rely exclusively on competitive or organised sports when promoting physical activity. Instead, institutions could provide a diverse range of exercise and recreational opportunities, including fitness programmes, walking and jogging activities, group exercise, recreational individual sports, and flexible self-directed exercise. Such programmes could accommodate students with different interests, physical abilities, confidence levels, and academic schedules. Brown et al. (2024) emphasised that interventions addressing environmental resources, social support, and students' ability to prioritise physical activity may be particularly important for improving university students' participation.

Overall, the findings demonstrate that exercise activities constitute the predominant form of physical activity involvement among the participants, while individual sports also represent a substantial proportion of participation. The similarity between the present findings and those reported by Wee et al. (2022), and Wee et al. (2023) strengthens the evidence that exercise-based activities are commonly preferred by undergraduates. Universities should therefore build upon students' existing preferences by providing accessible facilities, flexible programmes, and varied physical activity opportunities. Creating an

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environment that addresses barriers related to time, accessibility, motivation, and social support may encourage more consistent participation and contribute to the development of physically active lifestyles among undergraduates.

Physical activity level of the participants

This research revealed that participants generally had low physical activity levels (PAL), with only about one quarter achieving good or excellent PAL. Additionally, roughly one third of the participants fell into the 'needs improvement' category. These findings are supported by Chen (2025), who examined 370 Chinese undergraduates and reported that only 9.1% achieved the good or excellent category, while 36.5% fell into the 'needs improvement' category. In contrast, participants in the present study appeared to have a higher level of physical activity than those reported by Wee et al. (2025). In their study, 55% of participants were classified as having a physical activity level in the "Needs Improvement" category, while only 8% achieved the "Good" or "Excellent" categories. This comparison suggests that the participants in the present study demonstrated a relatively more favourable physical activity profile.

The finding is consistent with broader evidence showing that insufficient physical activity remains a significant concern among undergraduates. Brown et al. (2024), in a systematic review of undergraduates, reported that most undergraduates did not engage in sufficient physical activity to obtain its health benefits and identified environmental resources, social influences, and competing priorities as important determinants of participation.

The findings are consistent with the Chinese higher education context, where academic pressure, limited time, inadequate facilities, and insufficient professional guidance may constrain students' physical activity (Pan et al., 2022). Zhang et al. (2023) similarly reported that Chinese undergraduates prioritised academic activities over physical activity. These factors may partly explain the relatively low PAL observed in the present study.

Despite some participants achieving favourable PAL, approximately three-quarters did not reach the good or excellent categories, highlighting the need for stronger physical activity promotion. Yuan et al. (2024) found that university-based interventions can improve students' physical activity, while Johannes et al. (2024) emphasised the importance of addressing environmental and behavioural barriers through strategic interventions.

Overall, although participants demonstrated better PAL than those reported by Chen (2025), and Wee et al. (2025), the low proportion achieving good or excellent PAL remains a concern. Universities should therefore provide accessible, flexible, and student-centred programmes addressing academic demands, time constraints, motivation, social support, and physical activity confidence to encourage regular participation.

Physical activity self-efficacy of the participants

Physical self-efficacy of the participants in this study was normally distributed with 40% high PASE and 48% low PASE. PASE level is important as most participants in this research had low physical activity; 67% of the low PASE participants was categorized as fair and need improvement. Previous research has shown that individuals with higher self-efficacy are more likely to show positive intentions to be physically active; individuals who believe in their ability to overcome barriers to participate in physical activity are more willing to actively engage in exercise activities, and the confidence motivate individuals to take

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appropriate positive action (Brouwer, 2020). According to Streetman et al. (2023), the higher the self-efficacy, the stronger the intention to exercise and vice versa. Yapar et al. (2025) concur that undergraduates with high level of PA demonstrates increased self-confidence, self-efficacy, and psychological resilience. Similarly, Quaye et al. (2024) reported that physical activity self-efficacy (PASE) and attitudes are important factors influencing individuals' exercise behaviour and intention to engage in exercise. Individuals with higher self-efficacy, who possess greater confidence in their ability to perform physical activities, are more likely to initiate and maintain regular exercise routines, thereby demonstrating a greater commitment to an active lifestyle (Di Maio et al., 2021). Higher levels of self-efficacy have also been associated with greater motivation and confidence in overcoming barriers to physical activity, which may contribute to stronger exercise adherence (Kekalainen et al., 2024; Schunk & DiBenedetto, 2021). However, possessing moderate or even relatively high levels of physical self-efficacy does not necessarily translate into sustained physical activity behaviour. Lin et al. (2022) noted that undergraduates may demonstrate moderate physical self-efficacy while still experiencing difficulties in consistently converting their confidence into regular exercise participation. Similarly, Han et al. (2022) found only a weak association between self-efficacy and exercise behaviour, suggesting that self-efficacy alone may be insufficient to sustain regular physical activity and that other motivational, behavioural, and contextual factors may also play important roles.

PASE may influence participation in exercise activities, individual sports, team sports, outdoor leisure, and outdoor challenges, although the relationship may vary according to the demands and social context of each activity. Recent evidence indicates that higher exercise self-efficacy is associated with greater physical activity engagement and intentions, with peer relationships and social support further strengthening this relationship (Zhou et al., 2025).

Exercise activities such as fitness training, aerobic exercise, walking, jogging, and gym-based exercise can be adapted to individual abilities, allowing undergraduates to gradually build confidence through successful experiences. Bao (2025) found a strong positive relationship between exercise self-efficacy and physical activity commitment ($r = .758$). Therefore, progressive and adaptable exercise programmes may be particularly beneficial for undergraduates with low PASE.

Individual sports such as badminton, swimming, cycling, and jogging may be closely associated with PASE because they require personal confidence, self-regulation, and perceived physical competence. Students with higher PASE may be more likely to initiate and sustain participation, whereas those with lower PASE may avoid physically demanding or skill-based activities. This is consistent with Bao (2025), who reported a strong positive association between exercise self-efficacy and physical activity engagement among undergraduates.

Team sports such as football, basketball, volleyball, and hockey may strengthen PASE through peer interaction, encouragement, feedback, and social support. Zhou et al. (2025) found that peer relationships influenced physical activity intentions through social support and exercise self-efficacy, while Huang et al. (2025) reported that social support contributed significantly to university students' exercise behaviour. Thus, supportive team environments may enhance confidence and encourage sustained participation.

Outdoor leisure activities, including walking, cycling, and hiking, may offer accessible options for undergraduates with lower PASE because they involve less competitive pressure. However, participation may depend on environmental accessibility, time, companionship, and safety (Brown et al., 2024). Outdoor

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challenge activities, such as trekking, climbing, and adventure hiking, may require greater confidence because they involve physical exertion and unfamiliar environments. Importantly, successful participation may subsequently strengthen self-efficacy through mastery experiences. Tyne et al. (2024), and Obray et al. (2024) found that outdoor challenge and rock-climbing programmes could improve self-efficacy.

Overall, the five activity types provide different pathways for developing PASE. Universities should therefore offer diverse and progressive programmes, enabling undergraduates with lower PASE to begin with accessible activities and gradually progress to more demanding individual, team, or outdoor activities. Such opportunities for mastery, social support, and positive experiences may strengthen self-efficacy and encourage sustained physical activity participation.

4. CONCLUSION

In conclusion, this study highlights the importance of PASE in understanding undergraduates' self-reported PAL. The findings suggest that undergraduates with greater confidence in their ability to engage in physical activity are more likely to report higher levels of physical activity. Strengthening PASE through supportive university environments, appropriate physical activity programmes, and opportunities for successful participation may contribute to promoting more active lifestyles among undergraduates.

Practical Implications

The findings have several practical implications for private universities. First, university administrators and student affairs departments should develop programmes that could strengthen undergraduates' PASE by providing achievable activities, progressive challenges, positive feedback, and opportunities for successful participation. Second, physical activity programmes should consider undergraduates' different levels of ability, interests, and confidence to encourage sustained participation. Third, universities could provide accessible facilities, organised recreational activities, and peer-support initiatives to create an environment that facilitates regular physical activity. Finally, periodic assessment of undergraduates' PAL and PASE may help universities identify undergraduates who require additional support and evaluate the effectiveness of physical activity promotion programmes. Collectively, these strategies can foster a supportive university environment and encourage undergraduates to initiate and maintain physically active lifestyles.

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6. CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

7. AUTHORS' CONTRIBUTION

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Eng Hoe Wee: Conceptualization, methodology, data analysis, data curation, original draft preparation, review & editing and funding acquisition; **Tarsame Singh Masa Singh:** Original draft preparation, review & editing; **Juan Juan Qin:** Data collection, and data analysis; **Hancheng Chen:** Data collection, and data analysis; **Zheng Chen:** Data collection, and data analysis

All authors reviewed and approved the final version of the manuscript.

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