FROM CAMPUS LIFE TO GLOBAL HEALTH: UNDERSTANDING NON-COMMUNICABLE DISEASES AND PHYSICAL INACTIVITY AMONG GHANAIAN UNIVERSITY STUDENTS

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ABSTRACT

Non-communicable diseases (NCDs) have become a significant global health concern, with the majority of mortalities occurring in low and middle-income countries. This study focused on the rising prevalence of physical inactivity among regular university students and aimed at contributing to the limited literature on barriers to physical activity (PA) in this demographic. While the impact of NCDs extends beyond physical health, causing societal and economic repercussions, there is insufficient attention on physical inactivity among regular university students in Africa. The study utilised a cross-sectional research design with primary quantitative data collected through Google Forms. The results were analysed using a 2x3 factorial Analysis of Variance (ANOVA). Interaction between gender and age was also significant, F (1, 667) =13.593, p<0.000, partial n2=.020). Results also indicated a significant decline in PA levels as regular university students progress from adolescence to early adulthood. Health reasons

predominantly motivate PA, while barriers include lack of time and access to sports environments. The findings underscore the importance of targeted health promotion initiatives within universities, considering the influential role of health and wellness factors. Additionally, the study highlights the need for gender-specific strategies and ongoing monitoring of PA levels to inform interventions and contribute to global efforts in achieving Sustainable Development Goal 3 Target 4 by 2030.[1]

KEYWORDS: Physical Activity, Inhibitors, Enablers, Participation, Barriers

INTRODUCTION

Non-communicable diseases (NCDs) are no longer confined to the developed world; approximately 85% of global NCD mortalities now occur in low and middle-income countries, particularly those grappling with a dual burden of malnutrition, especially in urban areas (Gakidou *et al.,* 2017; Haddad *et al.,* 2016). The impact of NCDs extends beyond physical health, causing lost working days, decreased productivity among adults, and a decline in the quality of life for children and adolescents (Malta *et al.,* 2020). As of 2030, NCDs are anticipated to surpass infectious diseases in Sub-Saharan Africa, necessitating urgent policy interventions (WHO, 2022; Gakidou *et al.,* 2017; Haddad *et al.,* 2016; Yach *et al.,* 2004).

Youth in this paper has been operationalized as university undergraduate students between the ages of 18 to 40 years. While global attention recognizes physical inactivity as a pervasive issue (Kohl *et al.,* 2012), the majority of evidence is derived from studies on adults, whose inactive lifestyles' effects on NCDs become

apparent (Lee *et al.,* 2012; Gore *et al.,* 201). Physical Activity Guidelines Advisory Committee, 2018). Notably, studies on physical activity barriers among youth in sub-Saharan Africa are scant, with existing research predominantly conducted in the Western world (Sluijs *et al.,* 2021; Chaput, *et al.,* 2020; Tremblay *et al.,* 2011), posing challenges in generalising findings to diverse cultural contexts.

In Ghana, various studies have explored factors influencing physical activity among different populations. However, the majority of these studies were conducted among the general population, with limited investigation into the exercise and physical activity habits among youth. Given that the transition from school to adulthood is a critical period involving significant physical and mental transformations, understanding the barriers faced by youth in implementing physical activity programs is crucial for health promotion (Memon *et al.,* 2021; Vadeboncoeur *et al.,* 2015; Fedewa *et al.,* 2014).

The World Health Organization (WHO) has provided updated global guidelines on the frequency, intensity, and duration of physical activity for various age groups, emphasizing its importance for health benefits. Despite these guidelines, a significant proportion of young people, particularly youth, fail to meet recommended physical activity levels globally, with more than 81% of youth considered physically inactive (Sluijs *et al.,* 2021; Guthold, 2019).

In Ghana, the 2018 Report Card on Physical Activity for Children and Youth highlighted suboptimal ratings, emphasizing increased attention to youth physical activity levels and related concerns. For instance, results from Ghana's 2018 Report Card on PA for children and youth revealed that on physical activity level, youth scored a

grade of C, grade D on school, grade D on family and peers, grade C+ on active transportation, and grade D+ on community and government involvement (Nyawornota *et al.,* 2018). While the prevalence of physical inactivity among youth in Ghana is rising, it is not fully recognized as a public health concern, partly due to insufficient data tracking of physical activity levels in Africa. This oversight contradicts the achievement of Sustainable Development Goal 3 Target 4 (Sluijs *et al.,* 2021), aiming to reduce premature mortality from NCDs through prevention and treatment and to promote mental health, well-being, and quality education by 2030 (WHO, 2022).

Scientific evidence underscores the serious threat that physical inactivity poses to health and well-being, particularly in low- and middle-income countries (Ekelund *et al.,* 2019; WHO, 2013). Physical inactivity increases the risk of numerous NCDs and shortens life expectancy (Lee *et al.,* 2012). Consequently, educational policies globally emphasize the practical teaching of physical education, particularly in basic schools, to promote lifelong physical activity participation among adolescents and young adults (WHO, 2017; Patton *et al.,* 2016; Erskine *et al.,* 2015).

Theoretical Framework

One model that explains barriers and enablers to PA participation among populations is the Socio-ecological model (SEM) of health behaviour (Vygotsky, 1987). According to the socio-ecological model, individual (demographic variables, health status), interpersonal (living with a spouse, social support), health behavioural (Leisure Time PA, participation in a health behaviour change programme, smoking status) and environmental (size of and satisfaction with the living area) factors were included in the analysis.

According to the SEM, individual knowledge and attitudes have less of an impact on health behaviour than the surroundings in which community inhabitants live, play, work, and study. Individual-level interventions (for example, providing individuals with knowledge on the health advantages of exercise) have not proven adequate to improve PA levels, as expected. In terms of PA, strong scientific evidence suggests that the existence of physical and social surroundings that support exercise appears to considerably enhance individuals' PA levels (Sallis, *et al.*, 2012; Vernez *et al.*, 2007). As a result, organizations such as WHO, have placed a greater emphasis on the significance of adopting policies and practices that promote built and social environments for PA (Bornstein, & Davis, 2014).

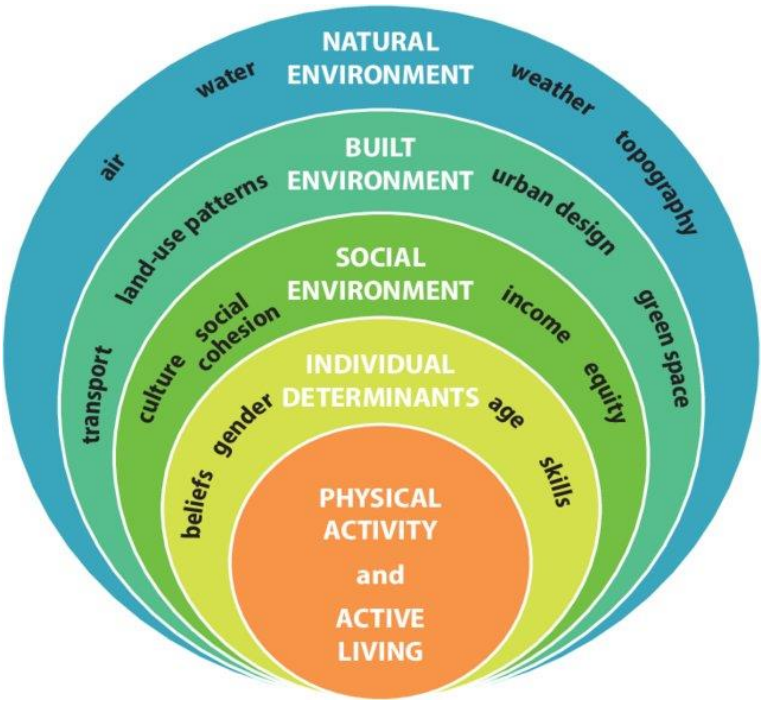


Fig 1: The Social-Ecological Model Adapted for PA (Adapted from Aydın, 2013).

The SEM recognizes the role of psychosocial elements in behaviour change, as well as the necessity of dynamic person-environment relationships in explaining the complexity of human existence (McLaren & Hawe, 2005). McLeroy *et al.,* (1988) used the SEM, which was initially described by Bronfenbrenner (1977), in public health and health promotion. According to McLeroy *et al.,* (1988), health behaviour is influenced at five levels: individual (knowledge, attitudes, beliefs, self-efficacy, and behaviour), interpersonal (families, friends, and social networks), institutional (services, formal and informal rules), community (local and state laws and policies), and public policy (local and state laws and policies). While McLeroy *et al.,* (1988) did not identify environmental components in their model, environmental aspects have been an integral part of ecological models in health promotion in subsequent approaches and show people's connection with their physical and social surroundings (Sallis *et al.,* 2006).

Empirical Evidence

Barriers to practising physical activity, as highlighted by Freene *et al.,* (2014) and Seabra *et al.,* (2008), encompass individual, behavioural, and environmental factors. Notably, factors such as lack of time, motivation, skills, social support, and university-related lifestyle changes pose significant challenges to students' physical activity Understanding and addressing these barriers are crucial for the development of effective health promotion initiatives aimed at fostering a physically active lifestyle.

Participation in physical activity (PA) has been observed to diminish with age, commencing in early adolescence (Corder *et al.,* 2019), and experiencing a more notable decline during late adolescence and early adulthood (Lu *et al.,* 2017; Morseth *et al.,* 2011). The downward trend in PA persists with age, with the most

significant drop occurring between adolescence and early adulthood (Molanorouzi *et al.,* 2015; Gavin, *et al.,* 2014).

During the final two months of high school and the initial two months of university education among youth, there is a substantial decrease in both the frequency and duration of robust PA engagement (Bray & Born, 2004). Despite the awareness of the benefits associated with PA, students persist in engaging in physical inactivity (Calestine, *et al.,* 2017). Utilizing 2008 Demographic and Health Survey data, Doegah and Amoateng (2019) found that Ghanaian youths tended to physical inactivity, with identified barriers including maintaining chastity, safety concerns, ill health, upbringing, and laziness.

Donkor and Seibu (2019) investigated factors influencing exercise and PA habits among undergraduate sandwich students at the University of Education, Winneba. Their findings revealed that health and wellness factors predominantly influenced (M=3.60, SD=0.75) sandwich students' exercise habits, followed by psycho-social factors (M=3.31, SD=0.65), and other factors (M=3.13, SD=0.86). A systematic review by Ferreira *et al.,* (2022) highlighted the main barriers to PA among high school and university students as a lack of time, motivation, and accessible locations.

Despite existing guidelines aimed at improving PA levels, anecdotal evidence suggests that only a minority of regular university students engage in meaningful PA. Many resort to motorized transportation for even short distances, contributing to declining PA indices, possibly linked to risk factors such as physical inactivity and a sedentary lifestyle (Ghana Ministry of Health, 2014).

Higher levels of physical inactivity are associated with non-communicable diseases (NCDs) and premature death (Martinez *et al.,* 2020). Prolonged periods of physical inactivity in adolescents may contribute to issues such as overweight and obesity (Aryee *et al.,* 2013). Conversely, regular PA plays a crucial role in reducing the risk of health problems, including obesity, heart disease, and diabetes, while enhancing mental health and overall quality of life (van Sluijs *et al.,* 2021; WHO, 2020; Tremblay *et al.,* 2011).

Public health interventions emphasize lifestyle changes, promoting increased PA and reduced sedentary living (Soleymani, *et al.,* 2016). Given that youth aged 10 to 24 constitute a substantial portion of the global population, investing in their health is deemed essential for current and future generations (van Sluijs *et al.,* 2021). Despite this, the literature on PA research in this age group is limited, with a predominant focus on younger adolescents in school settings within high-income countries (van Sluijs *et al.,* 2021).

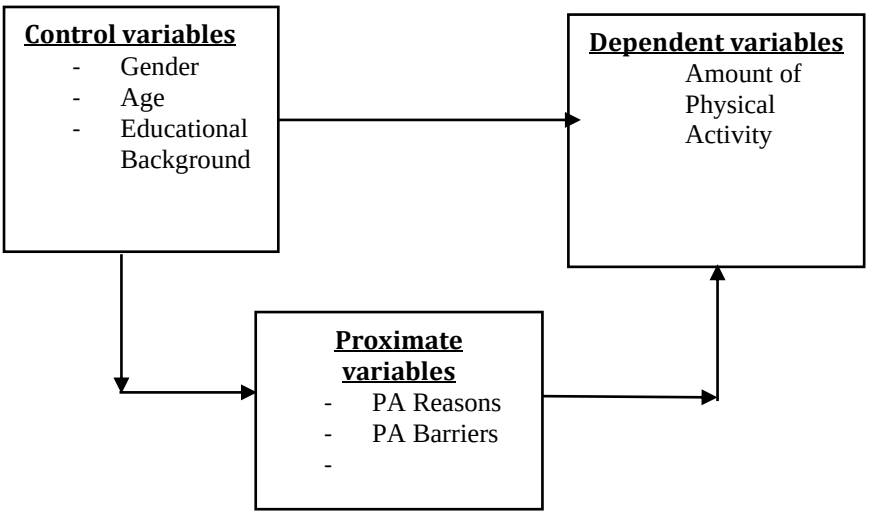
The specific barriers to PA faced by regular university students, primarily adolescents, remain unknown. Given the multitude of factors influencing PA behaviour, exploring these aspects, particularly among individuals during late adolescence and early adulthood, is crucial. There is a timely need to redirect global action plans on physical inactivity towards the youth, specifically addressing PA. The objective of this study was to contribute to the sparse literature on reasons and barriers to PA participation among regular university students.

Research Questions

1. What are the reasons for engaging in PA among regular university students?
2. What factors impede regular university students from engaging in daily PA?

3. Are there any significant mean differences in the amount of PA between male and female undergraduate university students?
4. Are there any significant mean differences in the level of PA for age category among undergraduate university students?
5. Is there any significant interaction between gender and age on the level of PA category attained by regular undergraduate university students?

Variable Definitions and Measurements



Source: Author's Construct

Outcome variable

The analysis examined one dependent variable; the amount of PA. The amount of PA in adolescents refers to the PA level of respondents. This was measured by asking a single question "Do you do the recommended minimum 150 to 300 minutes moderate to vigorous intensity PA throughout the week?" and was

categorized as (1=Yes, 2= Less than a minimum, 3=sometimes, 4=Rarely, 5=Never).

Proximate variables

The proximate (intermediate) factors considered in this study; comprised reasons for being physically active and PA barriers. Respondents were asked about reasons for engaging in PA. This was measured by asking a single question "Why are you physically active?" (1= Health reasons, 2= Makes you feel good, 3= Social Reasons, 4= Good for the environment, 5= I am not physically active).

A single question was used to assess the barriers to PA participation among university students. "If you are unable to be physically active in your daily lives, is that because you…" (1= have no time, 2= are too busy, 3= have little or no access to sports environments, 4= don't enjoy it, 5= are not bothered and don't think about being physically active in your everyday lives).

Control variables

Gender was measured and was categorized as (1=Male, 2= Female). Age was measured on a single question that asked "How old are you?" and was categorized as (1= Below 20 years, 2=21-30 years,3= 31- 40 years;4= above 41 years). Marital Status was measured by asking respondents to state their marital status and was categorized as (1=Single, 2= Married, 3=Divorced, 4= Separated). Level refers to the year the student has spent in the university and was categorized as (1=Level 100, 2=level 200, 3=level 300, 4=level 400).

METHODS

Participants

The study adopted the cross-sectional research design. According to Barbie (2021), Cross-sectional surveys entail observations of a

sample, or cross-section, of a population or phenomenon that are made at one point in time. The study was delimited to regular university students in the Department of Basic Education, with individual university students as the unit of analysis. Convenient sampling was employed to draw samples, and the sample size was determined a priori using G-Power Software version 3.1. A minimum sample size of 93 was calculated to achieve a large effect size of 0.50 at an alpha level of 0.001, following Cohen's guidelines (1977).

Protocol

Primary quantitative data was collected using Google Forms, consisting two sections. The first section gathered demographic information from the respondents, while the second section was designed to address the research questions of the study. To ensure the validity of the test instrument, both content and construct means were assessed. Expert consultation involving three esteemed university lecturers, well-versed in the constructs being measured, was employed to evaluate the content validity of the instrument. The reliability of the instrument items was evaluated using Cronbach's alpha model, resulting in a reliability coefficient of 0.85. This coefficient signifies high reliability, as per Barbie's criteria (2021). The reliability assessment adds confidence to the consistency and dependability of the instrument in measuring the intended constructs.

Statistical Analysis

The primary data collected underwent a thorough screening process to identify and address missing cases and outliers using descriptive statistics and the Mahalanobis Distance Test respectively. This rigorous procedure was aimed at ensuring data accuracy and assessing the impact of extreme values (Tabachnick & Fidell, 2013). During the initial screening for missing cases, descriptive statistics were applied to all variables, revealing the

following identified missing cases: Age (13), Gender (4), Level of education (5), Marital status (15), Why are you physically active? (12), Do you do the recommended minimum of 150 to 300 minutes of moderate to vigorous intensity PA throughout the week? (7), If you are unable to be physically active in your daily lives, is that because you…(5), How physically active would you say you have been during last semester? (8).

In addressing the missing cases, each variable's missing data was substituted with a dummy variable. Subsequently, an independent samples t-test was conducted to examine potential differences between the original data and the imputed data. The results indicated a significant difference between the two datasets (p<0.05). Furthermore, the data underwent assessment for multivariate outliers leading to the identification and removal of twenty-eight (28) multivariate outliers resulting in a reduced sample size of 672. Primary quantitative data was analysed using 2x3 factorial Analysis of Variance (ANOVA). In addition, Cohen's *d-effect* sizes were calculated to examine the practical significance of the outcomes. Cohen (1977) described d values less than 0.2 as small, 0.5 as moderate and values greater than 0.8 as large effect sizes.

RESULTS

Table 1: Socio-Demographic Characteristics of Respondents

Item	Frequency	Percentage
Gender		
Male	462	69
Female	210	31
Total	672	100
Age		
Below 20 years	42	6
21-30 years	616	92
31and Above	14	2
Total	672	100

Level of Degree		
200	140	21
300	203	30
400	329	49
Total	672	100
Reasons for Being Physically Active		
Health reasons	553	82
Social Reasons	70	10
Good for the environment	21	3
I am not physically active	28	4
Total	672	100
Perceived Barriers		
Have No time	280	42
Too busy	228	35
Have little or no access to the sports environment	140	21
Not bothered and don't think about being physically active in your everyday lives.	14	2
Total	672	100

Source: Field Survey, 2023

Table 1 presents an overview of the sociodemographic characteristics and proximate factors of the respondents. The data indicates that 70% of the participants were males, while females constituted 30%. The majority of respondents (92%) fell within the age range of 21-30 years, among different age categories. Regarding Marital Status, all respondents (100%) were reported as single. In terms of academic levels, majority (49%) of the respondents were in level 400.

Exploring the reasons for engaging in physical activity (PA), the findings reveal that the majority eighty-two percent (82%) of respondents cited health reasons as their primary motivation,

reflecting a health-conscious approach to exercise. Social reasons accounted for 10%, while the least reported motivation was "good for the environment" at 30%.

Examining perceived barriers to engaging in PA among respondents, approximately 42% identified time as their greatest obstacle. Also, twenty-one percent (21%) mentioned having little or no access to sports environments, and a smaller percentage two percent (2%) indicated that they were not bothered and did not think about being physically active in their everyday lives.

Table 2: Tests of Between-Subjects Effects

Source	Type III Sum of Squares	*Df*	Mean Square	*F*	Sig.	Partial Eta Squared	Observed Power
Corrected Model	103.250[a]	4	25.813	17.495	.000	.095	1.000
Intercept	1204.708	1	1204.708	816.537	.000	.550	1.000
Gender	18.972	1	18.972	12.859	.000	.019	.947
Age	99.466	2	49.733	33.709	.000	.092	1.000
Gender * Age	20.055	1	20.055	13.593	.000	.020	.957
Error	984.083	667	1.475				
Total	5866.000	672					

a. R Squared = .095 (Adjusted R Squared = .090)
b. Computed using alpha = .05

Table 3: Multiple Comparisons

(I) Age	(J) Age	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Below 20 years	2021-30 years	1.4318*	.19371	.000	.9669	1.8967
	31-40 years	1.0000*	.37485	.023	.1003	1.8997
21-30 years	Below 20 years	-1.4318*	.19371	.000	-1.8967	-.9669
	31-40 years	-.4318	.32830	.567	-1.2197	.3561
31-40 years	Below 20 years	-1.0000*	.37485	.023	-1.8997	-.1003
	21-30 years	.4318	.32830	.567	-.3561	1.2197

Based on observed means.
The error term is Mean Square (Error) = 1.475.
*. The mean difference is significant at the 0.05 level.

A 2x3 factorial ANOVA was conducted to investigate the level of PA differences in gender and age categories among regular undergraduate university students. ANOVA results, presented in Table 2, showed a significant main effect for GLM corrected Model, F (4, 667) =17.495, p<0.001, partial n2=.095), showed a significant main effect for gender, F (1, 667) =12.859 p<0.001, partial n2=0.019) and age category, F (2, 667) =33.709, p<0.001, partial n2=.092). Interaction between gender and age was also significant, F (1, 667) =13.593, p<0.000, partial n2=.020).

Nevertheless, the computed effect size for each factor suggests a modest impact on the amount of physical activity (PA) explained by individual factors. To identify specific age categories that exhibited significant differences, the Bonferroni post hoc test was employed. The outcomes demonstrated a noteworthy mean difference at the 0.05 significance level for the age categories of below 20 years and 21-30 years.

DISCUSSION

Engagement in physical activity (PA) has been observed to decrease with advancing age, initiating in early adolescence (Corder *et al.,* 2019), and exhibiting a more pronounced decline during late adolescence and early adulthood (Morseth *et al.,* 2011; Lu *et al.,* 2017). This trend of declining PA persists across age brackets, with the most significant decrease noted between adolescence and early adulthood (Gavin, *et al.,* 2014; Molanorouzi *et al.,* 2015). Notably, a substantial reduction in both the frequency and duration of vigorous PA involvement occurs during the last two months of high school and the initial two months of university (Bray & Born, 2004).

Despite awareness of the benefits associated with PA, research indicates a notable decrease in physical activity participation and an increase in sedentary behaviour during the college years (Calestine, *et al.,* 2017). Analyzing the 2008 Demographic and Health Survey data, Doegah and Amoateng (2019) uncovered a tendency toward physical inactivity among Ghanaian youths. Similarly, Nyawornota *et al.,* (2018) conducted a study among Ghanaian youth, revealing suboptimal scores in PA participation within educational institutions and the broader community.

Examining the factors influencing exercise and PA habits among undergraduate sandwich students at the University of Education, Winneba, Donkor and Seibu (2019) reported that health and wellness factors exerted the greatest influence (M=3.60, SD=0.75) on the exercise habits of sandwich students. Following closely were psycho-social factors (M=3.31, SD=0.65), and other factors (M=3.13, SD=0.86).

The results of the 2x3 factorial ANOVA examining physical activity (PA) levels among regular undergraduate university students yielded several significant findings. The main effects for the GLM corrected model, gender, and age category were all statistically significant. Additionally, there was a significant interaction between gender and age. The effect sizes for each factor were determined to be small, suggesting that the amount of PA accounted for by gender and age category is relatively modest. Post hoc analysis using the Bonferroni test further elucidated the significant differences within age categories. Specifically, the mean difference in PA levels was found to be significant between individuals below 20 years old and those in the 21-30 years age range, with a significance level of 0.05.

The findings suggest a concerning trend of decreasing engagement in physical activity (PA) as individuals progress from early adolescence through late adolescence and into early adulthood. Despite a general awareness of the benefits associated with PA, there appears to be a substantial decrease in participation and a simultaneous increase in sedentary behaviour during the college years (Calestine et al., 2017).

The situation is not unique to a particular demographic, as evidenced by studies such as those by Doegah and Amoateng (2019) and Nyawornota *et al.,* (2018) among Ghanaian basic school children, revealing a propensity toward physical inactivity. Within the specific context of undergraduate sandwich students at the University of Education, Winneba, Donkor and Seibu (2019) shed light on the influential factors behind exercise habits. Health and wellness factors emerged as the primary influencers, emphasizing the importance of these considerations in shaping the exercise habits of students. Psycho-social factors and other elements also played significant roles, contributing to a nuanced understanding of the factors influencing PA among this student population.

Given the significant influence of health and wellness factors on exercise habits, universities should invest in health promotion initiatives. These initiatives could include on-campus fitness programs, mental health support, and wellness counselling to create a holistic approach to students' well-being. Secondly, individuals should implement measures to create supportive environments that encourage physical activity, both within educational institutions and the broader community. Finally, we should acknowledge the significant interaction between gender and age in influencing PA levels. Develop gender-specific strategies that consider the unique challenges and preferences of male and female students, ensuring inclusivity in promoting an

active lifestyle. Establish a system for regular monitoring and assessment of PA levels among university students. This can help identify trends, assess the effectiveness of interventions, and provide valuable data for ongoing improvement.

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