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Research Article

Physical Activity Practice Pattern among Undergraduate Students in the Faculty of Health Sciences -

Adiele Dube[1]*, Chantell Gouws[2] and Morgan P. Gundani[3]

[1]Department of Health Education, Southern Africa Nazarene University, Eswatini
[2]Department Human Movement Science, University of Zululand, South Africa
[3]Sports Science and Coaching, National University of Science and Technology, Zimbabwe

***Address for Correspondence:** Adiele Dube, Department of Health Education, Southern Africa Nazarene University, Eswatini, Tel: +268-782-93182; ORCID ID: https://orcid.org/0000-0002-4430-2401; E-mail: dubea2567@gmail.com

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ABSTRACT

Objective: The current study seeks to compare patterns of physical activity practice, benefits and perceived barriers of physical activity among first year and final year undergraduate students.

Methods: A cross-sectional study was conducted from the Southern Africa Nazarene University's Faculty of Health Sciences in Eswatini. A total of 480 students were drawn from the 4 departments; Midwifery, Medical laboratory sciences, Nursing and Pharmacy. Physical activity was measured using the International Physical Activity Questionnaire (IPAQ) and Global Physical Activity Questionnaire (GPAQ). Descriptive statistics and bivariate analysis; Pearson chi-square test, Fisher exact test were employed for data analysis using SPSS v23.0.

Results: Total physical activity on weekly basis was significant among men (p = 0.001) and for the female counterparts there was no significant difference (p = 0.014). Sedentarism were predominantly affecting females in the 4th years compared to their 1st year counterparts (p = 0.001). More than 15% of the male students from 1st and 4th years were physically inactive. Time limitation and lack of accessible and suitable sporting facilities were identified by both classes as the most barriers to physical activity (p = 0.001). 83% of the participants stated that physical activity promotes and maintains health. The results showed the correlation between physical activity and sitting time (p = 0.001).

Conclusion: Insufficient physical activity is a health problem in the Faculty of Health Sciences at SANU in Eswatini. The main risk groups for physical inactivity were female students across the undergraduate study levels. The University should prioritize to implement a positive physical activity environment; places, equipment and sport facilities should be availed within campuses, and other interventions that effectively enable the practice of physical activity by the students' population enrolled at the institution.

Keywords: Physical activity; Medical students; Sedentary behavior; Fourth industrial revolution

INTRODUCTION

Physical Activity (PA) is movement that is carried out by the skeletal muscles that requires energy expenditure, measured in kilocalories [1], hence any movement one does is physical activity. PA can be achieved through household, occupational, fitness and conditioning, sports and other activities. Exercise, however, is planned, structured, repetitive and intentional movement intended to improve or maintain physical fitness [1], a product of either health- or skill-related. Therefore, exercise is a subcategory of physical activity. It is important to understand that PA and exercise are positively correlated to physical fitness.

Physical Activity (PA)'s health benefits are well known and instituted world-wide. Literature reveals several physical and positive psychological health benefits for children [2,3], adolescents [4] and adults [5,6] including delays the onset of dementia, a lower risk of Cardiovascular Disease (CVD), Hypertension (HPT), weight management, reduces feelings of depression, diabetes mellitus, osteoporosis and breast and colon cancer [4-12]. Despite this background, physical inactivity has been progressively escalating and has developed into a serious cause of concern in the 21st century public health.

Physical Inactivity (PIA) is a result of many factors such as economic, cultural, labor, environmental, social and political. According to WHO, the decline in physical activity levels has been partly attributed to increasing sedentary behaviors due to insufficient participation in physical activity during occupational, domestic, recreational and leisure activities, along with higher use of "passive" modes of transportation such as cars, trains and buses in communities worldwide [13]. Despite that Eswatini's beautiful landscape; a traditional culture that makes it to remain largely peaceful and envied by others, increased urbanization has resulted in several environmental, social and cultural factors to change significantly promoting PIA.

With the globe's tremendous move passing the hyper connectivity-based third industrial revolution towards the 4th Industrial Revolution (4IR), with its super-intelligence, technological advances, capitalism, entrepreneurship and Artificial Intelligence (AI) and the robot system dictates numerous changes to human relations, forms of life and the societal behavior policies [14,15]. These 21st century changes in lifestyle generated by the 4IR have major influences in the PA and exercise patterns and nutrition, posing an increase in population exposure to high risk of major Non-Communicable Diseases (NCDs) as a result of a decline in industrialization where manpower was actively involved in manual work. To curb this strong relationship between PA and NCDs, WHO has identified nine global targets to improve the prevention and treatment of non-communicable diseases [12] and it's member states have embarked on 10% relative reduction in the prevalence of insufficient physical activity by 2025 [7].

In the Southern Africa, the Kingdoms of Lesotho with physical inactivity prevalence of 6·3% 4·5 – 8·6 at 95% CI) [7] and Eswatini (formerly Swaziland) with prevalence of men 72.7 (67.9, 77.6) and women 60.6 (56.7, 64.5) respectively at 95% CI [16] are not spared among the WHO member states facing physical inactivity predicament. A close monitoring of high-risk populations such as children, adolescents and university students is essential to track the effectiveness of the policy and future guide plan. Eswatini has a blue print mandating all primary schools to do Health and Physical Education (HPE) so that all children are exposed to PA and exercise; however, it is still infancy and no resources and has tailored to achieve this goal.

In recognition of the above, it is imperative to know the trends of insufficient physical activity among medical undergraduate students so as to track progress towards this global physical activity targets. Significant personality changes, sedentary habits [17], new relationships and academic stress and workloads [18,19] are consolidated to adopt sedentary behaviors during university life. Although university life is temporary and full of unhealthy habits [18], participation in PA needs consistent higher level of self-esteem, self-concept, lower levels of anxiety and stress, so that the unhealthy habits picked up during this time period will not persist in adult life.

The medical school faculty members and students are expected to practice and live a healthy lifestyle not only for their personal benefits but also to make their endorsement of an active lifestyle more

credible [20], since they have a greater knowledge about a healthy lifestyle and dietary habits when compared to other institutional members and students [20]. Since the medical students are future health professionals, they will be exceptionally positioned to convey effective guidance, messages and advice regarding to physical fitness, wellness and positive health lifestyle to the public. This will be implemented during general consultations, counseling sessions and other workshops in line with their scope of practice.

To the best of authors' knowledge, literature regarding physical activity patterns of Eswatini population and specifically the student population in higher and tertiary institutions is scant. Therefore, the main aims of the current study were to compare the pattern of physical activity practice, benefits and perceived barriers to physical activity among first year and final year undergraduate students. Also, recommendations regarding to promotion of PA during their training period as health professionals will be discussed so as to pave the way for planning for PA and health promotion programmes in the Eswatini institutions.

METHODS

Study design and sample

This cross sectional study was carried out at the Southern Africa Nazarene University's Faculty of Health Sciences, Eswatini, during the period from May 2018 to July 2019. The Faculty of Health Sciences is the oldest institution offering medical programmes in the country. Despite its birth as a university in the late 2010, it had been training medical students as a College of Nursing Sciences since 1928, housed at the Raleigh Fitkin Memorial Hospital, offering two major programmes namely General Nursing and Midwifery. Later other programmes introduced were namely, Community Nursing Assistant, Nurse Anesthetist, Laboratory Technician, Radiography and Pharmacy Dispenser courses. Currently, the Faculty offers four-year degree programmes which are; Bachelor of Nursing and Midwifery, Bachelor of Science in Medical Laboratory Sciences, Bachelor of Science in Nurse Anesthesia and Diploma in Pharmacy. A non-probability sample of convenience with total of 480 students; 160 females and 120 males were drawn from the 4 departments; Pharmacy, Medical laboratory science, Nursing science and Midwifery. All students agreed to participate in this study and their participation was voluntary and anonymous. All PA measures recorded in this study were based on participant's self report.

Inclusion criteria: A student should have been enrolled and to be attending the first two or last two semesters of undergraduate medical programme, with a minimum age of 18 years old.

Exclusion criteria: A student who was not enrolled in 1st or 4th year attending the first two or last two semesters of undergraduate medical programme was not considered in the study.

Ethical considerations: The study was approved by the SANU Research Ethics Committee 03/2018, and the Dean of the Faculty of Health Sciences. After explaining the aims of the study, informed consent was obtained from each subject before the research was conducted.

Data collection

The International Physical Activity Questionnaire (IPAQ) and Global Physical Activity Questionnaire (GPAQ), short self-administered forms [21] recommended by WHO [22] were used to assess PA. The difference between IPAQ asks about overall activity across domains and GPAQ assesses activity for each of these domains separately [18]. The questionnaires were administered during the classes to encourage participation. Individuals were classified as very active, active, irregularly active and sedentary, according to the scores found. Adults not meeting the WHO recommendations on PA for health were considered as risk groups having insufficient physical activity, that is at least 150 min of moderate-intensity, or 75 min of vigorous-intensity physical activity per week, or any equivalent combination of the two [7].

Data analysis

Data were coded and entered into SPSS version 23.0. Descriptive statistical tests and multivariate analyses (chi-square - Pearson's correlation and Fischer's exact test - hypergeometric probability) were performed using distributions of absolute (n) and relative (%) frequencies, mean and standard deviation for data interpretation. Also, association Odds Ratio (OR) and 95% confidence intervals were used. The results were statistically significant at $p < 0.05$.

RESULTS

Table 1 below shows socio-demographic data for the undergraduate students in the faculty of Health sciences.

Table 2 below's anthropometric results reveals that the mean value of the Body Mass Index (BMI) for both female and male undergraduate students was within the normal weight range of $18.5 \leq BMI \leq 24.9$

The table below (Table 3) shows prevalence of physical activity among the undergraduate students. Moderate physical activity per

Table1: Socio-demographic data for the faculty of health science undergraduate students.

Characteristics	Gender		Total
	Male (%)	Female (%)	
Age			
19-21	70(40.5)	134(60.6)	204(53.1)
22-24	90(51.2)	81(39.4)	171(45.3)
25+	5(1.6)	2(0.9)	7(1.2)
Department			
Nursing and midwifery	31(18.3)	54(30.7)	85(27.4)
Medical laboratory sciences	38(21.4)	26(19.4)	64(19.6)
Pharmacy	36(20.3)	30(19.9)	66(20.1)
Anaesthia	-	12(6.3)	12(7.2)
Marital Status			
Single	180(93.6)	214(89.7)	394(91.3)
Married	5(2.7)	24(8.2)	29(6.2)
Divorced	1(0.4)	7(2.9)	8(1.5)
Widowed	-	2(0.3)	2(0.6)
Residence			
Boarding	38(21.4)	52(30.1)	90(26.3)
Renting	92(53.5)	183(78.6)	275(68.4)
Staying with families	21(7.1)	43(22.4)	64(16.5)

Table 2: Anthropometric assessment for undergraduate students.

Variable	Males (m ± sd)	Females (m ± sd)	*p*-value
Age (years)	23 ± 2.42	22.14 ± 2.16	0.001
Weight (kg)	70.3 ± 14.26	57.45 ± 7.34	
Height (cm)	176.2 ± 8.46	166.13 ± 6.47	
BMI (kg/ m²)	22.03 ± 2.48	20.63 ± 2.01	

day between the gender groups yielded a positive and favorable significance level, $p = 0.001$.

Table 4 & 5 compares physical activity participation between males and female students in years 1 and 4 respectively. The overall prevalence of physical activity in males year 1, 18.3 (11.4 - 26.6); year 4, 16 (9.2 - 21.3) (Table 4) and females year 1, 15.4 (9.8 - 20.6); year 4, 16 (9.2 - 21.3) students who meet World Health Organisation's (WHO) recommendation level of at least 150 min. per week was 18.3% and 16.0% (Table 4) and 15.4% and 10.3% (Table 5) with significant differences between males and females in 1st and 4th years ($p < 0.05$). The highest prevalence from table 4 of physical activity among male students was reported in walking year 1, 20.8 (14.3 - 30.5); year 4, 20.6 (95% CI. 14.3 - 29.7) compared to vigorous year 1, 12.3 (4.1 - 22.6) and year 4, 11.6 (3.4 - 26.3) respectively.

Table 6 below illustrates the indicator of physical activity practice of Faculty of Health sciences; 1st and 4th year undergraduate students in accordance with the IPAQ section cutoff point.

Despite that most students stay at home or where they renting around the university in terms of the domestic physical activities, sedentary behavior was observed as 79.3%, hence presenting greater impact on 4th years compared to their year 1 counterparts. In the case transport-related physical activity domain, 61.4% undergraduates were sedentary, with 56.8% and 62.3%; 1st and 4th years respectively.

The leisure physical activity domain showed that 72.6% students were classified as sedentary, 58.2% year 1 and 49.7% year 4. In the sport and exercise: domain, 62.3% students were classified as sedentary, 57.6% year 1 and 52.0% year 4 and insufficient physical activity 23.4% presented this behavior, 20.0% and 23.2%; 1st and 4th years respectively. The sitting time showed to be the indicator with the highest percentage of sedentary people. Out of 480 students, 89.6 % presented this behavior, 67.0% and 79.0%; 1st and 4th years respectively.

The IPAQ and domains in the sample were predominantly classified as sedentary for the student level groups recorded. Considering indicators of physical activity practice and the year of enrollment no statistical significant difference was observed, except for sitting time domain which presented a higher sedentary prevalence in the 4th year group compared to the 1st year group with p-value of 0.023. The odds ratio followed the same direction.

Table 7 below shows that students generally recommended for the provision of gym facilities (32.2%), educating students about benefits of Physical Activity (25.1%) and engaging in sports competition (inter-departmental, inter-faculty & inter-varsity) (19.2%).

Table 3: Prevalence of Physical Activity among undergraduates.

Physical Activity per day	Males (m ± sd)	Females(m ± sd)	Favorable/ Adverse	*p*-value
Vigorous	48.27 ± 29.35	42.46 ± 22.10	3.84[a] A	0.05
Moderate	43.8 ± 23.14	38.31 ± 29.35	22.46[b] F	0.001
Walking	86.04 ± 66.1	70.3 ± 48.14	4.78 F	0.003
Total Physical Activity	132.36 ± 90.61	104.28 ± 73.83	6.14 F	0.002

a - Exact statistic
b - The statistic is in the upper bound on F that yields a lower bound on the significance level

Table 4: Comparing weekly physical activity between males enrolled in 1st and 4th years.

Physical Activity per day	Males studying		*p*-value
	Year 1 (95% CI)	Year 4 (95% CI)	
Vigorous	12.3(4.1 - 22.6)	11.6(3.4 - 26.3)	0.089
Moderate	16.1(6.2 - 27.8)	10.4(3.1 - 25.8)	0.045
Walking	20.8(14.3 - 30.5)	20.6(14.3 - 29.7)	0.036
Total Physical Activity	18.3 (11.4 - 26.6)	16(9.2 - 21.3)	0.001

Table 5: Comparing weekly Physical Activity between Females enrolled in 1st and 4th years.

Physical Activity per day	Females studying		*p*-value
	Year 1 (95% CI)	Year 4 (95% CI)	
Vigorous	9.7(3.4 - 24.3)	3.6(1.2 - 13.7)	0.063
Moderate	12.2(4.1 - 26.6)	6.8(5.4 - 16.2)	0.246
Walking	24.8(11.4 - 30.1)	15.3(8.7 - 19.4)	0.012
Total Physical Activity	15.4(9.8 - 20.6)	10.3(6.3 - 16.8)	0.014

Table 6: Physical Activity prevalence and Odds ratio for 1st and 4th year students.

Predictor/ characteristics	Prev %	Year 1 (F&M) 266(64.3%)	Year 4 (F&M) 214(35.7%)	p-value	Odds ratio	95% CI
Work related PA (n = 206) Active Sedentary	78(84.8)	36(73.6)	42(80.1)	0.638*	0.78	0.33 - 2.84
Domestic PA Active Sedentary	120(79.3)	50(72.5)	70(81.3)	0.372*	0.78	0.33 - 2.84
Transport-related PA Active Sedentary	82(61.4)	38(56.8)	44(62.3)	0.601*	0.78	0.33 - 2.84
Leisure time PA Active Sedentary	94(72.6)	42(58.2)	52(49.7)	0.486*	0.78	0.33 - 2.84
Sport & Exercise PA Active Sedentary Insufficient	105(62.3) 61(23.4)	41(57.6) 38(20.0)	64(52.0) 23(23.2)	0.512*	0.78	0.33 - 2.84
Sitting Active Sedentary	188(89.6)	84(67.0)	104(79.0)	0.023**	0.16	0.04 - 0.88

*Pearson Chi-square (χ^2) test; **Fischer's Exact Chi-square (χ^2) test

Table 7: Students recommendations to physical activity among students (n = 480).

	Percentage (%)
Availability of gymnasium facilities	107(32.2)
Sports facilities eg. sports grounds	52(15.1)
Sports competition(inter-departmental, inter-faculty & inter-varsity)	64(19.2)
Educating students about benefits of Physical Activity	98(25.1)
None	22(8.4)

DISCUSSION

The current study focused on physical activity participation in a population of young university students who were enrolled in the Faculty of Health Sciences, studying Nursing and Midwifery, Medical Laboratory Sciences, Anesthesia and Pharmacy. The presence of population was predominantly females across the four departments.

WHO estimated NCDs in Eswatini to account for 37% of all deaths [22]. With the increase in the burden of the NCDs in Eswatini, it is of supreme significance for the government and the general population to look for strategies to reduce the burden by targeting modifiable risk factors such physical inactivity on adults 18+ years old male and females rated at 22% and 31% respectively by the 2016 [22]. Therefore, it is very important for the medical professionals to be at the forefront advocating positive health lifestyle changes with emphasis on risk factors for the NCDs as part of their daily health care service delivery. In tertiary medical institutions, students who are good advocators for physical activity have shown to also regularly practice in physical activity and have good attitude towards it [23]. To this extend, the burden of the NCDs in Eswatini has been reported to be high, there are no research studies done to determine the physical activity practices of medical students during tertiary medical training within the four institutions in order to prepare them to be competent advocators for physical activity when practicing.

There are numerous significant benefits of regular moderate physical activity to human health [18], contrary to greater risk and undesirable health conditions to less and insufficient physical inactive population [20,21,23]. Literature reveals that physical inactivity is a global concern [7,9,15,24] and in the kingdom of Eswatini in particular, physical inactivity on adults 18+ years old; males and females were calculated at 22% and 31% respectively by the 2016 and was found to be the most prevalent risk factor [23]. The current results of this study shed the light on interesting findings on sedentary lifestyle rated at 62.6% and 23.4% for insufficient physical activity and physical inactive respectively among undergraduate student population of Southern African Nazarene University in the Kingdom of Eswatini.

Insufficient physical activity participation prevalence is not only in the Southern Africa's Eswatini but has also been confirmed in some parts of the world with several countries located in south America, Middle East, north Africa, east Asia and eastern Europe rated not more than 50% [7,16,25]. Of interest is that the findings confirm that the Southern Africa female counterparts despite having lower PA than men [7], their PA is higher than those in Middle East and North Africa [16]. Literature reveals that sex differences have an impact on PA when assessing male and female participation in different types of PA domains such as at work, in the household, transport mode, and leisure time [7], and at moderate to vigorous intensities [15,26,27].

The pattern of physical activity participation among Faculty of Healthy Science students showed that both gender is sedentary. Similar studies conducted from different universities such as the University of Zimbabwe [21], Baskent University, Ankara in Turkey [25], Romanian university [28], Santa Catarina in the southern Brazil [29], and Jazan University, southwest in Kingdom of Saudi Arabia [30] concurred that female students are more vulnerable to sedentary lifestyle behaviors and insufficient physical inactivity. Despite these variances, the current study's results meet the WHO recommendations on PA guidelines and it revealed normal BMI among the undergraduate students.

Students who have enrolled at the Medical school at Year 1 take on in a lighter and incidental moderate-intensity physical activity during domestic chores [6] and active transportation compared to their 4th year counterparts who make conscious decisions to exercise for health benefits [31]. The 4th year undergraduate students' high sedentarism prevalence was a clear suggestion that the process of Faculty of Health Sciences' medical education has failed to support good results in the modification of students' lifestyle [29]. The communities and the Faculty of Health sciences should put forward more opportunities for safe and accessible leisure-time activity to youth and students in order to increase their overall levels of activity helping to close the gender gap and achieve the 2025 global physical activity target.

Our current study revealed that predictors and characteristics of PA; work-related, domestic chores, transport-related, leisure time, sitting and sport and exercise corresponds to Shaw and Spokane's observations [32] that physical inactivity increased with level of education. This finding could be further explained noting the Ministry of Education and Training [33] introduced Physical Education in primary schools in the year 2010, more than four decades after its independence hence there is the low priority accorded to the subject and physical activities in the education system, tertiary level inclusive as witnessed by students spending a considerable amount of time sitting in class with light intensity physical activity [34]. Despite that the variations in the level of physical inactivity between different study levels of undergraduate students may be a reflection of individual tastes, socio-economic development, technology and urbanization, understanding and addressing these barriers is needed to plan and deliver cultural and educationally sensitive actions to support positive behavior change in the medical fraternity.

CONCLUSION

This study showed a wide range of physical activity levels and patterns across undergraduate study levels, with sports exercise and physical exercise activity consistently being insufficient among the students. Insufficient physical activity is a public health problem in the Faculty of Health Sciences at SANU in Eswatini. More than individual behavior, there is a hostile environment that makes it difficult for students to engage in physical activity. Unless serious action is taken in the Faculty's settings, the low level of physical activity is likely to contribute to the rise in NCDs within the medical fraternity in the near future.

RECOMMENDATIONS

Following that the university has potential and has been at the helm of innovation in the recent years where it successfully launched the Faculty of Education's Enactus Team invention of the Reflector Belt project in the year 2018, for use on cattle so that they are identifiable at night, and the Faculty of Health Sciences' Enactus team undertook the Golden Waste Project this year, therefore, we recommend that:

- The university can use an application of AI to sports, which include a wearable performance monitoring system which has a compression shirt and measures heart rate, heart rate variability, respiratory rate, posture and impact. This devise can detect and inform the user if they have exercised beyond safety precaution zone and thus it reduces injuries, hence optimizing performance and facilitates return-to-play as well as monitors player movements during training and matches. The collected data is then analysed using AI to create a system

that is able to recommend best exercises for a given profile of a person.

- The university's health curriculum designers and policymakers should embed into university curricula sports as a compulsory subject for all the students, though course should not be credit bearing but should be a requirement for a student to proceed to the following year to promotion of physical activity
- A positive PA environment with places, equipment and sports facilities should be an investment priority of the university. One of the most visible signs of excellent university is their sports facilities. This is because there is clear link between physical vitality and educational outcomes.
- A Physical Activity Research Centre (PARC) where students and academicians develop research on emerging epidemics linked to physical inactivity and its impact to public health is needed in the university. It will also save as a space for students to develop innovative solutions at curbing this global health threat.
- The university should have health walks where both staff and students participate and these can be sponsored walks or perhaps prizes be given to those who complete these walks.
- The university's IT department should work using Artificial Intelligence (AI) to develop a system that will assist students, staff and communities to work on their sets of recommended exercises remotely, generating personalized exercises for everyone based on one's current physique and physical goals, and everyone with access to a laptop, iphone and hand phone with android will be able to access such services.

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