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Health Implications of Physical Activity Participation of Second Cycle School Students

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Abstract

The general objective of the study is to investigate health implications of physical activity participation of second cycle school students in Kumasi, Ashanti region of Ghana. This exploratory research recruited 660 SHS students (mean aged=16.51 ± 18.41 years). Age, height, weight, waist to hip ratio, BMI, systolic and diastolic blood pressure and resting energy expenditure were measured. Physical activity involvements were identified using modified SQUASH questionnaire. The prevalence of sedentary lifestyle due to the introduction of modern technological implements in learning, recreation and occupation play significant roles among the causes of cardiovascular risk factors globally. In Ghana, senior high school (SHS) students partake in physical activity (PA) as part of their physical education programme but there is scarce information on the health implications of such participation. This study examined the health implications of PA participation of senior high school students in Kumasi with emphasis on gender, weight, BMI, heart rate, waist to hip ratio and blood pressure. This study concluded that second cycle school students are physically active with incidences of overweight, obesity and morbidity. The PA program and time spent by those overweight, obese and morbid should be re-designed to prevent cardiovascular risk factors.

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INTRODUCTION

Physical activity (PA) plays an important role in prevention of non-communicable diseases (NCDs) such as cardiovascular diseases, overweight and musculoskeletal disorder (Baldew et al, 2015). It is an established fact that regular (≥3 times per week) moderate intensity PA such as brisk walking, dancing and gardening decrease the risk of NCD (Gulati & Anoop, 2014) . PA is commonly recommended as an important lifestyle in prevention of hypertension but worldwide prevalence of hypertension is projected to increase to 60% by 2025(Diaz & Shimbo, 2013). PA lowers blood pressure and assists in weight management and a reduction in visceral fat (Tchernof & Jean-Pierre, 2013). People of all ages can improve the quality of their lives and reduce the risks of developing coronary heart disease, hypertension, some cancers like; colon cancer and breast cancer, and type 2 diabetes with participation in moderate PA and exercise (Roper et al, 2016). Daily exercise will also enhance one's mental well-being and promote healthy musculoskeletal function throughout life (Gillen & Jenna, 2012). Although habitual PA is an attainable goal to a healthier life and significant health benefits can be obtain by a correct and graded PA throughout the week (Gillen & Jenna, 2012). Fitness programs involving progressive increase intensity of exercise will elicit greater cardio-protective benefits. There is a growing understanding of how levels of PA positively affect cardiovascular, musculoskeletal, respiratory, endocrine function, and mental health (Pontzer & Herman, 2016). Physical inactivity increases the risk of many chronic conditions, such as cardiovascular diseases, type 2 diabetes, obesity, colon cancer, breast cancer, dementia and depression (Egan, Brendan, Juleen & Zierath, 2013). The World Health Organization (WHO, 2000) recommends PA of at least 150 min per week at moderate intensity, or high-intensity physical activity of at least 75 min per week, in order to gain health benefits. Moderate and high-intensity PA can be combined to achieve the recommended amount of PA (El, Walid, Sakari, & Steve, 2017).Overweight and obesity are the major risk factors for increased morbidity, disability, and premature mortality from cardiovascular disease (mainly hypertension, heart disease and stroke), type 2 diabetes, musculoskeletal disorders (osteoarthritis and chronic back pain) and some cancers (breast, and colon) (Msyamboza, Kapaki, Damson & Titha, 2013). It is estimated that the burden of hypertension is attributable to obesity and is approximately 80% for men and 60% for women with respect to their physical activities but has a ratio of 32:14mmHg per pound respectively (Lam et al, 2015). Using body mass index (BMI) as an anthropometric measure, overweight category (BMI ≥ 25 kg/m2) is associated with approximately 30% higher for overall mortality and 40% higher for cardiovascular mortality of which is considered as a health problem for second cycle schools (Patel & Sen, 2016). Despite well-documented evidence that physical activity is beneficial to children, average fitness levels of children in the advanced world have declined. Lack of physical activity has been associated with childhood obesity: obesity raises the risk for type 2 diabetes mellitus, insulin resistance, heart disease, high blood pressure, metabolic syndrome, and other health related disorders. Type 2 diabetes, once uncommon in childhood, now represents 8% to 45% of all diabetes reported in children and adolescents,(Katz et al., 2010)

It is recommended by Health and Human Service that children and adolescents should engage in 60 minutes of physical activity per day, meeting this recommendation can improve cardiorespiratory fitness, muscular strength, blood pressure, and can decrease depressive symptoms in children in a short amount of time (Health and Human Service, 2010). Despite the known benefits, research shows a significant. Epidemiological findings have reported a decrease in physical activity as autonomy increases throughout middle and high school, this decrease in physical activities is associated to many factors including the gain of greater gain autonomy relative to their daily lives, psychosocial and residency (location, i.e. on or off campus housing) and greater time demands (e.g. work, class time) as well as different access to places to be active, (Calestine, Bopp, & Bopp, 2017).

The general objective of the study is to investigate effect of health implications of physical activity as a correlate of demographic profiles in second cycle students in Kumasi, Ashanti region of Ghana.

The study specifically sought to:

1. Determine demographic profiles status of second cycle school students.
2. Examine the level of blood pressure, heart rate and resting energy expenditure of the students.
3. Investigate the relationship between demographic profile and health implications of physical activity involvement in second cycle school students.
4. Investigate the relationship between blood pressure, heart rate, resting energy expen-

diture and physical activity involvement of the students.

5. Investigate the relationship between demographic profile and physical activity involvement of the students based on gender and class level.

METHODS

This exploratory research design recruited 660 Senior High School students in Ghana (mean aged=16.51 ± 18.41 years. Following a verbal discussion with the various head of the schools, letter of introduction was handed over to them and consent of parent in case of minor was sought. The data collected was divided into Demographic information; age, height, weight, waist to hip ratio and BMI and resting energy expenditure, systolic and diastolic blood pressures. The types of physical activity the students involve themselves were measured using modified SQUASH questionnaire. Convenient sampling technique was used in recruiting students because of the busy academic schedules of some students.

RESULTS AND DISCUSSION

Questionnaire guide with questions on health enhancing physical activity as correlate of body composition and anthropometric profile was developed. The questionnaire consisted of three parts; the first part included questions on demographic information, the second part included anthropometric and physiological measures such as height, body mass index, weight, and Waist-hip ratio and the third part included questions on health enhancing physical activity pattern of senior high school (SHS) students on frequency of physical activity participation (items) such walking or cycling, and duration for each activity within a week.

Weight and height was measured to the nearest 0.1 kg and 0.5cm respectively using a Health-O-Meter, floor type, model RGZ-16O. In measuring weight, the scale was placed on an even firm floor. Participants stood on the scale with shoes removed, both feet at the center of the scale with weight evenly distributed, looked straight ahead so that the line of sight was parallel to the floor and the weight of the participant was recorded. In measurement of height, the participants removed their shoes, bulky clothing, hair ornament, and unbraid hair that could interferes with measurement. Participants stood on the base of the health-o-meter with feet flat and together, legs straight, arms at side and shoulders level. Participants looked straight ahead so that the line of sight was parallel to the floor and height was recorded. BMI was calculated as weight (kg)/height2 (m2) and used to categorize BMI-measured weight status: underweight (BMI ≤ 18.5), normal weight (BMI 18.5–24.9), overweight (BMI 25.0–29.9) and obese (BMI ≥ 30) (WHO, 1995). Waist circumference (WC) was measured midway between the inferior angle of the ribs and the supra-iliac crest (WHO, 2011) to the nearest 0.5 cm using a non-stretchable but flexible measuring tape (ISAK, 2001). During the measurement, participants stood in an upright position, with arms relaxed at their side, feet evenly spread apart and body weight evenly distributed in accordance with the WHO expert consultation report on waist circumference and waist-to-hip ratio (WHR) (Mogre, Nyab & Aleyira, 2015). Abdominal obesity will be determining as a waist circumference >102 cm in male and >88 cm in female according to the World Health Organization cut-off points and risk of metabolic complications for Waist circumference (WHO, 2011).

Resting Energy Expenditure (REE) Equation: Males: 50.9xBW(kg) + 25.3xHt(cm) – 50.3xA(y) + 26.9); Females: (51.2xBW(kg) + 24.5xHt(cm) – 207.5xA(y) + 1629.8); Where BW is body weight, Ht is body height and A is age. Each REE value was converted from kilojoules and expressed as kilocalories by dividing each value by 4.186.

RESULTS

Majority of the participants in this study were between the ages of 16 and 18, followed by the 13-15. Out of the 660 participants 276, 237 and 147 were SHS 1, 2 and 3 students respectively. Majority of the participants recorded 75% as normal weight, followed by 20% as overweight, 4% as obese and 1% as morbid.

Table 1. Descriptive statistics of demographic profiles

Demographic Profile	Mean	Standard Deviation	Rating
Age(years)	16.5	1.84	NA
Height(m)	1.63	3.23	NA
Weight(cm)	60.11	1.35	NA
BMI	22.62	2.14	Normal
Waist to hip ratio	0.81	0.03	Normal
Heart rate / min	73.22	0.93	Normal
Systolic Blood ressure(mmHg)	121.2	1.93	Normal

Diastolic Blood ressure(mmHg)	76.88	1.25	Normal
Resting Energy Expenditure(C)	.77	3.25	Normal

The results of the participants showed that, they have normal heart rate, waist to hip ratio, systolic and diastolic and resting energy expenditure.

Table 2. Chi-Square Distribution of Physical Activities Participation

Physical Activity Involvements	Response	N (%)	P-value
`Do you engage in physical activities?	No	46 (7.0)	.000
	Yes	614 (93.0)	
Which of these activities do you regularly participate?	Soccer	145 (23.6)	.000
	Basketball	44 (7.2)	
	Running	153 (24.9)	
	Volleyball	71 (11.6)	
	Jogging	96 (15.6)	
	Others	105 (17.1)	
How many times per week do you engage in physical activities?	1-2	153(24.9)	.000
	3-4	240 (39.1)	
	5-6	90 (14.7)	
	7 above	131 (21.3)	
How long do you spend in performing these activities or sports?	30-45mins	192(31.3)	.000
	1 hr	120(19.5)	
	2 hours	234(38.1)	
	3 and above hours	68(11.1)	
Where do you long spend in performing these physical activities?	Home	227 (37.0)	.000
	School sports field	234 (38.1)	
	Sports recreational Centre	155 (24.9)	
With whom do you normally do your physical activities	Alone	139 (22.6)	.000
	School peers	266 (43.3)	
	Parents and relatives	104(16.9)	
	Other People	111 (17.1)	
When do you usually do your physical activities?	Morning	199(31.8)	.000
	Afternoon	135(22.0)	
	After evening meals	100(16.3)	
	Any convenient time	184(30.0)	
When are your reasons in participating of sports or physical activities?	Good Health	328(54.4)	.000
	Competition	133(21.7)	
	To lose weight	141(23.0)	
	To gain weight	12(2.0)	

About 93% of the respondents engage in some physical activity with the most being running (23.2%), soccer (22%) and jogging (14.5%). Majority (36.1%) engage in these activities 3-4 times per week with a modal duration of 30-45 minutes per session. The school sports field was the most cited place for which these physical activities take place but slightly fewer also said they do it at home, school peers (40.3%), activities (30.2%) but 27.9% cited any convenient time. 100(15.2%) engage in this activities after evening meals.

Table 3. Passive Activities

Activities	Response	N (%)	P-value
On average, how long do you watch TV/DVD/Video per day	30-45mins	85(12.9)	.000
	1 hour	193(29.2)	
	2 hours	191(28.9)	
		161(24.4)	
Do you use a computer?	No	96(14.5)	.000
	Yes	553(83.3)	
If you do, how long do you spend using this computer?	30-45mins	50(7.6)	.000
	1 hour	172(26.1)	
	2 hours	188(28.5)	
	3 and above	145(22.0)	
On average, how many hours do you sleep in a day?	2-3 hours	105(15.9)	.000
	4-5 hours	18127.4)	
	6-7 hours	284(43.0)	
	8 hours and above	61(9.2)	
What are your reasons for not participating in active sports or physical activities?	I have no time	192(29.1)	.000
	No suitable facility	168(25.5)	
	Not important	97(14.7)	
		108(16.4)	

Majority of the respondents watch television, DVD or videos for an average of 1 hour per day. About 84% own a computer with 28% of those spending 2 hours per day on their computers whilst 15.9% spend between2 and 3 hours. Modal sleep time for the participants of this study was between 6 and 7 hours with only 9% sleeping for above 8 hours per day. The most mentioned reasons for participation in physical activities were good health, followed by to lose weight, competitions and to gain weight in that order. Reasons for not participating in included lack of time (29.1%), No suitable facilities (25.5%), not important (14.7%) and others (16.4%).

Table 4. Association between Body Mass Index and Physical activities

BMI Classification	Physical Activities	
	No (n=46)	Yes (n=614)
Normal	23 (50.0%)	480 (78.2%)
Overweight	9 (19.6%)	109 (17.8%)
Obese	14(30.4%)	25(4.1%)
Morbid	0	5(0.8%)

DISCUSSION

Most students do PA 614(93%), majority in soccer 145(23.6%) at least 3 - 4 times in a week 240(39.1%) for two hours 234(38.1) in school 234(38.1%) with their peers 266(43.3%) in the morning 199(31.8%) and at convenient time 184(30.0%) which affirms Allender and co's study that, for young children and teenagers, pressure to conform to social stereotypes is a key motivator as well as children see enjoyment and social interaction with peers as reasons to be physically active (Allender, Cowburn, & Foster, 2006). The study recorded that the reasons of participation in physical activity been good health for majority 328(54.4%) as similarly observed by Boozer that physical activity and health related quality of life were significantly related (Boozer, 2017), followed by losing weight 141(23.0%) which is in agreement with the benefits of participating actively in physical activities (Calestine et al., 2017), competition 133(21.7%) and gain weight 12(2.0%). It is also observed in this study that majority of the students 480(78.2%) and 23(50.0%) both who actively participate in PA however most of the students who do not actively partic-

ipate in PA found themselves in the overweight and obese range and those who do not actively participate in PA respectively fall within the normal BMI range compared to their counterparts who actively participate in PA, similarly studies have shown that physical activity and health related quality of life were significantly related (Boozer, 2017; Calestine et al., 2017).

CONCLUSION

This study concluded that second cycle school students are physically active. However, some of them are overweight, obese and morbid. The PA program and time spent by those overweight obese and morbid should be re-designed to prevent cardiovascular (CV) risk factors.

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