

Effects of Body Mass Index and Drunkenness on Physical Activity Levels of Adolescents in Ghana

Seidu Sofu¹ and Emmanuel Thompson²

Abstract

The purpose of this study was to assess the effects of Body Mass Index (BMI) and drunkenness on the physical activity levels of junior high (JHS) and senior high (SHS) school students in Ghana. The 2012 Ghana Global School-Based Student Health Survey served as the main data source. Participants included 2790 Ghanaian junior high and senior high school students aged 11-18. They were 1508 boys and 1282 girls. The study investigated the extent to which participants were physically active (PA) seven days per week and also attended physical education (PE) classes five days or more per week (PAPE). The predictor variables were age, gender, level of education, BMI, number of times being drunk (NBD), and number of times in trouble due to drunkenness (TTD). Results showed that 72.69% of participants engaged in PA seven days per week and attended PE classes five days or more per week. Logistic regression analyses indicated that age, gender, BMI, NBD, and TTD were significant predictors of PAPE, while the level of education was not. Older participants were more likely to attain PAPE than their younger counterparts; and girls were more likely than boys to achieve PAPE. Those with higher BMI were less likely to achieve PAPE. The likelihood of achieving PAPE decreased with increase in NBD. In addition, the likelihood of achieving PAPE decreased with an increase in TTD. JHS and SHS students were equally likely to achieve PAPE. PA intervention programs should be multi-faceted and should target children in their pre-teens.

Keywords: Body Mass Index, drunkenness, Ghana, odds ratio, physical activity

¹ Professor, Southeast Missouri State University, USA

² Assistant Professor, Southeast Missouri State University, USA

1 Introduction

Low levels of health and education are two key factors resulting in low productivity and contributing to low economic growth [1]. Like several other public health challenges, overweight and obesity are public health concerns, and must be tackled early through proper diet and physical activity [2]. For example, more than 42 million children worldwide under the age of five years were overweight in 2013 [3]. Obesity increases the likelihood of diabetes, hypertension, coronary heart disease, stroke and certain types of cancer. Diabetes risk can be reduced by moderate weight loss and moderate daily physical activity in persons at high risk [3].

Despite the evidence indicating how PA improves the quality of life, physical inactivity is on the increase resulting in physical, emotional, and economic consequences [4]. Once considered as problems for high income countries, overweight and obesity are now also prevalent in low and middle income countries [5]. Consequently, Ghana (like other developing countries) has seen an increase in cardiovascular disease (CVD) risk factors such as poor dietary practices, physical inactivity, alcohol consumption and obesity [6]. Over-nutrition is now becoming a public health concern in Ghana, thus, exacerbating the problems with lower physical activity levels [7].

Inadequate infrastructure, absence of policy for physical education (PE) and sports in schools, lack of equipment and financial resources are mitigating participation in PA for children and youth in Ghana [8][9]. The 2014 Ghana PA card for children and youth, for example, indicated a grade “D” in the overall physical activity category [10]. It is for this reason that the Ghana School Health Education Program (SHEP) has one of its objectives the promotion of healthy lifestyles including healthy diet, avoiding alcohol and tobacco consumption, and physical inactivity [8]. As [11] noted, the prevalence of overweight and obesity are on the increase in Ghana, and comprehensive and concerted efforts should be made to reverse the upward trend.

An appropriate avenue for children and youth to accrue recommended levels of PA is school PE. The International Council of Sport Science and Physical Education [ICSSPE] [12] asserted that PE is the only school subject whose primary focus is on the body, physical activity, physical development and health. PE helps children to become physically active which is essential for healthy development and which, in turn, lays the foundation for adult healthy lifestyles [12]. A considerable part of children’s physical activity is presently allocated to regular PE classes in schools [13], because economic pressures [14] and parental concern for safety [15] often reduce children’s physical activity in non-school settings. PE is required twice a week in junior high; and senior high schools in Ghana [16, 17]. However, teachers do not implement the subject according to policy due to limited infrastructure and facilities [8], lack of adequate training, and lack of teacher’s guides [8, 19]. For example, only 65.9% of district coordinators of the School Health Education Program indicated they taught physical activity

and fitness in their curriculum [20].

Alcohol is another preventable risk factor [21] pertinent to the current study. Children who drink at an early age have a higher risk of developing health problems in adulthood [22, 20]. Furthermore, research shows that the prevalence of lifetime alcohol consumption among secondary students and a national sample of youth in Ghana [20, 23] was approximately 25%. Globally, alcohol is the third leading risk factor after childhood underweight and unsafe sex [24]. Research suggests that taking alcohol at an early age can result in greater risk of abusive consumption and other development problems [25]. For example, [22] reported participants in their study who started to drink at ages 11-14 were at the greatest risk of developing alcohol abuse.

Literature on alcohol use in sub-Saharan Africa has focused on its consumption and sexual behavior among adolescents and adults [26]. Similarly, studies on physical activity have traditionally examined its relationship with BMI. It is important for research to investigate the influence of alcohol consumption and other risk factors on the physical activity levels of adolescents and adults. Therefore, the purpose of the present study was to assess the effect of BMI and drunkenness on the physical activity levels of junior high and senior high school adolescent students in Ghana. An understanding of the effects would help policy makers and educational administrators identify effective strategies to increase the activity levels of adolescents.

2 Method

2.1 Participants

Participants included 2790 Ghanaian junior high (1188) and senior high (1602) school students aged 11-18. They were 1508 boys and 1282 girls. Some observations were excluded due to missing data for variables pertinent to this study.

2.2 Instrument

The 2012 Ghana Global School-Based Student Health Survey (GSHS) [27] served as the main data source. The study investigated the extent to which participants were physically active seven days per week and also attended physical education (PE) classes five days or more per week (PAPE). The predictor variables were age, gender, level of education, body mass index (BMI), number of times being drunk (NBD), and number of times being in trouble due to drunkenness (TTD). The GSHS operationally defined PA as any activity that increases your heart rate and makes you get out of breath some of the time [27]. The response variable, PAPE, utilized two items: "During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?" and "During this school year, on how many days did you go to physical education (PE) class each week?" BMI was computed from the body weights and heights that students

self-reported.

2.3 Statistical Analysis

The study utilized two-way tables to classify and count participants by the extent to which they were physically active seven days per week and also attended physical education (PE) classes five days or more per week (PAPE) and each of the predictor variables. The authors calculated the conditional percentage of dependent variable by each predictor variable [28]. The percentage distribution of each predictor variable was computed for each level of the dependent variable.

To model the relationship between the dependent variable and the predictor variables, the authors used binary logistic regression model because the response outcome is count or dichotomous – that is, the response variable “PAPE” can take one of two possible outcomes representing “yes to PAPE” or “no to PAPE”. The odds ratio and the associated $(1 - \alpha)\%$ confidence interval from the estimated model were used to establish statistical significance of the predictor variables on the dependent variable. Alpha represented the level of significance. RStudio version 0.98.1103 [29] statistical package was used for data analysis.

3 Results

3.1 Prevalence of physical activity

The results showed that 72.69% of participants exercised seven days per week and also attended PE classes five days or more per week (PAPE). Table 1 presents descriptive data for BMI and PAPE. Students who achieved PAPE had a slightly lower (20.22) mean BMI than those who did not. That is, participants with higher BMIs were less likely to meet PAPE.

Table 1: Mean BMI scores and percentages meeting PAPE

	Min	Max	Mean	St. Dev
Met (%)	12.74	53.98	20.22	2.90
Not Met (%)	14.06	54.88	20.41	3.23

Table 2 presents data on gender, level of education and PAPE. Of the 2028 (72.69%) participants who achieved PAPE, 53.16% were male and 46.48% female. More SHS (56.66%) than JHS (43.34%) achieved PAPE.

Table 2: Gender, level of education and PAPE

Gender	Met		Not Met	
	f	%	f	%
Male	1078	53.16	430	21.20
Female	950	46.84	332	16.37
Total	2028	100.00	762	37.57
Level of Education				
JHS	879	43.34	309	40.55
SHS	1149	56.66	453	59.45
Total	2028	100.00	762	100.00

Table 3 shows data on age and PAPE. The 18 years or older age group had the highest percentage (32.94%) of participants achieving PAPE, followed by the 16 year olds. The 11 years of younger age group had the lowest percentage (.74%) of participants achieving PAPE.

Table 3: Frequencies and percentages for age and PAPE

Age Group	Met		Not Met	
	f	%	f	%
11 years or younger	15	0.74	11	0.54
12 years	87	4.29	40	1.97
13 years	159	7.84	58	2.86
14 years	221	10.90	69	3.40
15 years	293	14.45	100	4.93
16 years	238	11.74	103	5.08
17 years	347	17.11	120	5.92
18 years or older	668	32.94	261	12.87
Total	2028	100.00	762	100.00

Table 4 presents the data on number of times participants were drunk, and number of times they got into trouble due to being drunk and PAPE. The data show that the highest percentage of students who achieved PAPE were those who never had a drink (89.69%). In addition, students who were never in trouble due to drunkenness had the highest percentage (91.37%) achieving PAPE

Table 4: Frequencies and percentages for number of times drunk, number of times in trouble, and PAPE

Number of Times Drunk	% (Met)		% (Not Met)	
	f	%	f	%
None	1819	89.69	661	86.75
1-2 times	151	7.45	70	9.19
3-9 times	36	1.78	19	2.49
10 or more times	22	1.08	12	1.57
Total	2028	100.00	762	100.00
Number of Troubles due to Being Drunk				
None	1853	91.37	709	93.04
1-2 times	114	5.62	34	4.46
3-9 times	35	1.73	10	1.31
10 or more times	26	1.28	9	1.18
Total	2028	100.00	762	100.00

3.2 Predictors of physical activity levels

Table 4 presents the logistic regression data for each of the predictor variables in the present study. The analyses indicated that age, gender, BMI, number of times being drunk, and the number of times one got into trouble due to drunkenness were significant predictors of PAPE, while the level of education was not. JHS and SHS students were equally likely to achieve PAPE. Participants 11 years or younger were used as the comparison or reference group for age. The data show no significant difference in PAPE for students 12 or 13 years old and those 11 years or younger. However, there were significant differences between those 13-18 plus years and those 11 years or younger. That is, participants 13-18 years plus years were two-fold more likely to achieve PAPE than those 11 years or younger.

Females were more likely than males to achieve PAPE. In addition, those with higher BMI were less likely to achieve PAPE. The likelihood of achieving PAPE decreased with increase in NBD. That is, those who were never drunk were more likely to achieve PAPE than those who were drunk at least once.

Participants who were “never in trouble” served as the comparison or reference group for the variable TTD. There was a significant difference between those who were in trouble 1-2 times and 3-9 times and those who were never in trouble. Those who were in trouble 1-2 times and 3-9 times were less likely than those who were never in trouble to achieve PAPE. There was no significant difference between those who were never in trouble and those who were in trouble 10 or more times.

Table 5: Logistic regression for age, educational level, BMI, number of times drunk, number of times in trouble and PAPE

Parameter	Estimate	P-value	OR	95% CI for the OR	
				Lower Limit	Upper Limit
Intercept	0.720	0.126	2.055	0.822	5.258
Age (12 years old)	0.464	0.294	1.591	0.657	3.768
Age (13 years old)	0.764	0.074*	2.146	0.909	4.935
Age (14 years old)	0.939	0.026**	2.558	1.093	5.830
Age (15 years old)	0.901	0.032**	2.463	1.059	5.571
Age (16 years old)	0.713	0.093*	2.040	0.868	4.665
Age (17 years old)	0.982	0.021**	2.669	1.136	6.107
Age (18 years plus)	0.897	0.034**	2.453	1.049	5.582
Level (SHS)	-0.141	0.238	0.869	0.687	1.096
Gender (Female)	0.179	0.045**	1.196	1.004	1.424
Body mass index	-0.028	0.058*	0.972	0.944	1.001
Number of Times Drunk (1-2 times)	-0.396	0.015**	0.673	0.491	0.929
Number of Times Drunk (3-9 times)	-0.628	0.040**	0.534	0.295	0.987
Number of Times Drunk (10 or more)	-0.794	0.046**	0.452	0.209	1.010
Number of troubles (1-2 times)	0.513	0.019**	1.671	1.101	2.599
Number of troubles (3-9 times)	0.632	0.099*	1.881	0.920	4.192
Number of troubles (10 or more)	0.480	0.254	1.617	0.735	3.894

** Significant at 5%; * significant at 10%

4 Discussion and Conclusions

The current study investigated the influence of BMI and drunkenness on the physical activity levels of adolescent students in Ghana. The findings have three policy implications. First, the results showed that adolescents 13 years or older were significantly more likely to achieve high levels of PA than their younger counterparts. Therefore, intervention programs should target students during their pre-teen years to help them become physically active early. Second, alcohol consumption and getting into trouble due to drunkenness significantly predicted adolescents' ability to be physically active. Therefore, intervention programs should aim at delaying the age of first alcohol use to after 14 years, consistent with recommendations by [22]. Delaying the age of first alcohol use would be particularly beneficial to males, since the prevalence of alcohol consumption and drunkenness are higher in Ghanaian adolescent males than females [30]. Finally,

to be effective, interventions intended to increase adolescents' PA levels should be multi-faceted. The findings that the number of times being drunk and the number of times adolescents got into troubles due to drunkenness significantly predicted PA levels support this assertion. Thus, rather than focusing solely on physical fitness components, PA intervention programs should incorporate education on alcohol consumption and other risk factors.

References

- [1] Schultz, P. T. (1999). Health and schooling investments in Africa. *Journal of Economic Perspectives*, 13(3), 67–88.
- [2] WHO (2004). *Global strategy on diet, physical activity and health*. Geneva: World Health Organization.
- [3] WHO (2014). *Global status report on communicable diseases*. Geneva: World Health Organization.
- [4] Patay, M. E., Patton, K., Parker, M., Fahey, K., & Sinclair, C. (2015). Understanding motivators and barriers to physical activity. *The Physical Educator*, 72, 496–517.
- [5] Campbell T, Campbell A. (2007). Emerging disease burdens and the poor in cities of the developing world. *Journal of Urban Health* 2007, 84(3 Suppl):i54-64. DOI: 10.1007/s11524-007-9181-7
- [6] Ofori-Asenso, R., & Garcia, D. (2016). Cardiovascular diseases in Ghana within the context of globalization. *Cardiovascular Diagnosis and Therapy*, 6(1):67-77.
- [7] Janssen, I., Katzmarzyk, P. T., Boyce, W. F., Vereecken, C, Mulvihill, C., Roberts, C., Currie, C., Pickett, W. (2005). Comparison of overweight and obesity prevalence in school-aged youth from 34 countries and their relationships with physical activity and dietary patterns. *Obesity Review*, 6(2): 123-132.
- [8] Ghana Education Service (2012). *School health education programme policy guidelines*. Accra: Ghana Education Service.
- [9] Ocansey R, Sofo, S, Jatong J. (2013). Physical education and after-school sport programs in Ghana: The role of public and private structures. In J. R. Chepyator-Thomson & S., Hsu (eds.), *Global perspectives on physical education and after-school sports* (pp. 13-35.). Lanham, MD: University Press of America.
- [10] Ocansey, R., Aryeetey, R., Sofo, S., Delali, M. B., Pambo, P., & Nyawornota, V. K. (2014). Results from Ghana's 2014 report card on physical activity for children and youth. *Journal of Physical Activity and Health*, 11(Supp 1), S58-S62.

- [11] Dake F.A.A, Tawiah E.O, Badasu D. M. (2011). Socio-demographic correlates of obesity among Ghanaian women. *Public Health Nutrition*, 14(7), 1285-1291. DOI: 10.1017/S1368980010002879.
- [12] International Council of Sport Science and Physical Education (2010). International position statement on physical education. Retrieved June 18, 2016 from http://assets.sportanddev.org/downloads/international_position_statement_on_physical_education.pdf
- [13] Bailey, R. (2006). Physical education and sport in schools: a review of benefits and outcomes. *Journal of School Health*, 76, 397-401.
- [14] Hardy L. L., Kelly, B, Chapman, K., King, L., & Farrell, L. (2010). Parental perceptions of barriers to children's participation in organised sport in Australia. *Journal of Paediatrics and Child Health* 46, 197-203.
- [15] Kalish, M., Banco L., Burke, G., Lapidus, G. (2010). Outdoor play: A survey of parent's perceptions of their child's safety. *Journal of Trauma*, 69, S218-S222.
- [16] Ministry of Education, Science & Sports (2007). Teaching syllabus for physical education (junior high school 1-3). Accra: MOESS.
- [17] Ministry of Education (2010). Teaching syllabus for physical education (senior high school 1-3). Accra: MOESS.
- [18] Morgan, P. J. & Hansen, V. (2008). Classroom teachers' perceptions of the impact of barriers to teaching physical education on the quality of physical education programs. *Research Quarterly for Exercise and Sport*, 79(4), 506-516.
- [19] Sofo, S., & Asola E. F. (2016). Barriers to providing quality physical education in primary schools in Ghana. *IOSR Journal of Sports and Physical Education*, 3(3), 45-48. DOI: 10.9790/6737-03034548.
- [20] Adu-Mireku, S. (2003). Schools and health: A district-level evaluation of school health education in Ghana. *Journal of Social Development in Africa*, 18(2), 105-120.
- [21] WHO (2016). Global Health Observatory country views. Retrieved July 7, 2016 from <http://apps.who.int/gho/data/node.country.country-GHA>
- [22] DeWit, D. J., Adlaf, E. M., Offord, D. R., & Ogborne, A. C. (2000). Age at first alcohol use: A risk factor for the development of alcohol disorders. *American Journal of Psychiatry*, 157(5), 745-750.
- [23] WHO (2003). National survey on prevalence and social consequences of substance (drug) use among second cycle and out of school youth in Ghana. Retrieved July 12, 2016 from <http://www.who.int/countries/gha/publications/>
- [24] WHO (2011). Global status report on alcohol and health. Geneva: WHO Press.
- [25] Hawkins J. D., Graham, J. W., Maguin, E., Abbott, R., Hill, K. G., & Catalano, R. F. (1997). Exploring the effects of age of alcohol use initiation and psychosocial risk factors on subsequent alcohol misuse. *Journal of Studies on Alcohol and Drugs*, 58, 280-290.

- [26] Morojele, N.K., Brook, J.S. (2006). Substance use and multiple victimisation among adolescents in South Africa. *Addictive Behaviors*, 31, 1163-1176.
- [27] WHO (2012). Global school-based student health survey (GSHS): 2012 Ghana GSHS Quesitonnaire. Retrieved on June 1, 2016 from http://www.who.int/chp/gshs/GSHS_Core_Modules_2009_English.pdf
- [28] Utts, J. M. (2015). *Seeing through statistics* (4th Ed.). Stamford, CT: Cengage learning.
- [29] RStudio Team (2015). *RStudio: Integrated Development for R*. RStudio, Inc., Boston, MA. Retrieved July 10 from URL <http://www.rstudio.com/>
- [30] Owusu, A. (2008). Global School-Based Student Health Survey (GSHS) 2008: Ghana Report, High Schools. In Centers for Disease Control and prevention C, ed. Atlanta, GA: CDC.