PHYSICAL EXERCISE AND DEPRESSIVE SYMPTOMS AMONG UNDERGRADUATE STUDENTS IN A TERTIARY INSTITUTION IN NIGERIA

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ABSTRACT
Background: The benefit of physical exercise in weight reduction and cardiovascular disease prevention is well known. However, its influence on mental health has scarcely been investigated. This study sought to explore the relationship between physical exercise and depressive symptoms among undergraduate students in a tertiary institution.

Method: A cross-sectional study was carried out among students of AlvanIkoku College of Education in Owerri, Imo State, Nigeria. Multi-stage sampling was used in the selection of students. Validated tools of Godin-Leisure Time Exercise Questionnaire (GLEQ) and Becks Depression Inventory (BDI) were used to assess physical exercise and depressive symptoms respectively among the students. Higher BDI scores indicate more depressive symptoms. Multiple liner regression analysis was performed at 0.05 significant level.

Results: The study comprised of 105 males and 187 females, making a total of 292 students. The mean age was 22.8 ($\pm$ 4.34) years with age range of 17 to 43 years. A higher proportion of the students did not engage in regular physical exercise (64.0%). The BDI scores were lower among those who regularly engage in physical exercise in comparison to those who did not (13.23±10.79 versus 16.49±10.46; t=-2.525; p-value=0.012). Multiple linear regression analysis shows that BDI scores reduces by 3.317 with regular physical exercise (β= -3.317; 95% CI:-5.847,-0.787; p-value=0.010).

Conclusion: Close to two-thirds of the students in the study do not regularly engage in physical exercise. Physical exercise has a preventive influence on depressive symptoms. Therefore, stakeholders at all levels should encourage regular physical exercise among students in Nigeria.
Keywords: physical exercise, depression, mental health, students, Nigeria.

INTRODUCTION
Physical exercise is any bodily activity that enhances or maintains physical fitness and overall health and wellness. It has been shown to have effects on the general and emotional wellbeing of individuals. Depression is an emotional illness that presents with loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep, low energy and poor concentration.

Depression is ranked by the World Health Organisation (WHO) as the single largest contributor to global disability and as well as a major contributor to suicide deaths, especially among youths. Furthermore, in 2015, the World Health Organisation reported that 4.4% of global population were

living with depressive illness. Disease burden can be measured by metrics, such as disability-adjusted life years (DALYs) or health-adjusted life years (HALYs) that account for both early mortality and loss of functioning. The Global Burden of Disease Study 2010 found that depressive disorders represented the second leading cause of disability worldwide.

Notably, there is an emerging interest in the role of physical exercise in the management of depression, following early evidences consistently showing that physical activity is effective in reducing mild-to-moderate unipolar depression. In Nigeria, depression has been reported to be prevalent among students of tertiary institutions. However, there is a dearth of information regarding the relationship of physical exercise and depression among students in Nigeria. Thus, it is imperative to undertake an enquiry into the relationship between exercise and depression in the locality. This study therefore sought to investigate the relationship between physical exercise and depressive symptoms among students of a tertiary institution.

METHODOLOGY
Study Site
The study site was AlvanIkoku Federal College of Education (AIFCE) Owerri, the capital of Imo State, Nigeria. The college has five academic schools, one gymnasium, a football field and different courts for basketball, volleyball, handball and tennis.

Study design and Study population
A cross-sectional study was employed in this study. The study population comprised of students of AIFCE, Owerri.

Sample size calculation and Sampling techniques
Sample size formula for cross-sectional study was utilized in this study[11]. Using the standard normal deviate of 1.96, proportion of depression among students of 23.8% from a study in Nigeria and error limit of 5%; a minimum sample size of 279 was obtained, which was rounded off to 300.

Sampling technique employed multi-stage sampling method in the study.

Stage I: A sampling frame comprising of the five academic schools of the college was drawn. From which, three (3) schools were selected using simple random sampling via ballot.

Stage II: Two departments were then selected from each of the three sampled schools in stage I by simple random sampling technique, making a total of six selected departments.

Stage III: In each of the selected department, the list of students comprised the sampling frame. Simple random sampling using table of random numbers was employed to select students. The number of students to be sampled from each of the six selected departments was determined using proportionate to size calculation. Therefore, the selected departments with higher number of students had higher sample representation, and vice versa.

Data collection
Data were collected using a self-administered structured tool comprising of the following: Socio-demographic questionnaire on personal data; Godin-

The Nigerian Health Journal, Volume 19 No 3, July to September, 2019
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Leisure time exercise questionnaire (GLEQ); and Becks Depression Inventory (BDI).

The socio-demographic questionnaire on personal data was used to obtain information on participant's age, gender and marital status of the respondents. The GLEQ comprises of two sections for the assessment of physical activity. The first section has three aspects for collection of data on the weekly frequencies for strenuous, moderate and light activities. The total weekly leisure activity score is calculated in arbitrary units by summing the products of the separate components as shown in the formula: weekly leisure activity = (9 x strenuous) + (5 x moderate) + (3 x light).The second section assess the frequency of weekly leisure time physical activity. Those who often engage in physical activity were classified as "those who regularly participate in physical exercise"; while those who tick the sometimes and never/rarely option in physical activity engagement were categorized as "those who do not regularly participate in physical exercise".

The BDI is a 21 item self-report inventory. It is one of the most widely used instruments for screening and estimating the intensity of depression. Each item has four statements and the respondents choose that which applies best to their feelings over the previous two weeks. A value of 0-3 is assigned to each answer and then the total is computed to determine the severity of depression. Higher scores indicate more depressive symptoms.

Validity and Reliability of Study Instruments

The BDI has been correlated with another depression rating scale-the Hamilton Depression Rating Scale. It has also been validated in Nigeria. The BDI has been reported to have high test-retest reliability and a high internal consistency.

Validity studiesfor GLEQ showed significant correlation coefficients in relation to other measures of physical activity. Godin leisure exercise questionnaire has demonstrated high test-retest reliability.

Statistical Analysis

Data analysis was performed using IBM Statistical Package for Social Science (SPSS) version 20. Depressive symptoms based on BDI scores were the dependent variable. The independent variables were socio-demographic characteristics, and physical exercise. Categorical variables were expressed as proportions and the differences in proportions were compared using Chi square or Fisher's exact test as appropriate. Data were tested for normality using Kolmogorov-Smirnov statistics and found to be normally distributed. Consequently, parametric tests of independent t-test and one-way Analysis of Variance (ANOVA) were used for determining significant differences across mean scores at significant level of 0.25. Statistically significant independent variables were entered into multivariate analysis model to control for any confounding influence. Multivariate analysis employed multiple linear regression using the BDI scores as the dependent variable. Confidence interval was set at 95% and p-value of less than 0.05 was considered statistically significant at multivariate analysis.

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Ethical Consideration

The principles of Ethics were upheld in present research. Permission to carry out the study was obtained from AIFCE Department of Physical and Health Education research accreditation board. Informed consent was obtained from the respondents prior to their inclusion in the study. Participation was voluntary. Confidentiality of information and anonymity were maintained in the course of data collection. Trained school counsellors were available to offer mental health support on request.

RESULTS

A total of 300 questionnaires were administered for the study among which 292 respondents completed and returned their questionnaires giving a response rate of 97.3%.

Socio-demographic findings

The mean age was 22.8 years (± 4.34). The age range was 17 years to 43 years. Most of the respondents were females (64%) and only 36%were males. Two hundred fifty five of the respondents (87.3%) were single and only 37 respondents were married constituting 12.7% of the respondents (Table 1).

Table 1. Socio-demographic characteristics of students in the study

Variables (N=292)	n	%
Age		
< 20 years	106	36.3
20 - 24 years	105	36.0
25 - 29 years	62	21.2
30 - 34 years	10	3.4
35 - 39 years	8	2.7
≥ 40 years	1	0.3
Sex		
Male	105	36.0
Female	187	64.0
Marital Status		
Single	255	87.3
Married	37	12.7

Engagement in Physical Exercise

A total of one hundred and eighty-seven (64.0%) of respondents did not participate in physical activities regularly, while 105 (36.0%) of the respondents regularly participate in physical exercise (Figure 1).
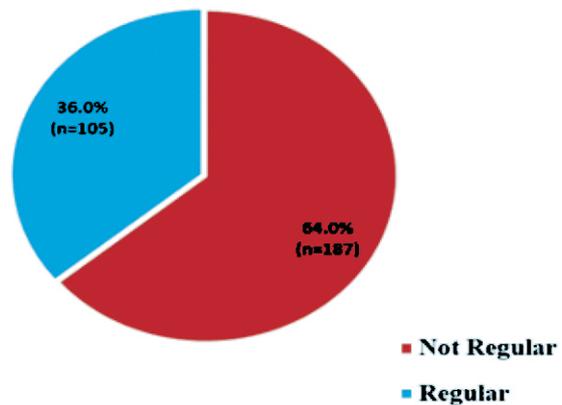
Figure 1. Distribution of engagement in physical exercise (regular/not regular) among students

Comparison of engagement in physical exercise across age categories, sex and marital status showed no statistically significant differences (Table 2).

Table 2. Socio-demographics and physical exercise among students

Variables (N = 292)	Physical Exercise		Total n (%)
	Regular n (%)	Not regular n (%)	
Age category			
<20 years	44 (41.5)	62 (58.5)	106 (100.0)
20 – 24 years	29 (27.6)	76 (72.4)	105 (100.0)
25 – 29 years	24 (38.7)	38 (61.3)	62 (100.0)
30 – 34 years	4 (40.0)	6 (60.0)	10 (100.0)
35 – 39 years	4 (50.0)	4 (50.0)	8 (100.0)
≥ 40 years	0 (0.0)	1 (100.0)	1 (100.0)
	Fisher's exact = 0.030; p-value =0.904		
Sex			
Male	40 (38.1)	65 (61.9)	105 (100.0)
Female	65 (34.8)	122 (65.2)	187 (100.0)
	Chi Square = 0.325; p-value = 0.569		
Marital status			
Single	91 (35.7)	164 (64.3)	255 (100.0)
Married	14 (37.8)	23 (62.2)	37 (100.0)
	Chi Square = 0.065; p-value = 0.799		

Depressive Symptoms Score (BDI)
The mean BDI (depressive symptoms) score was 15.3±10.7, the median score was 14.00, with a range from 0.0 to 46.

Table 3 shows the comparison of BDI scores across the socio-demographic categories. At significant level of 0.25, the differences in BDI scores by age groups and marital status were statistically significant. For the age categories, respondents aged below 24 years had lower BDI scores, while those aged above 35 years had higher BDI scores.

BDI scores between male and female respondents were similar,15.32±11.80 and 15.31±10.03 respectively (t=0.010; p-value=0.992).

BDI scores were higher among married respondents (18.30±12.12) in comparison to single counterparts (14.88±10.41).

Table 3: Comparison of Mean BDI by engagement in physical exercise and socio-demographic factors

Variables	BDI scores Mean ± S.D
Engagement in physical exercise	
Regular	13.23±10.79
Not regular	16.49±10.46
	t = -2.525; p-value = 0.012*
Age	
< 20 years	14.67±9.63
20 – 24 years	14.79±9.98
25 – 29 years	15.44±11.76
30 – 34 years	19.60±13.71
35 – 39 years	23.87±17.28
≥ 40 years	20.00±0.00
	ANOVA = 1.532; p-value = 0.180*
Sex	
Male	15.32±11.80
Female	15.31±10.03
	t = 0.010; p-value = 0.992
Marital Status	
Single	14.88±10.41
Married	18.30±12.12
	t = -1.825; p value = 0.069*

*Statistically significant *p*<0.25   S.D – Standard deviation

BDI (Depressive Symptoms) and Engagement in Physical Exercise

The mean BDI score was significantly (p=0.012) lower among respondents who regularly engaged in physical activity (13.23±10.79) in comparison to those who did not regularly engage in physical activity (16.49±10.46) as shown in Table 3.

Multiple linear regression analysis showed that relationship between BDI (Depressive Symptoms) and engagement in physical activity remained statistically significant after controlling for age and marital status. The coefficient (B= -3.317) from multiple linear regression analysis shows that BDI scores reduces by 3.317 with regular physical exercise (p-value=0.010) as shown in Table 4.

Table 4: Multiple linear regression analysis showing the influence of regular physical activity, age and marital status (independent variables) on depressive symptoms based on BDI (dependent variable)

Independent variables	Coefficient	95% Confidence limit of β		p-value
		Lower	Upper	
Regular physical activity	-3.317	-5.847	-0.787	0.010*
Age	0.137	-0.165	0.440	0.373
Marital status	2.813	-1.126	6.752	0.161
Constant	13.525	6.013	21.038	0.0001

*Statistically significant p<0.05

DISCUSSION
The finding that higher proportion of the students do not regularly participate in physical exercise in index study agrees with other studies who also opined that most students do not participate in physical activity".This possibly reveals that many students may not have been well informed about the benefits of physical exercise. Notably, the presence of gymnasium, football field and courts for basketball, volleyball, handball and tennis in the index study area, did not translate to greater proportion of

students engaging in physical activity. Thus, the state of sports facilities in our tertiary institutions may also need to be looked into as this may have implications regarding the desirability of these facilities for students. Although, the present study did not assess knowledge on benefit of physical exercise, the findings highlight the need for future studies to assess the perceived knowledge of students on the usefulness of physical activity.

The study supports findings that physical exercise plays a preventive role in the occurrence of depressive symptoms as significantly lower depressive scores were reported among those who regularly engage in physical activity. Also consistent with index study, is a recent meta-analysis, which concluded that exercise is an evidenced based treatment for depression. Noteworthy, elevation in the medial prefrontal glucocorticoid and dopamine has been implicated in the antidepressant-like effect of exercise.

The multivariate analysis showed that the relationship between physical exercise and depressive symptoms are not influenced by socio-demographic factors of age and marital status. Consequently, physical exercise among the youths irrespective of age and marital status should be encouraged by both mental health experts and sports experts. Although, several factors could contribute to the occurrence of depression, regular engagement in physical activity should be encouraged as it could help in curbing depression. Therefore, students should balance their time effectively for both learning and leisure activities including participation in physical exercises.

The absence of clinical interview for depression among the students in present study is a limitation of the study, nonetheless the study used a validated self-administered tool for assessing depressive symptoms. However, the authors advocate that further studies be carried out using diagnostic interviews.

CONCLUSION
The involvement of students in regular physical exercise is poor, as about 6 in 10 students do not regularly engage in physical exercise from the study. Physical exercise has a preventive influence on the occurrence of depressive symptoms irrespective of age, sex and marital status. Thus, experts in mental health and sports, as well as other stakeholders at different levels need to encourage regular physical exercise among students in Nigeria.

REFERENCES
1. Stampfer MJ, Hu FB, Manson JE, Rimm EB, Willett WC. Primary prevention of coronary heart disease in women through diet and lifestyle. *N Engl J Med.* 2000;**343**:16-22.
2. Yeh H-P, Stone JA, Churchill SM, Brymer E, Davids K. Physical and Emotional Benefits of Different Exercise Environments Designed for Treadmill Running. 2017 [cited 2020 Feb 24]; Available from: www.mdpi.com/journal/ijerph
3. Hogan CL, Catalino LI, Mata J, Fredrickson BL. Beyond emotional benefits: Physical activity and sedentary behaviour affect psychosocial resources through emotions. *Psychol Heal.* 2015;**30**:354-69.
4. Havard Medical School. Exercise is an all-natural treatment to fight depression.

The Nigerian Health Journal, Volume 19 No 3, July to September, 2019
www.tnhjph.com
A Publication of Nigerian Medical Association, Rivers State, Nigeria

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Havard Heal Publ. 2018;1.

5. World Health Organization. Mental disorders. Fact Sheets. 2019 [cited 2020 Feb 24]. p. 1. Available from: https://www.who.int/news-room/fact-sheets/detail/mental-disorders

6. World Health Organisation. Depression and Other Common Mental Disorders: Global Estimates . Geneva, Switzerland. 2017 [cited 2020 Feb 24]. p. 4-24. Available from: https://www.google.com/search?client = f i r e f o x - b - d&q=Depression+is+ranked+by+the+World+Health+Organisation+%28WHO%29+as+the+single+largest+contributor+to+global+disability+and+as+well+as+a+major+contributor+to+suicide+deaths%2C+especially+among+youths.

7. Whiteford HA, Ferrari AJ, Degenhardt L, Feigin V, Vos T. The global burden of mental, neurological and substance use disorders: An analysis from the global burden of disease study 2010. PLoS One. 2015;10.

8. Paluska SA, Schwenk TL. Physical activity and mental health: Current concepts. Vol. 29, Sports Medicine. Adis International Ltd; 2000. p. 167-80.

9. Adewuya AO, Ola BA, Aloba OO, Mapayi BM, Oginni OO. Depression amongst Nigerian university students: Prevalence and sociodemographic correlates. *Soc Psychiatry Psychiatr Epidemiol.* 2006;**41**:674-8.

10. Peltzer K, Pengpid S, Olowu S, Olasupo M. Depression and associated factors Among University students in Western Nigeria. *J Psychol Africa.* 2013;**23**:459-65.

11. Araoye MO. Research methodology with statistics for Health and Social Sciences.

Nathadex Publ. 2004;115-129.

12. Adeniyi A, Okafor N, Adeniyi C. Depression and physical activity in a sample of Nigerian adolescents: levels, relationships and predictors. *Child Adolesc Psychiatry Ment Health.* 2011;**5**:16-9.

13. Sikes EM, Richardson EV, Cederberg KJ, Sasaki JE, Sandroff BM, Motl RW. Use of the Godin leisure-time exercise questionnaire in multiple sclerosis research: a comprehensive narrative review. Vol. 41, Disability and Rehabilitation. Taylor and Francis Ltd; 2019. p. 1243-67.

14. Beck A, Ward CH, Mendelson M. An inventory for measuring depression. *Arch Gen Psychiatry.* 1991;**4**:561-85.

15. Awaritefe A. The Beck Depression Inventory in relation to some commonly used tests in Nigeria. *Niger J Basic Appl Psychol.* 1998;**1**:23-8.

16. Adewuya AO, Ola BA, Aloba OO. Prevalence of major depressive disorders and a validation of the beck depression inventory among Nigerian adolescents. *Eur Child Adolesc Psychiatry.* 2007;**16**:287-92.

17. Beek A, Steer R, Brown G. Manual for Beck Depression lnventory-ll. Man beek Depress Invent -11 san Antonio, Texas Psychol Coop Pp 12-17. 1996;

18. Sallis JF, Buono MJ, Roby JJ, Micale FG, Nelson JA. Seven-day recall and other physical activity self-reports in children and adolescents. *Med Sci Sports Exerc.* 1993;**25**:99-108.

19. Jacobs JD, Ainsworth BE, Hartman TJ, Leon AS. A simultaneous evaluation of 10 commonly used physical activity questionnaires. *Med Sci Sports Exerc.* 1993;**25**:81-91.

The Nigerian Health Journal, Volume 19 No 3, July to September, 2019
www.tnhjph.com
A Publication of Nigerian Medical Association, Rivers State, Nigeria

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20. Oyeyemi AL, Ishaku CM, Oyekola J, Wakawa HD, Lawan A, Yakubu S, et al. Patterns and associated factors of physical activity among adolescents in Nigeria. *PloS one* 2016;**11**. 2016;11:1-6.

21. Umeifekwem JE. Awareness of health-related benefits of physical activity (PA)and habitual participation in PA among undergraduate students in selected Nigerian universities. *Int J Educ Res.* 2011;**11**:226-232.

22. Landers, DM. The influence of exercises on mental health. In: In CB Corbin & RP Pangrazi (Eds) Towards a better understanding of physical fitness & activity. 1999. p. 136-43.

23. Atlantis E, Chow CM, Kirby A, Singh MF. An effective exercise-based intervention for improving mental health and quality of life measures: a randomized controlled trial. *Prev Med.* 2004;**39**:424-34.

24. Barreto Schuch F, Vancampfort D, Richards J, Rosenbaum S, Ward PB, Stubbs B. Exercise as a treatment for depression: a meta-analysis adjusting for publication bias. *J Psychiatr Res.* 2016;**77**:42-51.

25. Chen C, Nakagawa S, Kitaichi Y, An Y, Omiya, Y, Song N, Koga M, Kato A IT, I. K. The role of medial prefrontal corticosterone and dopamine in the antidepressant-like effect of exercise. *Psychoneuroendocrinology.* 2016;**69**:1-9.

The Nigerian Health Journal, Volume 19 No 3, July to September, 2019
www.tnhjph.com
A Publication of Nigerian Medical Association, Rivers State, Nigeria

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