Relationship Between Admission Qualification and Final Grade Point Average of Graduates of a Physiotherapy Programme in a Nigerian University

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Abstract

In order to facilitate admission of candidates with aptitude to successfully complete a course of study, educators are always in search of factors that may be associated with performance outcome. This study was aimed at determining the relationship between admission qualification and final cumulative grade point average (FGPA) of graduates of the Physiotherapy programme in a university in North Eastern Nigeria. The methods used in this study were: Being a retrospective study, records of 169 former students over a four-year period were pulled and data on the students' socio-demographics, admission qualifications; West African Senior School Certificate Examination/National Examination Council (WASSCE/NECO) scores, Direct Entry (DE) scores and remedial programme score, university entrance examination, Joint Admissions and Matriculation Board (JAMB), in-programme yearly Grade Point Averages (GPAs) and final cumulative GPA (FGPA) was collected. Descriptive statistics, Pearson product moment correlation and analysis of variance (ANOVA) was used to analyse the data as appropriate. The results were: The study shows a modest relationship between students JAMB score and FGPA ($r=0.340$, $p<0.001$), while WASSCE/NECO score was poorly but also significantly related to the FGPA ($r=0.171$, $p<0.01$). The GPA for year one ($r=0.777$), and the cumulative GPA (CGPA) at the end of years two ($r=0.837$), three ($r=0.933$) and four ($r=0.968$) separately, were moderately to strongly associated in increasing order of strength, with the FGPA ($p<0.001$). The conclusion reached was for the first four sets of Physiotherapy graduates of the University, there was a poor to tenuous link between admission qualification/entrance exam and FGPA, thus affirming the multi-factorial nature of the determinants of the final performance in physiotherapy programme in the university.

Keywords: *Admission Criteria, Physiotherapy Programmes, Performance Outcome, Grade Point Average*

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Introduction

Worldwide University admissions into health professional programmes are always competitive (Cook, 2010) and every year in Nigeria, the number of candidates seeking admission into the universities to study towards the health professions always far outnumber the available spaces (Ayodele, 2002). University admission is an elaborate process and varies widely from country to country and sometimes from institution to institution. In countries were physiotherapy is offered at the post-baccalaureate level such as in the US, Canada and Australia, admission requirements include achieving some set of minimum score in Graduate Record Examination (GRE), Health Science Reasoning Test (HSRT), personal interview ratings, personality or interest inventory scores, written composition (Essay) scores, letters of recommendation, motor dexterity test scores and biographical information (Balogun, 1988).

GRE tests are for analytical writing, verbal reasoning, quantitative reasoning skills, (Green, Sharon, & Ira, 2009). HSRT measures high-stakes reasoning and decision making processes (Sharp, Rebecca, & Keisha, 2013) and is specifically calibrated for trainees in health sciences educational programmes (undergraduate and graduate) and for professional health science practitioners. HSRT is used worldwide at high ranking health science education programmes and top rated medical centres. Scholastic Assessment Test (SAT) tests students' skills in writing, critical reading and mathematics which are needed for academic success in college. Also, standardised (aptitude) test scores are also common requirements for selection of students into medical and allied health professions education programmes (Balogun, 1988).

In the last decade, reliance on standardised criteria for eligible students into educational programmes in Nigeria has come under attack (Emaikwu, 2012). None of either the SAT, HSRT or standardised (aptitude) test above is applicable to students seeking admission in Nigeria, as the country has its own version of admission test called the Joint Admission Examination (JME). Since 1978, the JME which is a national examination organised by the Joint Admission and Matriculation Board (JAMB) has to be taken and passed (JAMB, 2002) in addition to meeting the requirements in subjects at the secondary education level (i.e. WASSCE/NECO). Since after the introduction of JME, many previous studies have been conducted on the predictor of success in health professional programmes including medicine (Olaleye & Salami, 1997; Salahdeen & Murtala, 2005), nursing (Wharrad, Chappel, & Price, 2003; Wolkowitz, 2010), pharmacy (Allen, 2001) and physiotherapy (Balogun, Abereoje, Obajuluwa, Oyeyemi, & Marzouk 1992; Amosun, Balogun, & Alawale 1996; Thieman, Weddle, & Moore, 2003).

Dockter (2001) studied a convenience sample of 107 students from a physical therapist education programme in the US and found a correlation of National Physical Therapy Examination (NPTE) score with core course GPA ($r=.341$, $P<.01$) and first year GPA ($r=.648$, $P<.05$). This study found that academic success was predicted by total admission points (comprised of scores attributed to pre-admission GPA, the oral interview and a writing sample) plus age on admission. Age was found to be inversely related to GPA. In Nigeria, according to Balogun Abereoje, Obajuluwa, Oyeyemi, & Marzouk (1992) data from the University Matriculation Examination (UME) and WASCE showed weak correlation while GPA scores showed stronger correlation. In USA where physiotherapy is post-Baccalaureate programme Grade Point Average (GPA) and GRE scores were good predictors of students' academic success (Balogun, Karacoloff, & Farina, 1986; Balogun, 1988; Kirchner, Holm, Ekes, & Williams, 1994; Scott, Chase, Lefkowitz, Morton-Rias, Chambers & Joe, 1995; Agho, Mosley, & Williams, 1999; Dockter, 2001; Utzman, Riddle, & Jewell, 2007) and success in national licensing examination (Utzman et al, 2007).

Amosun, Balogun & Alawale (1996) also reviewed records of students at University of Ibadan, Nigeria. They concluded that pre-admission requirements were not significantly related to academic and clinical performance and generally entrance examination poorly predicted students' university academic achievement. In Nigeria, physiotherapy programme is a 5-year long bachelors' degree level and students are admissible after their secondary education that leads to external examination including West African Examination Council (WAEC) and National Examination Council (NECO) examinations or both. Previously, Balogun, Abereoje, Obajuluwa, Oyeyemi, & Marzouk (1992) had concluded that JAMB and WASSCE admission requirements were not related to academic and clinical performance and that the present criteria used for selection should be reviewed. Furthermore, students with post-secondary qualifications such as the General Certificate of Education (GCE) at advanced level in relevant subjects are also admissible to the programme through Direct Entry (DE) for 4 years. At the University of Maiduguri, students may also be admitted through a remedial programme that allows disadvantaged students to re-mediate any deficiency in the science subjects. Students in other science programmes in the University may also be allowed to [2]transfer to physiotherapy department at either 100 or 200 levels of study.

Several decades back, it was recognised that educators will always be concerned with admitting candidates with aptitude to successfully complete

[2]Undergraduate students' handbook, 2009.

the courses of studies for which the students were admitted and would continue to search for the best criteria by which student-selection decisions can be based (Balogun, 1988). The aim of this study is therefore to determine the relationship between admission qualification and final cumulative grade point average (FGPA) of graduates of the physiotherapy programme in a university in North Eastern Nigeria. This study has implications for identifying candidates and students who may be at risk of not succeeding in the programme and who may need counselling or other interventions to facilitate success during their course of study in the programme.

Method

Participants: Records of 193 Physiotherapy graduates (N=193) of Department of Medical Rehabilitation University of Maiduguri were pulled out to obtain information about their entry qualification as well as their performance during the programme. In this retrospective study, data of 169 students that have graduated from the programme in the year 2010, 2011, 2012 and 2013 were collected and computed.

Procedure

Ethical approval was sought and obtained from the Research and Ethical Committee of University of Maiduguri Teaching Hospital (UMTH) before commencement of the study. Official permission was sought from the Head of Department of Medical Rehabilitation, University of Maiduguri to access files of the graduates. Anonymity was assured as data were used and reported in aggregate forms only; names were not needed in the data sheet. Also, confidentiality was assured. Upon obtaining a file containing the record, the necessary informations were recorded on a data sheet. A data collection sheet was used to extract the following information from each student's file; age, gender, state of origin, religious affiliation, admission route, year of admission, number of years spent in the programme, number of repeats and year of graduation.

Also obtained were information on WASSCE/NECO score in five core science subjects comprising English, Mathematics, Physics, Chemistry and Biology passed in at most two sittings. Also obtained were percentage of JAMB score, CGPA score year one, CGPA score year two, CGPA score year three, CGPA score year four, CGPA score year five and overall CGPA. Computed scores were combined WASSCE/NECO also JAMB/remedial score were combined and converted. In addition, converted JAMB score was obtained by multiplying the main JAMB score (which has a maximum score of 400) by 5 and dividing it by 400 so as to be able to compare it with the remedial score which has a maximum score of 5.0. Points were assigned to

grades obtained in WASSCE and NECO (A=1, B=2, C=3, D=4, E=5, F=6). The sum of the assigned points was the overall WASSCE/NECO score. Therefore, the lower the score, the better the performance while the higher the score, the poor the performance.

Data Analysis

The data obtained in this study were analysed as follows. Descriptive statistics of mean, standard deviation and percentage were used to describe socio-demographic characteristics, various admission criteria examination scores and in-program CGPA scores. Pearson product moment correlation was used to determine the relationship between the dependent variable which is academic performance and the independent variables which are JAMB and WASSCE scores. The data were further analysed using analysis of variance (ANOVA) to determine the variation in the independent variables which are the WASSCE and JAMB scores. The level of statistical significance was set at 0.05.

Results

Socio-demographic characteristics of students whose records were obtained were analysed thus: Information from graduates comprising 100 males (59.2%) and 69 females (40.8%) were obtained and analysed. From the files, the mean age of the students at the time of admission into the University was 20.62±2.97 (range from 17 and 42 years). Majority of the students were from North-East region (n=112, 66.7%) and North-West region had the lowest number of students (n=4, 2.4%). Fifty nine (35.1 %) of the students were admitted through the remedial route, whereby those admitted by direct were few (n=9, 5.4%). Complete details of socio-demographic characteristics of the students are presented in Table 1.

Table 1: *Socio-demographic characteristics of students whose records were analysed*

Variables	Number (n)	percentage (%)
Gender		
Male	100	59.2
Female	69	40.8
Religion		
Christianity	78	46.2
Islam	91	53.8
Region of Origin		
North-East	112	66.7
North-West	4	2.4
North-Central	19	11.3
South-West	8	4.8
South-South	10	6.0
South-East	15	8.9
Year of Admission		
2004	32	18.9
2005	46	27.2
2006	59	34.9
2007	32	18.9
Admission Route		
Remedial	59	35.1
Jamb	81	48.2
Direct Entry	9	5.4
Transfer	19	11.3
Year of Graduation		
2010	23	13.6
2011	44	26.0
2012	60	36.5
2013	42	24.9
Number of Repeat		
No repeat	?	?
Once	20	80.0
Twice	5	20.0

Mean Entry Score, In-Programme Performance Grades and Years Spent In-Programme for all the Students

The mean years spent in program was 5.01±0.60. The mean WASSCE and NECO score were 13.86±1.90 and 14.68±2.04 respectively for males; and 14.11±2.10, 14.16±2.53 respectively for female. The mean percentage JAMB score for the combined group was 49.74±6.77 while the mean remedial score for the combined group was 3.01±0.68. The mean GPA for year 2 for the combined group was 3.12±0.66 while the mean CGPA for the combined group was 3.16±0.57. The age of the male on admission was significantly higher than that females (p=0.02). The CGPA in year 1 was higher for males than females (p=0.01) (3.34±0.71, 2.98±0.50), similarly, the CGPA year 2 for the male was higher than that of females (0.02). There was no significant difference in the CGPA and GPA for other years. Details is contained on table 2. It will be observed that the GPA increases each year with the GPA in year 2 being the lowest followed by the year one GPA. The GPA in year 5 is the highest.

Table 2: *Difference in mean age, remedial score, JAMB score, WASSCE score, NECO score and in-programme performance grades by gender*

Variable	Male	Female	Total	P-value
Age (years)	21.21±3.5	19.80±1.8	20.62±2.9	0.02*
Years in Programme	5.01±0.6	5.01±0.6	5.01±0.6	0.96
WASSCE score	13.86±1.9	14.11±2.1	13.99±1.9	0.61
NECO score	14.68±2.0	14.16±2.5	14.51±2.2	0.31
JAMB score (%)	51.14±5.8	47.71±7.6	49.74±6.7	0.02*
Remedial score	3.21±0.8	2.91±0.5	3.01±0.6	0.07
GPA Year 1	3.33±0.7	2.98±0.5	3.00±0.6	0.01*
CGPA Year 1	3.34±0.7	2.98±0.5	3.20±0.6	0.01*
GPA Year 2	3.20±0.7	2.99±0.6	3.12±0.6	0.06
CGPA Year 2	3.28±0.6	2.97±0.5	3.16±0.5	0.02*
GPA Year 3	3.80±0.4	3.82±0.4	3.79±0.4	0.50
CGPA Year 3	3.51±0.5	3.31±0.4	3.39±0.4	0.06
GPA Year 4	4.00±0.4	3.99±0.4	4.01±0.4	0.97
CGPA Year 4	3.71±0.5	3.52±0.4	3.60±0.4	0.08
GPA Year 5	4.11±0.4	4.10±0.4	4.10±0.7	0.60
CGPA Year 5	3.72±0.4	3.61±0.4	3.70±0.4	0.11

Key: WASSCE=West African Senior School Certificate Exam, NECO=National Examination Council, JAMB=Joint Admission and Matriculation Board, GPA=Grade Point Average, CGPA=Cumulative Grade Point Average, while (*) indicates significant difference.

Differences in Mean Age, Entry Scores and In-Programme Grades Between Groups (Years of Graduation)

Students that graduated in year 2010 had mean fifth year CGPA or graduating CGPA of 3.6±0.3. Students in year 2011 had mean fifth year CGPA of 3.6±0.4, those who graduated in 2012 had a mean fifth year CGPA of 3.7±0.4 while those who graduated in 2014 had a mean fifth year CGPA of 3.8±0.4. Significant difference was found in mean third year GPA between graduates of 2010 and 2012 and also between those of 2011 and 2012 ($p<0.000$). Those that graduated in year 2012 had higher mean third year GPA (3.9±0.4) than those that graduated in years 2010 (3.6±0.3) and 2011 (3.6±0.3), but not for those that graduated in year 2014 (3.8±0.4).

Significant difference was found in the mean fourth year GPA between graduates of 2010 and 2011, between 2010 and 2012 and between 2010 and 2014 ($p<0.000$). Those that graduated in year 2011 (3.9±03) had higher mean fourth year GPA than those that graduated in year 2010 (3.5±0.4) but not for those that graduated in years 2012 (4.0±0.4) and 2014 (4.1±0.4). Significant difference was also found in the mean fifth year GPA between those that graduated in years 2010 and 2011, between years 2010 and 2012 and between years 2010 and 2014 ($p<0.000$). Those that graduated in year 2010 had higher mean fifth year GPA (4.6±0.2) than those that graduated in the other years. Complete details can be found in Table 3.

Table 3: *Difference in mean age, entry scores and in-programme grades between groups*

Variable	2010	2011	2012	2014	P-value
Age	20.4±1.8	21.4±4.9	20.4±2.1	20.2±1.5	0.24
GPA Year 1	3.3±0.6	3.1±0.8	3.2±0.5	3.3±0.6	0.47
CGPA Year 1	3.3±0.6	3.1±0.8	3.2±0.5	3.3±0.6	0.48
GPA Year 2	2.9±0.6	2.9±0.8	3.1±0.4	3.3±0.6	0.19
CGPA Year 2	3.1±0.5	3.1±0.7	3.1±0.4	3.3±0.6	0.29
GPA Year 3	3.6±0.3	3.6±0.3	3.9±0.4	3.8±0.4	<0.01*
CGPA Year 3	3.3±0.4	3.2±0.5	3.5±0.4	3.5±0.5	0.09
GPA Year 4	3.5±0.4	3.9±0.3	4.0±0.4	4.1±0.4	<0.01*
CGPA Year 4	3.4±0.3	3.5±0.5	3.6±0.4	3.7±0.4	0.03
GPA Year 5	4.6±0.2	4.0±0.4	4.1±0.3	4.1±0.4	<0.01*
CGPA Year 5	3.6±0.3	3.6±0.4	3.7±0.4	3.8±0.4	0.13
JAMB score	47.3±4.8	50.2±7.3	48.4±6.4	51.4±7.0	0.35
WASSCE score	14.0±2.6	14.3±1.7	14.2±2.2	13.5±1.7	0.50
NECO score	13.3±3.3	14.7±1.8	14.7±2.3	14.8±1.5	0.17
Remedial score	3.2±0.6	3.1±0.7	3.0±0.6	2.9±0.9	0.77
Years in Programme	4.9±0.3	4.9±0.6	5.1±0.7	5.1±0.6	0.12
Years of Repeat	0.0±0.0	1.0±0.0	1.3±0.5	1.2±0.4	0.35

Key: WASSCE=West African Senior School Certificate Exam, NECO=National Examination Council, JAMB=Joint Admission and Matriculation Board, GPA=Grade Point Average, CGPA=Cumulative Grade Point Average, while (*) indicates significant difference.

Difference by Admission Route

Results for mean fourth year CGPA showed that those admitted via direct entry had significantly higher score than those admitted via remedial JAMB and those transferred from other departments (p=0.026). Also, results for fifth year CGPA showed that those admitted via direct entry had higher score than those admitted via remedial, JAMB, and those who transferred from other departments (p=0.046). Significant difference was found in the mean age on admission with those admitted via direct entry having higher

mean age on admission (26.0±8.4) than those admitted via remedial (20.6±1.7), and those transferred from other departments (20.7±2.2) in addition to those admitted through JAMB (19.9±2.2). Significant difference was also found in the mean years spent in programme between those admitted through remedial and direct entry, remedial and transfer from other departments, JAMB and direct entry, JAMB and transfer ($p<0.000$). (*see* Table 4.)

Table 4: *Difference in admission routes*

Variable	Remedial	JAMB	Direct Entry	Transfer	P-value
Age	20.6±1.7	19.9±2.2	26.0±8.4	20.7±2.2	<0.01*
No of Repeats	1.2±0.4	1.3±0.5	1.0±0.0	1.0±0.0	0.75
WASSCE score	4.3±2.0	13.7±1.9	15.8±2.5	13.8±1.5	0.17
NECO score	14.8±2.6	14.4±1.8	14.2±2.4	13.9±2.2	0.52
GPA Year 1	3.2±0.7	3.3±0.6	0.0±0.0	3.0±0.5	0.12
CGPA Year 1	3.2±0.7	3.3±0.6	0.0±0.0	3.0±0.5	0.12
GPA Year 2	3.0±0.7	3.3±0.6	3.2±o.7	2.9±0.6	0.17
CGPA Year 2	3.1±0.6	3.3±0.5	3.1±0.6	3.0±0.5	0.34
GPA Year 3	3.7±0.5	3.9±0.5	3.9±0.6	3.7±0.4	0.05*
CGPA Year 3	3.3±0.5	3.5±0.5	3.6±0.6	3.3±0.4	0.13
GPA Year 4	3.9±0.4	4.1±0.4	4.1±0.5	.9±0.4	0.10
CGPA Year 4	3.5±0.4	3.7±0.4	3.9±0.6	3.5±0.3	0.03
GPA Year 5	4.0±0.4	4.1±0.3	4.2±0.3	4.0±0.5	0.66
CGPA Year 5	3.6±0.4	3.7±0.4	3.9±0.5	3.6±0.3	0.04
Years in Programme	5.2±0.5	5.2±0.5	4.1±0.3	4.2±0.4	<0.01*

Key: WASSCE=West African Senior School Certificate Exam, NECO=National Examination Council, JAMB=Joint Admission and Matriculation Board, GPA=Grade Point Average, CGPA=Cumulative Grade Point Average, while (*) indicates significant difference.

Relationship Between admission Criteria In-Programme CGPAs and Final CGPA

Final CGPA or CGPA year 5 was correlated with in-programme grades, WASSCE/NECO score and JAMB/remedial score. Significant statistically positive correlation was found between CGPA 5 and all the admission variables (*see* Table 5). There was significant correlation between WASSCE/NECO score and final cumulative grade point average (CGPA 5)

at the end of the programme (p-value = 0.044). There was significant correlation between JAMB score and final cumulative grade point average (CGPA 5) at the end of the programme (p-value = <0.0001).

The study also found significant correlation between CGPA score in the first year and final cumulative grade point average (CGPA 5) at the end of the programme (p-value = <0.0001). There was significant correlation between CGPA in the second year and final cumulative grade point average (CGPA 5) at the end of the programme. (p-value = <0.0001). There was significant correlation between CGPA in the third year and final cumulative grade point average (CGPA 5) at the end of the programme (p-value = <0.0001), as well as between CGPA in the fourth year and final cumulative grade point average (CGPA 5) at the end of the programme (p-value = <0.0001)

Table 5: *Relationship between admission score, in-programme CGPAs and final CGPA*

Variables	**Correlation Coefficient(r)**	**P-value**
WASSCE/NECO and CGPA year 5	0.171	< 0.01*
JAMB and CGPA year 5	0.340	< 0.01*
CPGA Year 1 and CGPA year 5	0.777	< 0.01*
CGPA Year 2 and CGPA year 5	0.837	< 0.01*
CGPA Year 3 and CGPA year 5	0.933	< 0.01*
CGPA Year 4 and CGPA year 5	0.968	< 0.01*

Key: WASSCE=West African Senior School Certificate Exam, NECO=National Examination Council, JAMB=Joint Admission and Matriculation Board, GPA=Grade Point Average, CGPA=Cumulative Grade Point Average, while (*) indicates significant difference.

Discussion

The current study showed that male students had better GPA and CGPA than female students in the first and second years of the programme but not in any of the other years or their final CGPA. The reason for the difference in the first two years is unclear. Perhaps, the better performance by the male is a result of this group's better JAMB score when compared with their counterparts. It can however be argued that any differences at the beginning of the programme has become eliminated in the last three years of the programme. This study found age to have no significant relationship with academic performance.

Better final CGPA for those admitted via direct entry than students admitted via other routes may be understandable perhaps because these students had been exposed to post-secondary education and the intricacies in semester course system and may have already become test wise and matured for university education than others **(**Gbore, 2013). This corroborates with the reports of Oluwatayo (2003) and Adonis (2005) that reported that performance in advance level papers correlated well with academic performance. The findings of the present study shows that in-programme GPA correlates positively with final performance is in agreement with the findings in previous studies by (Peat, Woodbury, & Donner, 1982; Balogun, Abereoje, Obajuluwa, Oyeyemi, & Marzouk 1992; and Docter, 2001) which suggests that in-programme grades are good predictors of success.

In the present study, ordinary level score (WASSCE/NECO) correlates very poorly ($r=0.171$, $p<0.0001$) with the final GPA, contrary to the findings among undergraduate social science students (Olaniyan, Ajayi, Oyekanmi, Obameala, & Alarape, 2006) in which general certificate of education ordinary level examination appeared to predict undergraduate performance as measured by CGPA. The finding of this study that shows that JAMB/remedial correlates modestly ($r=0.340$, $p<0.0001$) with final cumulative grade point average is also not in agreement with the findings on the social science students at the University of Ibadan. The above finding is not consistent with the present study that showed that ordinary level score (WASSCE/NECO) correlates weakly ($r=0.171$, $p<0.0001$) while JAMB/remedial correlates more strongly ($r=0.340$, $p<0.0001$) with final cumulative grade point average. This study found a tenuous association between WASSCE/NECO and final CGPA, which is in agreement with that of Okilagwe (2001) who reported a weak association between SSCE and academic performance from 6 Universities in the Southwestern Nigeria that specialised mostly in Arts, Education, Engineering, Law, Sciences and Social Sciences.

Absence of strong association between admission score and FGPA is not different from previous reports that found general public examination including JAMB and WASSCE admission requirements were not related to academic and clinical performance (Balogun, Abereoje, Obajuluwa, Oyeyemi, & Marzouk 1992; Amosun et al, 1996; Obioma and Salau, 2007) and is an indication that there is a multi-factorial link to final academic performance in physiotherapy programmes in this university. Perhaps this has made the introduction of other admission tests including Health Science Reasoning Test, GRE as admission criteria in some countries that offer post-baccalaureate degrees in physiotherapy.

Study Limitations

The finding of this study which shows that students admitted via direct entry seem to graduate with better CGPA than those admitted via JAMB and remedial should be interpreted with caution. This is because the total number of students admitted through DE is small (n-8). Significant difference found by routes of admission is not also surprising since those admitted by direct entry would naturally spend one year less in programme because they are placed at 200 levels compared to those admitted via JAMB or remedial route that begins at 100 levels.

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