RESEARCH ARTICLE

# Grit and its associated factors among final year pharmacy students in public universities in Nigeria: A cross-sectional study

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## Abstract

**Background:** Assessing grit among pharmacy students provides insights into the students' experiences as well as the importance of implementing interventions to increase their levels of grit. The purpose of this study was to assess students' grit in Nigerian pharmacy schools and to identify factors that predict the amount of grit among pharmacy students. **Methods:** This study utilised a nine-item questionnaire-based cross-sectional design among final-year pharmacy students from one public university in each of the six geopolitical zones of Nigeria for a month. Descriptive and inferential statistics were employed. **Results:** A total of 590 pharmacy students responded to the questionnaire (response rate = 66.89%). Most students, 409 (69.32%) were between the ages of 20 - 25 years. A majority, 573 (97.1%), reported being free from chronic diseases, and 427 (72.37%) reported being engaged in extracurricular activities. A group mean grit score of 37.091 ± 0.253 was observed. Students from all the schools reported "*Not like me*" 14 (2.37%) to "*I have overcome setbacks to conquer an important challenge*", while 275 (46.61%) chose "*Very much like me*". Predictors of high grit level were institution (*Beta*, *p-value*), mode of accommodation (β = 1.494, *p* = .039), and sponsorship (β = 4.207, *p* = .047). **Conclusion:** Pharmacy students in Nigeria have a high grit level, and the institution of study had an impact on the level of grit.

## Introduction

Grit is a non-cognitive factor that involves sustained efforts through every hurdle to achieve a long-term goal (Duckworth *et al.*, 2007). Grit can affect academic performance because it has a significant association with psychological performance due to its ability to lead to a reduction of anxiety and mental or emotional strain experienced by students (Zhang *et al.*, 2018; Mosanya, 2019). Over time, debates have been ongoing in the field of psychology on what makes some people successful in scenarios where other people fail to achieve their goals. Although the acquisition of skills and competencies as well as enabling opportunity have dominated the conversation, it is obvious that these

factors are insufficient to predict success (Duckworth & Gross, 2014). Grit, according to Duckworth *et al.* (2007), is "*perseverance and passion for long-term goals, especially in the face of adversity*". The concept has been identified as an important factor in academic performance, enabling learners to endure in the face of challenges and disappointments (Luthans *et al.*, 2019). Persistence and tenacity, rather than talent alone, are now believed to be the factors that contribute and influence the most, especially in educational pursuits. (Eskreis-Winkler *et al.*, 2014) Self-control is yet another essential indicator of success. It is the ability to restrain one's attention and actions in the face of temptation (Duckworth & Gross, 2014). However, due to the tremendous pressure that pharmacy students and the

whole healthcare industry have been under since the turn of the century, it is now imperative to position and understudy grit as a more holistic indicator of success (Abebe *et al.*, 2023).

A positive correlation has been reported to exist between grit and academic success and other desirable outcomes, such as greater levels of well-being and reduced stress (Duckworth *et al.*, 2007; Datu & Fong, 2018) The psychological concept of grit has recently gained a lot of attention, especially in relation to academic accomplishment. According to a study by Datu and Fong (2018), grit was a strong predictor of academic success among university students in Hong Kong, revealing that students with higher levels of grit outperformed their colleagues academically (Datu & Fong, 2018). Similarly, grit was found to be an important predictor of academic achievement in undergraduate Ivy League students in a research study by Duckworth *et al.* (2007). The study indicated that grit is a more accurate predictor of academic success than conventional indicators like standardised test scores and high school GPA (Duckworth *et al.*, 2007). Some factors such as place of residence, engagement in routine physical activities, intrigue with studying pharmacy, etc. have been shown to be significantly associated with higher levels of grit among undergraduate pharmacy students (Elnaem *et al.*, 2023)

Healthcare educators have been placing more emphasis on the idea of grit and its role in improving student performance. According to Kalsbeek *et al.* (2013), grit also consists of the non-cognitive abilities of persistence in effort and constancy in interest. Gritty people, especially teens, often express more happiness with themselves because they are ultimately dedicated to and motivated by long-term goals. (Datu *et al.*, 2022) In pharmacy education, resolve is positively related to other non-cognitive success indicators, such as stronger academic self-efficacy, or the conviction that one can complete a task. (Cooper, 2014) Grit is a contemporary issue in pharmacy education which needs to be explored and harnessed among students as curricula continue to undergo changes to meet expected pharmacy practice goals. The curriculum for pharmacy students is always evolving, necessitating that students leverage a combination of analytical thinking, problem-solving skills, as well as expertise transferable to clinical settings (Toklu & Hussain, 2013). Grit has been shown to be a positive factor that can influence and predict career consulting and career decision difficulties (Shin & Kelly, 2015; Pang *et al.*, 2021).

Despite its significance for academic and personal achievements, little is known about the grit levels of Nigerian undergraduate pharmacy students. Given the demanding requirements of the pharmacy curriculum and the major challenges that students encounter in finishing their studies, this is especially worrisome.

A study on grit is important because it will expand the current body of knowledge by analysing the levels and contributing variables among Nigerian undergraduate final-year pharmacy students. The findings of the investigation will additionally provide some insights into the difficulties pharmacy students experience and the necessity of creating opportunities to raise their levels of grit. Therefore, this study was conducted to evaluate student grit levels in Nigerian schools of pharmacy as well as to identify factors that influence grit levels among these students.

## Methods

### *Study design*

This study utilised a questionnaire-based cross-sectional survey for fifth-year undergraduate pharmacy students from selected pharmacy schools in Nigeria.

### *Study settings*

This study was conducted in public universities in Nigeria. Private universities were not eligible for selection because of the institutional bureaucracy involved in gaining access to their students. Some private universities do not allow their students to use mobile devices while others outrightly do not allow research surveys to be conducted among their students. In addition, the use of public universities might be a better representation of the students in the country, since they are the majority in number and admit more students.

Nigeria is geographically segmented into six zones: south-west (SW), south-south (SS), south-east (SE), north-east (NE), north-central (NC), and north-west (NW). In this study, one university was purposively selected from each zone to reflect a geographical representation of the country. The pharmacy undergraduate programme in Nigeria is still being run in all pharmacy schools as a Bachelor of Pharmacy programme, regulated by the Pharmacy Council of Nigeria. Thus, the following six institutions running the five-year Bachelor of Pharmacy (B.Pharm) degree were chosen: University of Nigeria Nsukka, UNN (SE), University of Port-Harcourt, UNIPORT (SS), University of Lagos, UNILAG (SW), University of Maiduguri, UNIMAID (NE), University of Jos, UNIJOS (NC), and Ahmadu Bello University, Zaria (ABU) - NW.

### Study sample

The study population was comprised of only fifth-year undergraduate pharmacy students of the participating public Nigerian universities. An eligibility criterion was that the students were in the fifth year of schools running the B.Pharm programme. At the time of this study, pharmacy schools which had begun the Doctor of Pharmacy programme were still in the third/fourth year of the six-year programme.

The estimated total number of final-year pharmacy students in each selected institution was 882. The minimum sample size required for this study was determined to be 640 using the Raosoft online sample size calculator, assuming a 50% response rate, 95% confidence level and 5% margin of error.

### Data collection tool

After an extensive search of the literature, a nine-item short grit questionnaire was employed for this study. Eight items were obtained from the study conducted by Elnaem and colleagues which measured grit levels among pharmacy students (Elnaem *et al*., 2023) and one item from the Duckworth Grit Scale *(Duckworth et al*., 2007). The validity and reliability of these items for measuring grit were determined in a small sample of the study population. The components of grit assessed in this study were questions focused on the consistency of interest and perseverance of efforts, using both positively and negatively worded questions. For each question, the respondents had the option of selecting from a five-point Likert scale options of *"very much like me"*, *"mostly like me"*, *"somewhat like me"*, *"not much like me"* and *"Not like me at all"*. In addition, respondents' sociodemographic characteristics were also obtained, and all items were transformed into a Google form for survey transmission.

### Study procedure

The study protocol was submitted to the Research and Ethics Committee of the Faculty of Pharmaceutical Sciences, University of Nigeria and it was deemed exempt from ethical approval as items on the questionnaire were non-invasive and non-discriminatory. Permission from each pharmacy school was obtained before approaching the eligible students. The two platforms adopted for the transmission of the survey were WhatsApp and short messages system (SMS). Thereafter, informed consent, the first section of the online form was also obtained from each participating student before they were requested to complete the questionnaire. Different researchers in this study were assigned to different institutions. The researcher for each school was added to each class'

WhatsApp group. An introduction was made by the class leader and a hyperlink to the questionnaire's Google form was sent directly to each student in the group, both as a WhatsApp message and an SMS. Reminders were sent via both message platforms two weeks later. The use of the groups to identify each student ensured that non-eligible persons did not have access to the questionnaire, since student leaders primarily screen and admit eligible students into the group. The Google form was set to receive only a single response from each respondent. Respective respondents were informed that the provision of socio-demographic information was a requirement for completing the study questionnaire. Response collection in the Google drive was deactivated at the end of the pre-set data collection period of one month; (12th April – 12th May, 2023).

### Data management and analysis

After the conclusion of data collection, the responses were downloaded into a Microsoft Excel spreadsheet (version 2019). The data was cleaned and only data sets which had the socio-demographic information and all grit questions completed were considered fit for analysis. The cleaned data was exported to the Statistical Product and Service Solutions (version 27) for statistical analysis. The questionnaire items that were negatively worded were reverse-coded before the commencement of the analysis. Descriptive analysis was used to present all the primary findings of the study. Categorical variables were presented with frequencies and percentages, while mean and standard error of means (SEM), and maximum and minimum values were used to present the continuous variables. Grit was first presented in its original five-point Likert scale, after which it was summed and converted into a continuous variable. From the latter format, the median score was obtained, and it was used to categorise the students into either high grit or low grit. For all categorical variables (e.g. age, gender, institution, grit category, sponsorship, past experience, place of residence, etc.), the Chi-square test was used to compare the findings across all schools. One-way ANOVA was used to determine the difference in the hours of study among students of various schools as well as comparing the continuous grit scores. Logistic regression was used to determine the factors that could predict high grit level, with the first option in each categorical independent variable set as the reference. In all analyses, statistical significance was assumed at *p*-values less than 0.05.

### *Ethical consideration*

Ethical approval for this study was obtained from the Health Research and Ethics Committee of the University of Nigeria Teaching Hospital (Reference no: NHREC/05/01/2008B-FWA00002458-IRB00002323). Strict confidentiality was maintained in the management of information obtained from the respondents.

### Results

A total of 590 students responded to the questionnaire, producing an overall response rate (RR) of 66.89%. There were 232, 96, 49, 61, 71 and 81 respondents from UNN (RR = 58.88%), UNIPORT (RR = 78.05%), UNIJOS (RR = 81.67%), UNILAG (RR = 70.93%), ABU (RR = 74.73%), and UNIMAID (RR = 100.00%), respectively. The majority of the respondents from UNN, UNIPORT, and UNILAG identified their gender as female, comprising 122 (52.59%), 51 (53.13%), and 41 (67.21%) respectively. Conversely, male students constituted the majority of students at UNIJOS (27, 55.10%), ABU Zaria (27, 55.10%), and UNIMAID (44, 54.32%); *p* = 0.114. In terms of age distribution, a large proportion of students from all universities fell between 20 - 25 years, accounting for 154 (66.38%) respondents from UNN, 65 (67.71%) from UNIPORT, 33 (67.35%) from UNIJOS, 55 (90.16%) from UNILAG, 55 (90.16%) from ABU Zaria, and 43 (53.09%) from UNIMAID (*p* ≤ 0.001). Regarding accommodation arrangements, the majority of students from UNN (162, 69.83%) and UNIJOS (32,

65.31%) reported residing outside the school premises. However, most students from UNIPORT (49, 51.04%), UNILAG (52, 85.25%), ABU Zaria (43, 60.56%), and UNIMAID (41, 50.62%) lived in school-provided hostels (*p* ≤ 0.001).

Almost all the respondents reported being free from any chronic diseases (97.1%, *p* = 0.005), just as the majority reported being actively engaged in extracurricular activities (72.4%, *p* ≤ 0.001). Self-reported academic performance varied among the students in the universities surveyed. At UNN, more than half of the students, 137 (59.05%), reported never having failed a course throughout their studentship. In contrast, 80 (83.33%) students of UNIPORT acknowledged experiencing course failures at different times of their study. Similarly, 42 students (85.71%) at UNIJOS admitted to having failed a course, while at UNILAG, 36 students (59.02%) faced academic setbacks in the form of failed courses. Ahmadu Bello University, Zaria (ABU Zaria), had 43 students (60.56%) who had experienced course failures, while at the University of Maiduguri (UNIMAID), 60 students (74.07%) reported encountering similar challenges (*p* ≤ 0.001). In terms of having leadership experience, a large majority of the students across all universities reported having held a leadership position among their colleagues. Specifically, 183 (78.88%) students from UNN, 83 (86.46%) from UNIPORT, 40 (81.63%) from UNIJOS, 41 (67.21%) from UNILAG, 39 (54.93%) from ABU, and 58 (71.60%) from UNIMAID acknowledged having undertaken leadership roles during their academic pursuits (*p* ≤ 0.001), see Table I.

**Table I: Sociodemographic characteristics and lifestyle practices of the students across the pharmacy schools in Nigeria**

| Characteristics | | UNN (N = 232) | UNIPORT (N = 96) | UNIJOS (N = 49) | UNILAG (N = 61) | ABU (N = 71) | UNIMAID (N = 81) | Total (N = 590) | χ²(df) | *p*-value |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Frequency (%) | | | | | |
| Gender | Female | 122 (39.9) | 51 (16.7) | 22 (7.2) | 41 (13.4) | 33 (10.8) | 37 (12.1) | 306 (100) | 8.884 (5) | .114 |
| | Male | 110 (38.7) | 45 (15.8) | 27 (9.5) | 20 (7.0) | 38 (13.4) | 44 (15.5) | 284 (100) | | |
| Age (Years) | 20 - 25 | 154 (37.7) | 65(15.9) | 33 (8.1) | 55 (13.4) | 59 (14.4) | 43 (10.5) | 409 (100) | 35.458 (10) | <.001 |
| | 26 - 30 | 66 (41.3) | 30 (18.8) | 13 (8.1) | 6 (3.8) | 10 (6.3) | 35 (21.9) | 160 (100) | | |
| | > 30 | 12 (57.1) | 1 (4.8) | 3 (14.3) | 0 (0.0) | 2 (9.5) | 3 (14.3) | 21 (100) | | |
| Marital Status | Unmarried | 204 (38.3) | 92 (17.3) | 44 (8.3) | 58 (10.9) | 67 (12.6) | 68 (12.8) | 533 (100) | 11.558 (5) | .410 |
| | Married | 28 (49.1) | 4 (7.0) | 5 (8.8) | 3 (5.3) | 4 (7.0) | 13 (22.8) | 57 (100) | | |
| Place of residence | Hostel | 70 (25.7) | 49 (18.0) | 17 (6.3) | 52 (19.1) | 43 (15.8) | 41 (15.1) | 272 (100) | 71.457 (5) | <.001 |
| | Off-campus | 162 (50.9) | 47 (14.8) | 32 (10.1) | 9 (2.8) | 28 (8.8) | 40 (12.6) | 318 (100) | | |
| Mode of admission | UTME | 202 (39.4) | 94 (18.3) | 44 (8.6) | 35 (6.8) | 63 (12.3) | 75 (14.6) | 513 (100) | 60.011 (5) | <.001 |
| | Direct entry | 30 (39.0) | 2 (2.6) | 5 (6.5) | 26 (36.8) | 8 (10.4) | 6 (7.8) | 77 (100) | | |

| Characteristics | | UNN (N = 232) | UNIPORT (N = 96) | UNIJOS (N = 49) | UNILAG (N = 61) | ABU (N = 71) | UNIMAID (N = 81) | Total (N = 590) | χ²(df) | p-value |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Frequency (%) | | | | | |
| Presence of chronic disease | No | 229 (40.0) | 96 (16.8) | 48 (8.4) | 59 (10.3) | 67 (11.7) | 74 (12.9) | 573 (100) | 16.625 (5) | .005 |
| | Yes | 3 (17.6) | 0 (0.0) | 1 (5.9) | 2 (11.8) | 4 (23.5) | 7 (41.2) | 17 (100) | | |
| Physical exercise routine | Regular | 51 (45.9) | 14 (12.6) | 4 (3.6) | 13 (11.7) | 11 (9.9) | 18 (16.2) | 111 (100) | 16.287 (10) | .092 |
| | Irregular | 127 (38.4) | 59 (17.8) | 36 (10.9) | 26 (7.9) | 39 (11.8) | 44 (13.3) | 331 (100) | | |
| | No exercise | 54 (36.5) | 23 (15.5) | 9 (6.1) | 22 (14.9) | 21 (14.2) | 19 (12.8) | 148 (100) | | |
| Extracurricular activities | No | 54 (33.1) | 20 (12.3) | 10 (12.3) | 13 (6.1) | 33 (8.0) | 33 (20.2) | 163 (100) | 26.493 (5) | <.001 |
| | Yes | 178 (41.7) | 76 (17.8) | 39 (9.1) | 48 (11.2) | 38 (8.9) | 48 (11.2) | 427 (100) | | |
| Fail a course before | No | 137 (58.5) | 16 (6.8) | 7 (3.0) | 25 (10.7) | 28 (12.0) | 21 (9.0) | 234 (100) | 77.278 (5) | <.001 |
| | Yes | 95 (26.7) | 80 (22.5) | 42 (11.8) | 36 (10.1) | 43 (12.1) | 60 (16.9) | 356 (100) | | |
| Held leadership position | No | 49 (33.6) | 13 (8.9) | 9 (6.2) | 20 (13.7) | 32 (21.9) | 23 (15.8) | 146 (100) | 27.628 (5) | <.001 |
| | Yes | 183 (41.2) | 83 (18.7) | 40 (9.0) | 41 (9.2) | 39 (8.8) | 58(13.1) | 444 (100) | | |

UNN = University of Nigeria, Nsukka; UNIPORT = University of Port Harcourt; UNIJOS = University of Jos; UNILAG = University of Lagos; ABU = Ahmadu Bello University, Zaria; UNIMAID = University of Maiduguri; N = Total number of participants; n = frequency

Table II presents a multiple comparison of the hours of study among participants from various universities. Across all universities, the minimum study time reported was 1.0 hours, while the maximum study time ranged from 8.0 hours at UNILAG to 10.0 hours at the other universities. Among the universities, ABU students had the highest mean study time, with an average of 5.3803 ± 0.2790 hours. Conversely, those at

UNIJOS had the lowest mean study time of 3.2449 ± 0.3080 hours. The differences in the average study time between students of ABU and those of the other universities were as follows: 1.3889 ± 0.2646 (UNN), 1.3907 ± 0.3054 (UNIPORT), 2.1354 ± 0.3623 (UNIJOS), 1.8229 ± 0.3406 (UNILAG), and 1.1828 ± 0.3172 (UNIMAID); $p \leq 0.001$.

**Table II: Multiple comparisons of self-reported hours of studies of the participants across the universities**

| University (reference) | Mean (SEM) | Min | Max | University (comparator) | Mean difference | Std. error | 95% C.I. Lower bound | 95% C.I. Upper bound | p-value |
|---|---|---|---|---|---|---|---|---|---|
| UNN | 3.9914 (0.121) | 1.00 | 10.00 | UNIPORT | 0.00180 | 0.23675 | -0.4632 | 0.4668 | .994 |
| | | | | UNIJOS | 0.74648[†] | 0.30672 | 0.1441 | 1.3489 | .015 |
| | | | | UNILAG | 0.43400 | 0.28071 | -0.1173 | 0.9853 | .123 |
| | | | | ABU | -1.38890[†] | 0.26459 | -1.9086 | -0.8692 | <.001 |
| | | | | UNIMAID | -0.20615 | 0.25178 | -0.7006 | 0.2883 | .413 |
| UNIPORT | 3.9896 (0.1858) | 1.00 | 10.00 | UNN, | -0.00180 | 0.23675 | -0.4668 | 0.4632 | .994 |
| | | | | UNIJOS | .74469[†] | 0.34252 | 0.0720 | 1.4174 | .030 |
| | | | | UNILAG | 0.43221 | 0.31943 | -0.1952 | 1.0596 | .177 |
| | | | | ABU | -1.39070[†] | 0.30537 | -1.9905 | -0.7909 | <.001 |
| | | | | UNIMAID | -0.20795 | 0.29433 | -0.7860 | 0.3701 | .480 |
| UNIJOS | 3.2449 (0.3080) | 1.00 | 10.00 | UNN, | -.74648[†] | 0.30672 | -1.3489 | -0.1441 | .015 |
| | | | | UNIPORT | -.74469[†] | 0.34252 | -1.4174 | -0.0720 | .030 |
| | | | | UNILAG | -0.31248 | 0.37425 | -1.0475 | 0.4226 | .404 |
| | | | | ABU | -2.13538[†] | 0.36232 | -2.8470 | -1.4238 | <.001 |
| | | | | UNIMAID | -.95263[†] | 0.35307 | -1.6461 | -0.2592 | .007 |

| University (reference) | Mean (SEM) | Min | Max | University (comparator) | Mean difference | Std. error | 95% C.I. | | p-value |
| | | | | | | | Lower bound | Upper bound | |
|---|---|---|---|---|---|---|---|---|---|
| UNILAG | 3.5574 (0.2502) | 1.00 | 8.00 | UNN, | -0.43400 | 0.28071 | -0.9853 | 0.1173 | .123 |
| | | | | UNIPORT | -0.43221 | 0.31943 | -1.0596 | 0.1952 | .177 |
| | | | | UNIJOS | 0.31248 | 0.37425 | -0.4226 | 1.0475 | .404 |
| | | | | ABU | -1.82290[†] | 0.34058 | -2.4918 | -1.1540 | <.001 |
| | | | | UNIMAID | -0.64015 | 0.33072 | -1.2897 | 0.0094 | .053 |
| ABU | 5.3803 (0.2790) | 1.00 | 10.00 | UNN, | 1.38890[†] | 0.26459 | 0.8692 | 1.9086 | <.001 |
| | | | | UNIPORT | 1.39070[†] | 0.30537 | 0.7909 | 1.9905 | <.001 |
| | | | | UNIJOS | 2.13538[†] | 0.36232 | 1.4238 | 2.8470 | <.001 |
| | | | | UNILAG | 1.82290[†] | 0.34058 | 1.1540 | 2.4918 | <.001 |
| | | | | UNIMAID | 1.18275[†] | 0.31716 | 0.5598 | 1.8057 | <.001 |
| UNIMAID | 4.1975 (0.2082) | 1.00 | 10.00 | UNN, | 0.20615 | 0.25178 | -0.2883 | 0.7006 | .413 |
| | | | | UNIPORT | 0.20795 | 0.29433 | -0.3701 | 0.7860 | .480 |
| | | | | UNIJOS | .95263[†] | 0.35307 | 0.2592 | 1.6461 | .007 |
| | | | | UNILAG | 0.64015 | 0.33072 | -0.0094 | 1.2897 | .053 |
| | | | | ABU | -1.18275[†] | 0.31716 | -1.8057 | -0.5598 | <.001 |

SEM = Standard Error Mean; C.I. = Confidence interval; UNN = University of Nigeria, Nsukka; UNIPORT = University of Port Harcourt; UNIJOS = University of Jos; UNILAG = University of Lagos; ABU = Ahmadu Bello University, Zaria; UNIMAID = University of Maiduguri

[†] p < .05

Tables IIIa and IIIb present the responses to the individual grit items received on the five-point Likert scale across the universities. The respondents had similar responses across the six universities for seven of the nine grit items. For the statement, "*I have overcome setbacks to conquer an important challenge*" 14 students from all the schools reported "*Not like me*", while 275 (100%) of the students chose "*Very much like me*" ($p$ = 0.009). As for the statement, "*I finish whatever*

*I begin*", the majority of the students (293, 100%) reported "*Very much like me*" while only seven indicated "*Not like me*" across all the schools ($p$ = 0.003). Similarly, seven students chose "*Not like me*" for "*I am a very persistent person, new ideas and projects do not distract me from previous ones*", whereas 244 (100%) indicated "*Very much like me*" ($p$ = 0.011).

**Table IIIa: Grit responses of the students across the pharmacy schools in Nigeria**

| Grit items | | UNN (N = 232) | UNIPORT (N = 96) | UNIJOS (N = 49) | UNILAG (N = 61) | ABU (N = 71) | UNIMAID (N = 81) | Total (N = 590) | $\chi^2$(df) | p-value |
| | | Frequency (%) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| I have overcome setbacks to conquer an important challenge. | Not like me | 6 (42.9) | 1 (7.1) | 0 (0.00) | 0 (0.00) | 6 (42.9) | 1 (7.1) | 14 (100) | 38.02 3 (20) | .009 |
| | Not much like me | 14 (38.9) | 3 (8.3) | 2 (5.6) | 3 (8.3) | 6 (16.7) | 8 (22.2) | 36 (100.0) | | |
| | Somewhat like me | 42 (38.5) | 12 (11.0) | 11 (10.1) | 8 (7.3) | 20 (18.3) | 16 (14.7) | 109 (100.0) | | |
| | Mostly like me | 51 (32.7) | 33 (21.2) | 14 (9.0) | 20 (12.8) | 19 (12.2) | 19 (12.20) | 156 (100) | | |
| | Very much like me | 119 (43.3) | 47 (17.1) | 22 (8.0) | 30 (10.9) | 20 (7.3) | 37 (13.5) | 275 (100) | | |
| I am a hard worker. | Not like me | 6 (50.0) | 2 (16.7) | 0 (0.0) | 2 (16.7) | 1 (8.3) | 1 (8.3) | 12 (100.0) | 25.22 3 (20) | .194 |
| | Not much like me | 12 (50.0) | 0 (0.0) | 2 (8.3) | 2 (8.3) | 3 (12.5) | 5 (20.8) | 24 (100.0) | | |
| | Somewhat like me | 39 (31.0) | 18 (14.3) | 12 (9.5) | 19 (15.1) | 18 (14.3) | 20 (15.9) | 126 (100.0) | | |

| Grit items | | UNN (N = 232) | UNIPORT (N = 96) | UNIJOS (N = 49) | UNILAG (N = 61) | ABU (N = 71) | UNIMAID (N = 81) | Total (N = 590) | χ²(df) | *p-*value |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Frequency (%) | | | | | |
| | Mostly like me | 88 (43.3) | 28 (13.8) | 20 (9.9) | 22 (10.8) | 24 (11.8) | 21 (10.3) | 203 (100.0) | | |
| | Very much like me | 87 (38.7) | 48 (21.3) | 15 s (6.7) | 16 (7.1) | 25 (11.1) | 34 (15.1) | 225 (100.0) | | |
| I am diligent. | Not like me | 1 (20.0) | 2 (40.0) | 1 (20.0) | 0 (0.0) | 1 (20.0) | 0 (0.0) | 5 (100.0) | 22.153 (20) | .332 |
| | Not much like me | 8 (33.3) | 2 (8.3) | 2 (8.3) | 4 (16.7) | 4 (16.7) | 4 (16.7) | 24 (100.0) | | |
| | Somewhat like me | 45 (35.2) | 15 (11.7) | 13 (10.2) | 17 (13.3) | 22 (17.2) | 16 (12.5) | 128 (100.0) | | |
| | Mostly like me | 88 (39.8) | 39 (17.6) | 15 (6.8) | 24 (10.9) | 28 (12.7) | 27 (12.2) | 221 (100.0) | | |
| | Very much like me | 90 (42.5) | 38 (17.9) | 18 (8.5) | 16 (7.5) | 16 (7.5) | 34 (16.0) | 212 (100.0) | | |
| I have been obsessed with certain idea or project for a short time and do not lose interest later. | Not like me | 4 (30.8) | 1 (7.7) | 0 (0.0) | 1 (7.7) | 4 (30.8) | 3 (23.1) | 13 (100.0) | 28.567 (20) | .097 |
| | Not much like me | 9 (37.5) | 4 (16.7) | 0 (0.0) | 5 (20.8) | 4 (16.70) | 2 (8.3) | 24 (100.0) | | |
| | Somewhat like me | 52 (44.8) | 10 (8.6) | 8 (6.9) | 18 (15.5) | 14 (12.1) | 14 (12.1) | 116 (100.0) | | |
| | Mostly like me | 71 (37.4) | 36 (18.9) | 14 (7.4) | 20 (10.5) | 24 (12.6) | 25 (13.2) | 190 (100.0) | | |
| | Very much like me | 96 (38.9) | 45 (18.2) | 27 (10.9) | 17 (6.9) | 25 (10.1) | 37 (15.0) | 247 (100.0) | | |
| I do not have difficulty maintaining my focus on projects that take more than a few months to complete. | Not like me | 0 (0.0) | 1 (25.0) | 0 (0.0) | 0 (0.0) | 2 (50.0) | 1 (25.0) | 4 (100.0) | 25.775 (20) | .173 |
| | Not much like me | 8 (38.1) | 0 (0.0) | 1 (4.8) | 5 (23.8) | 2 (9.5) | 5 (23.8) | 21 (100.0) | | |
| | Somewhat like me | 47 (42.3) | 13 (11.7) | 10 (9.0) | 10 (9.0) | 14 (12.6) | 17 (15.3) | 111 (100.0) | | |
| | Mostly like me | 77 (38.3) | 38 (18.9) | 15 (7.5) | 26 (12.9) | 25 (12.4) | 20 (10.0) | 201 (100.0) | | |
| | Very much like me | 100 (39.5) | 44 (17.4) | 23 (9.1) | 20 (7.9) | 28 (11.1) | 38 (15.0) | 253 (100.0) | | |

UNN = University of Nigeria, Nsukka; UNIPORT = University of Port Harcourt; UNIJOS = University of Jos; UNILAG = University of Lagos; ABU = Ahmadu Bello University, Zaria; UNIMAID = University of Maiduguri; N = Total number of participants; n = frequency

**Table IIIb: Grit responses of the students across the pharmacy schools in Nigeria (cont'd)**

| Grit items | | UNN (N = 232) | UNIPORT (N = 96) | UNIJOS (N = 49) | UNILAG (N = 61) | ABU (N = 71) | UNIMAID (N = 81) | Total (N = 590) | χ²(df) | *p-*value |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Frequency (%) | | | | | |
| Setbacks do not discourage me. | Not like me | 6 (50.0) | 1 (8.3) | 0 (0.0) | 0 (0.0) | 2 (16.7) | 3 (25.0) | 12 (100.0) | 24.700 (20) | .213 |
| | Not much like me | 13 (43.3) | 2 (6.7) | 1 (3.3) | 4 (13.3) | 3 (10.0) | 7 (23.3) | 30 (100.0) | | |
| | Somewhat like me | 49 (47.6) | 14 (13.6) | 8 (7.8) | 13 (12.6) | 9 (8.7) | 10 (9.7) | 103 (100.0) | | |
| | Mostly like me | 75 (37.3) | 30 (14.9) | 14 (7.0) | 26 (12.9) | 30 (14.90) | 26 (12.9) | 201 (100.0) | | |
| | Very much like me | 89 (36.5) | 49 (20.1) | 26 (10.7) | 18 (7.4) | 27 (11.1) | 35 (14.3) | 244 (100.0) | | |

| Grit items | | UNN (N = 232) | UNIPORT (N = 96) | UNIJOS (N = 49) | UNILAG (N = 61) | ABU (N = 71) | UNIMAID (N = 81) | Total (N = 590) | χ²(df) | p-value |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Frequency (%) | | | | | | | | |
| I finish whatever I begin. | Not like me | 2 (28.6) | 1 (14.3) | 0 (0.0) | 0 (0.0) | 4 (57.1) | 0 (0.0) | 7 (100.0) | 41.297 (20) | .003 |
| | Not much like me | 5 (35.7) | 0 (0.0) | 0 (0.0) | 4 (28.6) | 2 (14.3) | 3 (2.4) | 14 (100.0) | | |
| | Somewhat like me | 35 (38.5) | 8 (8.8) | 9 (9.9) | 12 (13.2) | 9 (9.9) | 18 (19.8) | 91 (100.0) | | |
| | Mostly like me | 75 (40.5) | 30 (16.2) | 10 (5.4) | 23 (12.4) | 27 (14.6) | 20 (10.8) | 185(100.0) | | |
| | Very much like me | 115 (39.2) | 57 (19.5) | 30 (10.2) | 22 (7.5) | 29 (9.9) | 40 (13.7) | 293(100.0) | | |
| I often set a goal and work hard to accomplish it. | Not like me | 2 (40.0) | 1 (20.0) | 0 (0.0) | 0 (0.0) | 2 (40.0) | 0 (0.0) | 5 (100.0) | 25.565 (20) | .181 |
| | Not much like me | 2 (18.2) | 1 (9.1) | 0 (0.0) | 1 (9.1) | 3 (27.3) | 4 (36.4) | 11 (100.0) | | |
| | Somewhat like me | 39 (42.4) | 13 (14.1) | 7 (7.6) | 13 (14.1) | 7 (7.6) | 13 (14.1) | 92 (100.0) | | |
| | Mostly like me | 74 (38.3) | 25 (13.0) | 18 (9.3) | 25 (13.0) | 28 (14.5) | 23 (11.9) | 193(100.0) | | |
| | Very much like me | 115 (39.8) | 56 (19.4) | 24 (8.3) | 22 (7.6) | 31 (10.7) | 41 (14.2) | 289(100.0) | | |
| I am a very persistent person, new ideas and projects do not distract me from previous ones | Not like me | 4 (57.1) | 1 (14.3) | 0 (0.0) | 0 (0.0) | 2 (28.6) | 0 (0.0) | 7 (100.0) | 37.197 (20) | .011 |
| | Not much like me | 2 (10.0) | 2 (10.0) | 3 (15.0) | 4 (20.0) | 1 (5.0) | 8 (40.0) | 20 (100.0) | | |
| | Somewhat like me | 49 (41.9) | 11 (9.4) | 9 (7.7) | 18 (15.4) | 16 (13.7) | 14 (12.0) | 117(100.0) | | |
| | Mostly like me | 76 (37.6) | 39 (19.3) | 14 (6.9) | 17 (8.4) | 30 (14.9) | 26 (12.9) | 202(100.0) | | |
| | Very much like me | 101 (41.4) | 43 (17.6) | 23 (9.4) | 22 (9.0) | 22 (9.0) | 33 (13.5) | 244(100.0) | | |

UNN = University of Nigeria, Nsukka; UNIPORT = University of Port-Harcourt; UNIJOS = University of Jos; UNILAG = University of Lagos; ABU = Ahmadu Bello University, Zaria; UNIMAID = University of Maiduguri; N = Total number of participants; n = percentages

Overall, the students of the six schools had a group mean grit score of 37.091 ± 0.253, with from a possible minimum and maximum score of nine and 45, respectively. The individual mean scores of the students according to their institutions were 38.625 ± 0.574, 37.959 ± 0.769, 37.190 ± 0.403, 36.889 ± 0.713, 35.705 ± 0.803, and 35.521 ± 0.775 for UNIPORT, UNIJOS, UNN, UNIMAID, UNILAG, and ABU respectively (*F* (df) = 3.013 (5), *p* = 0.011). The differences in the mean scores between the students of the respective schools and further information on the grit scores are shown in Table IV. Using the median grit score of 38.000, it was observed that students with high grit scores in each pharmacy school were 108 (38.4%), 43 (15.3%), 39 (13.9%),38 (13.5%), 36 (12.8%), and 17 (6.0%) from UNN, ABU, UNIMAID, UNIPORT, UNILAG, and UNIJOS respectively.

**Table IV: Multiple comparison of the students' mean grit scores across the pharmacy schools in Nigeria**

| University (reference) | Mean (SEM) | Min. | Max. | University (comparator) | Mean difference | Standard error | 95% Confidence interval | | p-value |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Lower bound | Upper bound | |
| UNN | 37.1897 (0.4027) | 15.00 | 45.00 | UNIPORT | -1.43534 | 0.74023 | -2.8892 | 0.0185 | .053 |
| | | | | UNIJOS | -0.76953 | 0.95900 | -2.6530 | 1.1140 | .423 |
| | | | | UNILAG | 1.48474 | 0.87767 | -0.2390 | 3.2085 | .091 |
| | | | | ABU | 1.66853[†] | 0.82729 | 0.0437 | 3.2933 | .044 |
| | | | | UNIMAID | 0.30077 | 0.78722 | -1.2454 | 1.8469 | .703 |
| UNIPORT | 38.6250 (0.5740) | 9.00 | 45.00 | UNN | 1.43534 | 0.74023 | -0.0185 | 2.8892 | .053 |
| | | | | UNIJOS | 0.66582 | 1.07092 | -1.4375 | 2.7691 | .534 |
| | | | | UNILAG | 2.92008[†] | 0.99875 | 0.9585 | 4.8817 | .004 |
| | | | | ABU | 3.10387[†] | 0.95478 | 1.2287 | 4.9791 | .001 |
| | | | | UNIMAID | 1.73611 | 0.92027 | -0.0713 | 3.5436 | .060 |
| UNIJOS | 37.9592 (0.7693) | 26.00 | 45.00 | UNN | 0.76953 | 0.95900 | -1.1140 | 2.6530 | .423 |
| | | | | UNIPORT | -0.66582 | 1.07092 | -2.7691 | 1.4375 | .534 |
| | | | | UNILAG | 2.25427 | 1.17015 | -0.0439 | 4.5525 | .055 |
| | | | | ABU | 2.43806[†] | 1.13285 | 0.2131 | 4.6630 | .032 |
| | | | | UNIMAID | 1.07029 | 1.10392 | -1.0979 | 3.2384 | .333 |
| UNILAG | 35.7049 (0.8031) | 21.00 | 45.00 | UNN | -1.48474 | 0.87767 | -3.2085 | 0.2390 | .091 |
| | | | | UNIPORT | -2.92008[†] | 0.99875 | -4.8817 | -0.9585 | .004 |
| | | | | UNIJOS | -2.25427 | 1.17015 | -4.5525 | 0.0439 | .055 |
| | | | | ABU | 0.18379 | 1.06488 | -1.9077 | 2.2753 | .863 |
| | | | | UNIMAID | -1.18397 | 1.03406 | -3.2149 | 0.8470 | .253 |
| ABU | 35.5211 (0.7748) | 9.00 | 45.00 | UNN | -1.66853[†] | 0.82729 | -3.2933 | -0.0437 | .044 |
| | | | | UNIPORT | -3.10387[†] | 0.95478 | -4.9791 | -1.2287 | .001 |
| | | | | UNIJOS | -2.43806[†] | 1.13285 | -4.6630 | -0.2131 | .032 |
| | | | | UNILAG | -0.18379 | 1.06488 | -2.2753 | 1.9077 | .863 |
| | | | | UNIMAID | -1.36776 | 0.99165 | -3.3154 | 0.5799 | .168 |
| UNIMAID | 36.8889 (0.7132) | 17.00 | 45.00 | UNN | -0.30077 | 0.78722 | -1.8469 | 1.2454 | .703 |
| | | | | UNIPORT | -1.73611 | 0.92027 | -3.5436 | 0.0713 | .060 |
| | | | | UNIJOS | -1.07029 | 1.10392 | -3.2384 | 1.0979 | .333 |
| | | | | UNILAG | 1.18397 | 1.03406 | -0.8470 | 3.2149 | .253 |
| | | | | ABU | 1.36776 | 0.99165 | -0.5799 | 3.3154 | .168 |

SEM = Standard Error Mean; C.I. = Confidence interval; UNN = University of Nigeria, Nsukka; UNIPORT = University of Port Harcourt; UNIJOS = University of Jos; UNILAG = University of Lagos; ABU = Ahmadu Bello University, Zaria; UNIMAID = University of Maiduguri

[†] p < .05

In Table V, the predictors of high grit are shown for all respondents. Students of UNIJOS had 2.097 odds (95% CI: 1.073 – 4.099, *p* = 0.030) of having high grit, compared to the students in UNN. Also, being a student of ABU came with the potential of having a high grit score, compared to being at UNN (β = 0.544, 95% CI = 0.300 – 0.985, *p* = 0.045). In all schools, students that resided off-campus had 1.494 odds (95% CI: 1.021–

2.184, *p* = 0.039) of having high grit scores as compared to those who resided in their university-provided hostels. Pharmacy students who sponsored their education by themselves with the support of their parents/guardian had 4.207 odds (95% CI: 1.022-17.313, *p* = 0.047) of having high grit as compared to those who sponsored their education by themselves alone.

**Table V: Predictors of high grit for students across the pharmacy schools in Nigeria**

| Characteristics | β | 95% C.I for exponential beta | | *p*-value |
|---|---|---|---|---|
| | | Lower | Upper | |
| University | | | | |
| University of Nigeria, Nsukka | Reference | | | .035 |
| University of Port Harcourt | 1.267 | 0.751 | 2.138 | .374 |
| University of Jos | 2.097 | 1.073 | 4.099 | .030 |
| University of Lagos | 0.867 | 0.445 | 1.689 | .674 |
| Ahmadu Bello University, Zaria | 0.544 | 0.300 | 0.985 | .045 |
| University of Maiduguri | 0.872 | 0.500 | 1.520 | .629 |
| Gender (male) | 0.854 | 0.578 | 1.262 | .428 |
| Age (years) | | | | |
| 20 - 25 | | | | .345 |
| 26 - 30 | 1.368 | 0.892 | 2.097 | .151 |
| > 30 | 1.369 | 0.460 | 4.073 | .572 |
| Marital Status (Unmarried) | 0.711 | 0.378 | 1.338 | .290 |
| Place of residence (Off-campus) | 1.494 | 1.021 | 2.184 | .039 |
| Presence of chronic disease (Yes) | 0.825 | 0.293 | 2.319 | .715 |
| Mode of admission (Direct entry) | 0.757 | 0.424 | 1.353 | .347 |
| Sponsor | | | | |
| Self | Reference | | | .033 |
| Self, parents/guardian | 4.207 | 1.022 | 17.313 | .047 |
| Self, parents/guardian, government | 0.145 | 0.012 | 1.802 | .133 |
| Self, parents/guardian, scholarship | 0.575 | 0.067 | 4.903 | .613 |
| Parents/guardian | 0.557 | 0.273 | 1.137 | .108 |
| Parents/guardian, scholarship | 1.840 | 0.312 | 10.839 | .500 |
| Scholarship | 0.488 | 0.025 | 9.448 | .635 |
| Government | 78E8 | 0.000 | | 1.000 |
| Exercise routine | | | | |
| Regular exercise (two days per week) | Reference | | | .221 |
| Irregular | 0.728 | 0.448 | 1.184 | .200 |
| No exercise | 0.608 | 0.347 | 1.067 | .083 |
| Hours of study | 1.167 | 1.064 | 1.280 | .001 |
| Constant | 1.086 | | | .871 |

## Discussion

### Summary of main findings

The present study determined the level of grit among pharmacy students from six public universities in Nigeria. The responses received from the schools were considerably impressive, with UNN producing the highest number of respondents. Some students indicated that they could study for as much as ten hours a day, even though others stated that they could not study beyond an hour. For all the grit items, a higher proportion of the students of all the schools indicated "*Very much like me*". Of all the nine items, the difference in the responses of the students across the universities existed only in three items: "*I have overcome setbacks to conquer an important challenge*", "*I finish whatever I begin*", and "*I am a very persistent person, new ideas and projects do not distract me from previous ones*". The positive responses for the grit items were also observed in the impressive mean score for the population, with students of UNILAG and UNIPORT showcasing the least and highest scores, respectively. Hence, the institution of study was a predictor of high grit among the students. Other predictors of high grit were the students' accommodation choices and the means of sponsorship of their academic programme.

### Comparison with other studies

Although the concept of grit and the need to explore it among pharmacy students have been topics of discussion for a long time, there is scarcely any study that has been conducted in Africa about it, despite the abundance of studies from other regions like America, Malaysia, and, recently, in fourteen Asian and Middle Eastern countries (Hammond, 2017; Pate *et al.*, 2017; Abubakar *et al.*, 2021; Elnaem *et al.*, 2023). It was, therefore, important to conduct a study of the concept in Nigeria, Africa's most populous country with the largest number of accredited pharmacy schools (International Pharmaceutical Federation (FIP), 2020). Other than talent and opportunity, what makes some people more successful than others? One important determinant of success is self-control — the capacity to regulate attention, emotion, and behaviour in the presence of temptation. A second important determinant of success is grit — the tenacious pursuit of a dominant superordinate goal despite setbacks. Self-control and grit are strongly correlated, but not perfectly so. This means that some people with high levels of self-control capably handle temptations but do not consistently pursue a dominant goal. Likewise, some exceptional achievers are prodigiously gritty but succumb to temptations in domains other than their chosen life passion. Understanding how goals are hierarchically organised clarifies how self-control and grit are related but distinct: self-control entails aligning actions with any valued goal despite momentarily more alluring alternatives; grit, in contrast, entails having and working assiduously toward a single challenging superordinate goal through thick and thin, on a timescale of years or even decades. Although both self-control and grit entail aligning actions with intentions, they operate in different ways and over different timescales. This hierarchical goal framework suggests novel directions for basic and applied research on success. Grit is the ability to persevere and work passionately, even in the face of challenges. Although some prior research on grit has established that high grit is found in extremely intelligent people, Duckworth stated that it is negatively related to intelligence (Duckworth *et al.*, 2007). That is to say that, students obtaining C grades have been observed to be gritter than those receiving A grades.

The students of all the schools generally had a very high grit level. Although the students from UNIPORT and UNIJOS reported having failed a course or two at some time during their studentship, they still had a high level of grit. A previous study carried out among students of UNIJOS reported that the leading cause of academic failure in the school was test anxiety: students who experienced high levels of anxiety were more likely to fail a course compared to others and lacked a sustainable level of grit (Sariem *et al.*, 2014). Hence, the institution decided to assign students to academic advisors immediately after they were admitted into the pharmacy programme. This strategy was expected to help them overcome the challenges of being a novice in a professional programme, as the advisors would provide them with the needed guidance (Kannangara *et al.*, 2018). Students come into the university with all levels of enthusiasm, but as they progress in the institutions, different environmental factors contribute to their failure during academic assessment (Moldes *et al.*, 2019). Students stand to benefit more when they are allowed to explore and have the required guidance needed to perform their studies (Sato *et al.*, 2020). One would observe from studies that a considerable level of interest and passion for academic activities, as well as a decrease in anxiety, are direct products of the counselling of their advisers. Therefore, there is a need to determine how the system affects students and what leads some of them to fail, notwithstanding being assigned an adviser in their first year in university. A high level of grit can lead to an improvement in academic performance and some individuals tend to seek help when there is a concern while others do not seek help (Bazelais *et al.*, 2016; Christopoulou *et al.*, 2018). Some issues also arise with some advisers who are not quite engaging with the students (Kottasz, 2005).

Gender difference had no significant association with grit level among students. However in some institutions, male students had a higher failure rate than their female counterparts and this is perhaps due to the low tendency of the male gender to seek help when they are obviously in need (Shepherd *et al.*, 2023).

There is a popular opinion that the number of study hours is positively associated with academic performance (Liu, 2022). This assertion was, however, not established among the students of some institutions of this study. Respondents from ABU had the highest mean study time, but they ranked third with respect to the proportion of students who had failed some courses. Furthermore, students of ABU still turned out to be one of the respondent categories with the least grit. It has been proven that a high grit score improves academic performance and vice versa (Pate *et al.*, 2017; Elnaem *et al.*, 2023). Hence, the poor academic performance of ABU Zaria could be a result of their low grit, even when they had the longest mean study hours.

While it is tempting to assume that these long study hours could have been stressors on themselves that could have led to low grit, the assumption has been disproven by the findings of another study that study

hours have no significant effect on the stress level of students (Rahim *et al.*, 2016). Therefore, although ABU students study for long hours, poor study habits could be the reason why they have poor academic performance (Jafari *et al.*, 2019).

In comparison to their counterparts at ABU, students of UNIPORT and UNIJOS had a low mean study time but high levels of grit and failure. Their relationship with grit could be in their self-reported confidence in their abilities, as the extensive workload and number of activities to be carried out each term by pharmacy students calls for a need to carry out strategic study planning (Scully & Kerr, 2014).

Most students who stay on-campus rely on the subsidies of the schools for their accommodation, as such accommodations are more affordable compared to other locations (Sikhwari *et al.*, 2020; Ravhuhali *et al.*, 2022). This tells a lot about their financial status which can be a stressor and even affect their mental and physical health. Since stress has been reported to be inversely associated with grit, the students residing on-campus, compared to those off-campus, are more likely to have high grit because they are buoyant enough to afford an off-campus accommodation (Pate *et al.*, 2017; Campbell *et al.*, 2022). Participants sponsored by themselves have been shown to be more resilient, probably due to the high level of work they have trained themselves to carry out in order to earn money for their wellbeing. On the other hand, full-rounded support from their guardians or parents facilitated a sense of belonging. Parental and guidance involvement will drive the growth and cognitive development of students.

### *Policy implication*

What if the school system can help provide an environment that could assist students through a unique learning process? This question is germane as grit alone is not enough to survive in the school environment. Regulators such as the Pharmacy Council of Nigeria (PCN) should ensure that pharmacy schools are equipped to provide a proper and conducive learning environment for their students, ensure that there are an adequate number of pharmacists in academia at pharmacy schools in the country, and organise training or workshops for both pharmacists in academia and pharmacy students on better ways to improve or sustain grit. Institutions can also provide a better teaching and learning structure for pharmacy students, and organise seminars/workshops to improve or sustain grit.

### *Strengths and limitations*

Whilst grit and its related factors were considered in this study, the results have also presented a good comparison of the grit level of students of different schools in Nigeria. The study covered all the regions of Nigeria; considering the size of Nigeria, the findings could be extrapolated to other sub-Saharan countries. The study has also brought up the position of grit among the students in public Nigerian universities. A study done by Santos et al. (2022) has reported that if grit can be taught and a better approach to its handling, then factors that impede students' performance could be addressed. It is noted that the use of public institutions alone is a limitation to the study, as students of private universities, though not as many as those of their public counterparts, may have different behaviour, grit inclusive. The use of fifth-year students alone could also be a weakness of the study design, but it was intentionally done to choose those who have had the longest experience in pharmacy education and would be in the best position to present a comprehensive response.

### Conclusion

Pharmacy students in Nigeria have a high grit level, though the institution of study had an impact on the level of grit. Students' places of residence (on-campus or off-campus) and means of sponsorship (self-sponsored or with parental support) were predictors of high grit scores among the students. Future studies should be carried out on postgraduate pharmacy students and coping strategies should be found for students with low grit scores. The level of grit should be assessed among new pharmacy graduates in Nigeria by future researchers.

### Conflict of interests

None

### Financial disclosure

None

## Acknowledgements

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