RESEARCH ARTICLE

Predictors of poor academic performance among the medical students of the University of the Philippines College of Medicine

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ABSTRACT

Background: Despite the rigorous and extremely competitive selection process of medical students at the University of the Philippines College of Medicine (UPCM), a few still performed poorly in academics that resulted in delayed graduation or failure to graduate at all.

Objective: The objective of this study was to identify the factors that predict the likelihood of not graduating and delayed graduation among the medical students of 24 classes of the UPCM.

Methodology: Factors potentially associated with delayed graduation and failure to graduate among UPCM medical students were analyzed using univariate and multivariable logistic regression with their demographic and pre-admission academic profiles, namely, Pre-medical General Weighted Average Grade (PGWAG), National Medical Admission Test Scores (NMATs), interview scores, pre-med courses, the school graduated from, and admissions categories as predictors.

Results: The odds of delayed graduation and failure to graduate were increased by lower PMGWAG, NMAT score, interview score, admission through the special categories, being a non-UP graduate, and with BS Psychology as pre-med course.

Conclusion: The predictors of poor academic performance based on delayed graduation and failure to graduate were the PMGWAG, NMAT, interview scores, admissions category, pre-med course, and the school graduated from. It is recommended that the minimum admissions requirements for PMGWAG be increased particularly among the candidates in the special categories. The selection process in the special categories must put some bearing on the PMGWAGs and NMATs of their applicants.

Keywords: *medical college admission, medical education, academic performance*

Introduction

The University of the Philippines College of Medicine (UPCM) is the country's premier medical school. It is one of the most sought-after institutions of higher learning in medicine wherein entry is extremely competitive. The UPCM Admissions committee faces a difficult task in selecting those who have the best academic credentials from a large pool of aspirants. The committee also carries the additional burden of ensuring that accepted applicants will perform well in medical school and graduate on time to join the medical community of the country.

Yearly, there are close to a thousand graduates of a 4-year baccalaureate course who apply for admission as lateral entrants to the medical education program of the UPCM [1]. After a thorough documentary record credential review, only three hundred (300) will qualify for interview and from those, only the top one hundred twenty (120) will be accepted. They comprise 75% of the 160 yearly admissions to the College of Medicine. The remaining 40 slots or 25% are allotted to the direct entrants. These 40 students belong to the Integrated Arts Medical Program (Intarmed) course, a 7-year medicine program that accepts students straight from high school that includes one year of internship. Intarmed students join the lateral entrants on the third year (LU3) of the program. The applicants to the Intarmed program are high school graduates chosen among

the highest-scoring 50 males and 50 females in the UPCAT exam. The selection criteria for these direct entrants are distinct from those of the lateral entrants.

In the most recent data from the Admission Committee, the cut off for pre-medical general weighted average (PMGWAG) to be accepted under the regular Academic Category, was around 1.600 for males and 1.400 for females, with an average National Medical Admission Test (NMAT) between 98 and 99 percentiles [2]. This data demonstrates the very high level of competition among the aspirants such that several applicants with honors were not even accepted.

Cognitive potential has been found to predict academic performance [3-5] and this may be represented by high PMWAG and NMAT scores. However, despite the seemingly high PMWAG and NMAT scores obtained by the accepted applicants, UPCM still has students with poor academic performance and drop-outs. In certain instances, this poor academic performance was also reflected in the Physicians Licensure Examination [6].

Although Dannon *et al.* stated in their study that a high Medical College Admission Test (MCAT, local counterpart of NMAT) score correlates to good academic performance and physician licensure examinations [7], we have seen that this is not always the case. It is especially important in state universities like the University of the Philippines College of Medicine (UPCM) to find out which set of students are likely to do poorly given the fact that tuition fee is subsidized by the government [8]. The economic burden of allocating this resource to the wrong set of individuals may eventually lead to financial losses and opportunity costs.

UPCM is a state-subsidized university. Investing in its students is of paramount importance since the allocation of government funds to individuals who perform poorly may prove to be an economic burden, especially if these students are delayed in their graduation or do not graduate at all. It is, thus, important to investigate the reasons behind the poor academic performance of accepted applicants.

While there are a multitude of factors that could lead to the poor academic performance of medical students, there are factors that stand as predictors that approximate the odds and likelihood of not graduating on time or not graduating at all. It is, therefore, the purpose of this research to find out which factors can predict poor academic performance.

While the admissions committee has relied on the PMGWAG, NMAT, and interview score in the selection of applicants to the UPCM, this study determined other possible factors such as the school from which the student graduated, the pre-med course, the category (Academic Category, Regionalization/Indigenous Program, Faculty/Employee Category, and University of the Philippines Medical Alumni Society/University of the Philippines Medical Alumni Society in America [UPMAS/UPMASA]) that would correlate to poor performance described as not graduating on time or not graduating at all.

For more than three decades of implementing the same admissions policy and utilizing the same set of criteria, no study has yet been conducted to determine factor/s that would predict poor academic performance in the UPCM or even in the entire nation's medical education program. Neither was there any evaluation of the performance of those admitted under the affirmative action categories like the Regionalization and Indigenous Programs done. Admissions through the privilege-based allotment categories like the Faculty, UPMAS, and UPMSA categories have never been assessed regarding the performance of its recipients.

Some would relate other non-academic, non-cognitive factors with the academic performance of students in the medical schools. In a systematic review and meta-analysis, Woolf correlated ethnicity with the academic performance of medical students. [9]. The study was able to establish that students of “non-white” ethnicity underperformed compared with the “white” students. These ethnic differences in academic performance have persisted for many years across different medical schools, different types of assessments and examinations, both in the undergraduates and postgraduates.

As life in medical school is full of stressors, medical students are quite exposed to very high stress [10,11]. Among these stressors are exposure to death and human suffering, the highly competitive environment, and ethical conflicts [12]. These stressors take their toll on the academic performance of medical students in a pervasive and vicious manner. Earlier studies have established relationships between stress and academic performance [13,14]. Kotter's study has further established the predictive validity of perceived medical school stress of students on their performance [15]. Even the quality and the quantity of sleep has been associated with the students' performance in the medical school [16,17].

A research study was conducted to determine the association between demographic factors and academic performance of medical students. These demographic factors included age, sex, domicile, area, and type of school graduated from, course major, and time of graduation from high school.

The study revealed that males, older and graduated from high schools outside the National Capital Region, were at risk of poor academic performance and with lower GPAs [18].

One study showed no association between parental socioeconomic status and academic success [19].

Traditionally, the parameters that are often utilized to predict performance in the medical school include undergraduate (pre-med) grades, standardized medical college admissions test (NMAT, MCAT), information on the selectivity of the undergraduate institution, and selected transcript data [20]. Performance, on the other hand, is measured in terms of grades in the basic and clinical sciences, score in the nationally administered board/licensure examination, and class rank. Recently, a study of the above nature was conducted in the setting of UPCM [21] and was able to establish the predictive validity of pre-med grades, NMAT, and admissions interview score on the academic performance of medical students in terms of grades in the medical college, class/graduation rank, and scores in the Physician Licensure Examination. However, the said study, centered only on successful academic performance as it took into consideration only those who graduated on time and were able to take the board exam. The study did not delve into poor academic performance in college, particularly those who dropped out or did not graduate (delayed) on time.

This research work sought to establish a correlation between poor academic performances with pre-admission factors like demographic, socio-economic, and academic profile. The odds of failure to graduate and delayed graduation due to poor academic performance were estimated through logistic regression, both univariate and multivariate. Possible reasons were offered for these observations.

The information derived from this research work shall be utilized as basis for admission policy revisions and amendments. The data obtained in this study may also serve as future reference in decision making and other institutional policy development as well.

The general objective of the study is to identify the factors that determine the likelihood of poor academic performance at the UP College of Medicine. More specifically, the objectives are as follows:

1. To enumerate pre-admission factors that are associated with poor academic performance resulting in delayed graduation or failure to graduate.
2. To describe the impact/consequences of these factors on the odds of delayed graduation and failure to graduate.
3. To recommend measures to minimize/lessen the likelihood of delayed graduation and failure to graduate, relevant to the revision of the admissions policy.

Methodology

Study design

This study was part of an extensive research work [27] commissioned and funded by the Dean's Office of UPCM. The research work was a retrospective study that is both descriptive and inferential, that investigated and went over a wide scope of information, data, parameters, and variables relevant to the reformulation/revision of the admission policy. Different study components covered specific areas of interest, enquiries, focus, and objectives.

Data and information were mainly obtained from archival documents compiled, kept, and preserved by the Admissions Office for the years 1985 to 2013. Included in the data were the demographic profile of the applicants during the given time frame which contained the age, sex, economic status (income bracket), pre-med course, and school graduated from. Also included in data collection were the academic profile of the applicants who had been successfully accepted in the college namely the PMGWAG, NMAT, and Structured Interview Scores.

The entire population of Lateral Entrant students at the UP College of Medicine Lateral Entrants, who were accepted and enrolled was the target population. The demographic and pre-admissions profiles of those who poorly performed academically in UPCM resulting in their delayed graduation or failure to graduate were analyzed. These profiles were compared to those who performed satisfactorily and were able to graduate on time. Those who did not graduate on time or did not graduate at all due to non-academic-related reasons such as loss of interest, financial constraints, medical infirmities, etc. were excluded in the poor academic performance category.

The study covered the period from 1985 to 2010 and involved the records of students from UPCM Class 1990 to Class 2013. The records of the study subjects were retrieved from the Admissions Office and Student Records Office, then reviewed and processed relevant to the necessary statistical analysis. As the study covered a period of twenty-four years, it probed into at least 2,900 students' records and data.

Initial univariate logistic regression analyses were done to identify which of the potential predicting variables (PMGWAG, NMAT, Interview Score, Pre-med Course, School, Admissions Category) were associated with not graduating on time (delayed graduation) or failure to graduate at all. Multivariable logistic regression analysis was then performed to simultaneously measure the magnitude of the effects of association between the predictors using the adjusted odds ratios. Adjusted p-values less than 0.05 were considered statistically significant. Standard assumptions of multivariable logistic regression analysis were assessed and found to be valid. Generalized variance inflation factors for the predictors in the full model were all less than 1.5, indicating that there is no multicollinearity in the analysis.

Confidentiality of records and documents retrieved and reviewed, as well as the anonymity of the students' identities relative to these records and documents, were strictly maintained. Privacy of the individuals to whom these records and documents pertain was protected at all times.

Complete encoding of the identities and information was done solely by the research assistant, who was not from the medical community or UP System and totally unfamiliar with any of the record owners. The research assistant was required to sign a confidentiality agreement. Likewise, the principal investigator was always blinded on the ownership of the record and data.

Lastly, as a mandatory requirement for all research studies in this institution and for the purpose of future publication, the principal author of this undertaking personally worked for and obtained a waiver of consent, technical and ethical approval from the Research Implementation and Development Office (RIDO) and University of the Philippines, Manila Review Ethics Board (UPMREB).

Table 1. *Summary of Yearly Graduation Data*

	Graduated on time N = 2,652[1]		Delayed Graduation/Did not Graduate N = 291[1]	
YEAR	N	%	N	%
1990	109	91%	11	9%
1991	106	86%	17	14%
1992	100	84%	19	16%
1993	102	83%	21	17%
1994	99	83%	21	18%
1995	115	96%	5	4%
1996	117	91%	11	9%
1997	107	87%	16	13%
1998	111	93%	9	8%
1999	105	84%	20	16%
2000	103	86%	17	14%
2001	111	93%	9	8%
2002	104	86%	17	14%
2003	120	98%	3	2%
2004	120	92%	11	8%
2005	108	90%	12	10%
2006	110	89%	13	11%
2007	114	90%	13	10%
2008	115	93%	8	7%
2009	115	96%	5	4%
2010	115	96%	5	4%
2011	109	91%	11	9%
2012	116	94%	7	6%
2013	121	92%	10	8%

[1]Statistics presented: n (%); median (IQR)

Results

Table 1 shows the total and yearly number of students who did not graduate on time from 1990 to 2013. Out of the 2,943 students, 2,652 (90.1%) graduated on time, while 291 (9.9%) got delayed in their graduation or did not graduate at all due to poor academic performance. Seventy-two (2.7%) graduated with honors while 140 (4.8%) were dismissed from the roster for academic reasons. Class 1993 and 1994 both tallied the highest incidence (n=21 each) of failure to graduate on time, while class 2003 had the lowest at 2.5% (3 out of 120).

The demographic data in Table 2 does not show any age distinction in those who graduated on time and those who did not graduate on time or did not graduate at all. There were more male (n=157, 54%) than female students (n=134, 46%) who did not graduate or had delayed graduation. Being married also had a slightly higher count of not graduating on time or did not graduate. Those who failed to graduate or had delayed graduation were mostly those who had their pre-med courses from UP Diliman (n=166, 58%) and UP Manila (n=54, 19%). Students from UP Diliman and UP Manila constituted the great majority (80%) of the entire UPCM student population.

Table 2. *Demographic, Socio-economic and Graduation Data*

Variable	Graduated on time N = 2,652[1]	Delayed Graduation/Did not Graduate N = 291[1]
Age	21.00 (20.00, 21.00)	21.00 (21.00, 21.75)
Uknown	1,946	257
Sex		
Female	1,347 (51%)	134 (46%)
Male	1,305 (49%)	157 (54%)
Civil Status		
Married	3 (0.1%)	2 (0.7%)
Single	2,649 (100%)	289 (99%)
Annual Income		
80,000 or less	96 (14%)	5 (15%)
80,001 to 135,000	58 (8.2%)	3 (8.8%)
135,001 to 250,000	91 (13%)	5 (15%)
250,001 to 500,000	185 (26%)	8 (24%)
500,001 to 1,000,000	142 (20%)	8 (24%)
More than 1,000,000	134 (19%)	5 (15%)
Uknown	1,946	257
School (Pre-med)		
Ateneo	59 (2.3%)	6 (2.1%)
DLSU	22 (0.9%)	6 (2.1)%
FEU	1 (<0.1%)	0 (0%)
Other foreign	23 (0.9%)	5 (1.8%)
Other local	63 (2.5%)	11 (3.9%)
UP Baguio	34 (1.3%)	3 (1.1%)
UP Cebu	11 (0.4%)	1 (0.4%)
UP Diliman	1,447 (56%)	166 (58%)
UP Los Baños	224 (8.7%)	21 (7.4%)
UP Mindanao	3 (0.1%)	0 (0%)
UP Manila	605 (24%)	54 (19%)
UP Pampanga	1 (<0.1%)	1 (0.4%)
UP Tacloban	1 (<0.1%)	1 (0.4%)
UP Visayas	44 (1.7%)	7 (2.5%)
UST	25 (1.0%)	2 (0.7%)
Uknown	89	7

[1]Statistics presented: n (%); median (IQR)

As BS Biology graduates constituted most of the admissions at UPCM, they too contributed the highest (Table 3) in the number of those who did not graduate on time or did not graduate at all (n=125, 43%). However, the proportion of those who did not graduate on time (delayed and failed to graduate) over those who graduated (1308/125) was 9.55%. Those admitted through the Academic Category had the biggest contribution in the number of delayed graduation and failure to graduate (n= 186, 64%) as they constituted the great majority of admissions. However, for the same category, the attrition rate is only 8.1%. Among those who were accepted under the special categories (excluding Academic Category), those under the Faculty/Employee Category posted the highest number of failed to graduate and delayed graduation (n= 39, 13%) (18% within the same category), followed by those under the Regionalization category (n=32, 11%) (12% within the category).

Table 4 shows that those who did not graduate on time or failed to graduate, had less superior pre-admission academic profiles compared to those who graduated on time. They had lower %PMGWAG, NMAT scores, interview scores, Admissions Entry Scores, and Rank (Percentile). Similarly, those (Table 5) who did not graduate or had delayed graduation had inferior academic performance in the college of medicine. They also had lower %MGWAG, Class Rank (Percentile), and Board Rating. However, among those who did not graduate on time or did not graduate at all, there were 140 students' data that were not accounted for. These included data on MGWAG, %MGWAG, and Class Ranking. These data were unknown because these students did not reach LU 6 (fourth-year proper-clinical clerkship) for the complete computation of their MGWAG, %MGWAG, and determination of their Class Ranking by the UPCM Office of Students Records.

Table 6 shows that the NMAT bracket did matter in the timeliness of graduation. When comparing brackets, in general, the lower the NMAT bracket, the higher the proportion of those who did not graduate on time or did not graduate at all. Similarly, those within a better PMGWAG category posted a greater proportion of graduating on time than those who did not graduate or had delayed graduation. There were proportionally more BS Psychology students who did not graduate or had delayed graduation (12.3%) compared to non-BS Psychology students (9.2%). BS Biology students had a slightly lower delayed graduation/failed to graduate rate (8.7%) than non-BS Biology students (10.9%). Likewise, in proportion, there were more non-UP students

Table 3. *Pre-med Courses, Admissions Category, and Graduation Data*

Variable	Graduated on time N = 2,652[1]	Delayed Graduation/ Did not Graduate N = 291[1]
Pre-med Course		
AB Humanities	13 (0.5%)	2 (0.7%)
BA Behavioral Science	5 (0.2%)	1 (0.3%)
BA Development Studies	1 (<0.1%)	1 (0.3%)
BA Philosophy	13 (0.5%)	2 (0.7%)
BA Psychology	14 (0.5%)	4 (1.4%)
BS Biochemistry	13 (0.5%)	2 (0.7%)
BS Biology/Biological Science	1,308 (49%)	125 (43%)
BS Botany	13 (0.5%)	1 (0.3%)
BS Chemistry	36 (1.4%)	3 (1%)
BS Community Nutrition	11 (0.4%)	1 (0.3%)
BS Engineering	4 (0.2%)	1 (0.3%)
BS MBB	110 (4.1%)	11 (3.8%)
BS Medical Technology	26 (1.0%)	2 (0.7%)
BS Nursing	34 (1.3%)	1 (0.3%)
BS Pharmacy/Industrial Pharmacy	46 (1.7%)	4 (1.4%)
BS Psychology	557 (21%)	78 (27%)
BS PT/OT/Speech Pathology	45 (1.7%)	4 (1.4%)
BS Public Health	170 (6.4%)	15 (5.2%)
BS Sports Science	5 (0.2%)	0 (0%)
BS Zoology	139 (5.2%)	20 (6.9%)
Others	89 (3.4%)	11 (3.8%)
Unknown	0	2
Admission Category		
Academic	2,107 (79%)	186 (64%)
Faculty/Employee	176 (6.6%)	39 (13%)
Indigenous People	50 (1.9%)	15 (5.2%)
Regionalization Program	229 (8.6%)	32 (11%)
UPMAS	84 (3.2%)	13 (4.5%)
UPMASA	12 (0.5%)	4 (1.4%)
Unknown	0	2

[1]Statistics presented: n (%); median (IQR)

Table 4. *Pre-admission and Graduation Data (continued)*

Variable	Graduated on time N = 2,652[1]	Delayed Graduation/Did not Graduate N = 291[1]
PMGWAG	1.69 (1.55, 1.85)	1.79 (1.58, 2.04)
Unknown	1	1
%PMGWAG	83 (79, 86)	80 (74, 85)
Unknown	1	1
NMAT	97.0 (94.0, 99.0)	96.0 (92.0, 98.0)
Unknown	111	12
Interview Score	8.39 (7.81, 8.95)	8.25 (7.50, 8.83)
Unknown	224	30
%Interview Score	84 (78, 90)	82 (75, 88)
Unknown	224	30
Entry Score	6.8 (83.9, 89.1)	84.8 (79.7, 88.5)
Unknown	226	30
Entry Rank	60 (31, 90)	85 (38, 110)
Unknown	3	0

[1]Statistics presented: n (%); median (IQR)

Table 5. *Post-admissions Academic Performance and Graduation Data*

Variable	Graduated on time N = 2,652[1]	Delayed Graduation/Did not Graduate N = 291[1]
MGWAG	2.19 (2.01, 2.38)	2.49 (2.19, 2.69)
Unknown	1	140
%MGWAG	70 (66, 75)	63 (58, 70)
Unknown	1	140
Board Rating	81.2 (79.2, 83.1)	78.6 (76.6, 81.0)
Unknown	1,091	228
Class Ranking	74 (39, 109)	130 (88, 146)
Unknown	1	140
Total Class Size	153 (148, 158)	153 (147, 161)
Unknown	1	140

[1]Statistics presented: n (%); median (IQR)

Table 6. *Summary of Admissions and Graduation Data*

Variable	Graduated on time N = 2,652[1]	Delayed Graduation/Did not Graduate N = 291[1]
NMAT Bracket		
80 or less	32 (1.3 %)	20 (7.2%)
81 to 85	42 (1.7%)	14 (5.0%)
86 to 90	136 (5.4%)	23 (8.2%)
91 to 95	640 (25%)	67 (24%)
96 to 99	1,565 (62%)	142 (51%)
100	126 (5.0%)	12 (4.3%)
Unknown	111	12
PMGWAG Bracket		
1 to 1.75	1,639 (62%)	128 (44%)
1.76 to 2	719 (27%)	80 (28%)
2.1 to 2.25	215 (8.1%)	46 (16%)
2.26 to 2.5	72 (2.7%)	28 (9.7%)
2.6 to 5	6 (0.2%)	8 (2.8%)
Unknown	1	1
BS Psych		
BS Psychology	557 (21%)	78 (27%)
Non-BS Psychology	2,095 (79%)	211 (73%)
Unknown	0	2
BS Bio		
BS Biology	1,308 (49%)	125 (43%)
Non-BS Biology	1,344 (51%)	164 (57%)
Unknown	0	2
School		
UP	2,370 (92%)	254 (89%)
Non-UP	193 (7.5%)	30 (11%)
Unknown	89	7

[1]Statistics presented: n (%); median (IQR)

in the college who did not graduate on time or did not graduate at all (13.4%) than UP students (9.7%).

The univariate regression analysis, with different categories of NMAT scores as predictor, revealed statistically significant odds ratios that are less than 1 (Table 7). Table 8 shows that this effect was retained after adjusting for other factors in the multivariable logistic regression analysis. The adjusted odds ratios (Table 8) associated with delayed graduation or failure to graduate were all less than 1 signifying a "protective effect" of having high NMAT scores against not graduating on time or failure to graduate. A statistically significant reduction in the odds was observed in the NMAT brackets of 100 (adjusted OR of 0.27), 96 to 99 (adjusted OR of 0.22), 91 to 95 (adjusted OR of 0.19), and 86 to 90 (adjusted OR of 0.29).

The unadjusted (univariate) odds ratios of delayed graduation or failure to graduate associated with the different cut-off categories of PMGWAG are shown in Table 7 and their corresponding adjusted odds ratios (multivariable analysis) are given in Table 8. Comparatively, the adjusted odds ratios were lower than the non-adjusted odds ratios suggesting the "protective" effect of having a high PMGWAG after adjusting for other factors. It can be observed that the higher the PMGWAG, the lower are the odds of not graduating on time or not graduating at all. Statistically significant reductions in the odds of delayed graduation and failure to graduate were seen in the PMGWAG brackets 1 to 1.75 (adjusted OR of 0.04), 1.76 to 2 (adjusted OR of 0.06), and 2.1 to 2.25 (adjusted OR of 0.09).

The effect of admission category on the odds of delayed graduation and failure to graduate are shown in Table 7 and Table 8. The univariate analysis (Table 7) shows that those accepted under the special categories had higher odds (odds ratio > 1) of not graduating on time or not graduating at all. Students admitted through the UPMASA category, the Indigenous and Faculty categories appeared to be associated with highest increase in odds of not graduating on time or not graduating at all. However, none of these effects were found to be statistically significant after adjusting for the other factors in the multivariable logistic regression analysis.

The odds of not graduating on time or not graduating at all was higher in those who had BS Psychology as their pre-med course compared to non-BS Psychology graduates (Tables 7,8). This effect was found to be statistically significant even after adjusting for other factors (OR=1.39, P-value = 0.019; adjusted OR=1.71, P-value = 0.004).

Those who had BS Biology as pre-med course had lower odds (OR= 0.78, adjusted OR=0.91) of delayed graduation and failure to graduate than those who were non-BS Biology graduates (Tables 7,8). However, the unadjusted and adjusted odds ratios were not statistically significant.

On univariate and multivariable logistic regression analyses (Tables 7,8), UP graduates had lower odds of

Table 7. *Univariate Regression Analysis: Effects of Admissions Characteristics on the Odds of Delayed Graduation and Failure to Graduate*

Characteristic	Or[1]	95% CI[1]	p-value
NMAT Score			
100	0.15	0.07, 0.34	**<0.001**
96 to 99	0.15	0.08, 0.27	**<0.001**
91 to 95	0.17	0.09, 0.31	**<0.001**
86 to 90	0.27	0.13, 0.55	**<0.001**
81 to 85	0.53	0.23, 1.21	0.13
80 or less	-	-	
PMGWAG			
1 to 1.75	0.06	0.02, 0.17	**<0.001**
1.76 to 2	0.08	0.03, 0.25	**<0.001**
2.1 to 2.25	0.16	0.05, 0.48	**0.001**
2.26 to 2.5	0.29	0.09, 0.91	**0.035**
2.6 to 5	-	-	
Admission Category			
Academic	-	-	-
Faculty/ Employee	2.5	1.70, 3.62	**<0.001**
Indigenous People	3.39	1.81, 6.01	**<0.001**
Regionalization Program	1.58	1.04, 2.32	**0.025**
UPMAS	1.75	0.92, 3.09	0.069
UPMASA	3.77	1.04, 10.9	**0.023**
Pre-med course			
Non-BS Psychology	-	-	
BS Psychology	1.39	1.05, 1.82	**0.019**
Pre-med course			
Non-BS Biology	-	-	
BS Biology	0.78	0.61, 1.00	0.05
Institution graduated from			
Non-UP	-	-	
UP	0.69	0.47, 1.05	0.073

[1]OR = Odds Ratio, CI = Confidence Interval

Table 8. *Table Multiple Logistic Regression Analysis of the Effects of Admission Characteristics on the Odds of Delayed Graduation and Failure to Graduate*

Characteristic	Or[1]	95% CI[1]	p-value
NMAT Score			
80 or less	-	-	
81 to 85	0.54	0.22, 1.34	0.2
86 to 90	0.29	0.13, 0.66	**0.003**
91 to 95	0.19	0.10, 0.40	**<0.001**
96 to 99	0.22	0.11, 0.46	**<0.001**
100	0.27	0.10, 0.70	**0.008**
PMGWAG			
2.6 to 5	-	-	
1 to 1.75	0.04	0.01, 0.18	**<0.001**
1.76 to 2	0.06	0.01, 0.25	**<0.001**
2.1 to 2.25	0.09	0.02, 0.40	**0.002**
2.26 to 2.5	0.2	0.04, 0.89	**0.041**
Admission Category			
Academic	-	-	
Faculty/ Employee	1.16	1.70, 1.88	0.6
Indigenous People	1.12	0.48, 2.39	0.8
Regionalization Program	0.8	0.48, 1.31	0.4
UPMAS	0.81	0.37, 1.61	0.6
UPMASA	2.05	0.33, 10.4	0.4
Pre-med course			
Non-BS Psychology	-	-	
BS Psychology	1.71	1.19, 2.46	**0.004**
Pre-med course			
Non-BS Biology	-	-	
BS Biology	0.93	0.68, 1.29	0.7
Institution graduated from			
Non-UP	-	-	
UP	0.83	0.49, 1.49	0.5
Interview Score	0.98	0.96, 0.99	**0.003**

[1]OR = Odds Ratio, CI = Confidence Interval

delayed graduation and failure to graduate compared to non-UP graduates. However, this effect was not found to be statistically significant.

Lastly, the odds of delayed graduation and failure to graduate was decreased by 2% for every 1 unit increase in the interview scores (Table 7). This effect was found to be statistically significant even after adjusting for the effect of the other factors in the multivariable logistic regression analysis (adjusted OR = 0.98, P-value = 0.003).

Discussion

The overall academic outcome profile as cited in the earlier published study was generally indicative of a very satisfactory academic performance of the UPCM students in the past two decades. Perhaps no other medical school in the country comes close to the UPCM outcome of ninety percent (90.1%) graduating on time, of which seventy-two (2.7%) graduated with honors. Only around five percent (5.1%) were delayed in graduating with less than five percent (4.8%) attrition rate (dropped out/dismissed) [32]. This drop out or the attrition rate was mainly attributable to poor academic performance. These dismissals and dropouts were entirely not related to non-academic reasons like financial constraints, disciplinary sanction, or future career redirection. Thus, this study limits the scope and the parameter/indicator of poor academic performance in UP College of Medicine as to specifically pertain to the delayed graduation or not graduating at all.

Female medical students during the study frame seemed to perform better academically as there were more male students who graduated late or did not graduate at all. Being single and having a more affluent economic status predicted a slightly better academic performance. These findings were expected as female students always and consistently performed better academically than male students. Moreover, fewer social obligations, enough time for and focused attention on study with better access to learning resources as seen in unmarried, affluent students favored better academic performance.

Pre-admission academic credential relates to the performance in the College of Medicine. Those who performed poorly resulting in delayed graduation or failure to graduate had lower %PMGWAG, NMAT, Interview Scores, Admissions Entry Scores, and Percentile Rank. Similarly, they performed less impressively in the Physician Licensure Examination. These findings are consistent with previous studies [31,32].

Poor academic performance leading to delayed graduation or failure to graduate was observed more among those with BS Psychology as pre-med course, non-BS Biology, and those non-UP graduates in pre-med. This was consistent with the findings in those studies [31,32] where the said groups also posted lower %PMGWAG, class ranking, and board rating.

The logistic regression analysis, both univariate and multivariable, showed that a higher NMAT and better PMGWAG lessened the odds of delayed graduation or failure to graduate in medicine (Tables 7,8). The prevailing absolute admissions requisite of an NMAT score of least 90 is justifiable as the odds of delayed graduation or failure to graduate decreased in students with NMAT scores of 91-95 (adj OR = 0.19), in students with a score of 96-99 (adj OR = 0.22), and in students with NMAT scores of 100 (adj OR = 0.27), compared to students with NMAT score of 86-90 (adj OR = 0.29).

Based on univariate and multivariable logistic regression analysis, there may be some benefit in increasing the PMGWAG cut-off from 2.5 to 2.25, as there were large and highly statistically significant decreases in the odds of delayed graduation or failure to graduate with PMGWAG of 2.25 and higher (adj ORs of 0.04, 0.06, 0.09; Table 8). Although students with PMGWAG of 2.26 to 2.5 also had protective odds 0.2, but the effect was only of borderline significant (p-value = 0.041). If the admissions to the college are opened exclusively to those who graduated with Latin honors in pre-med courses (PMGWAG=1.75 or better), then these odds were drastically reduced (OR=0.06, adjusted OR=0.04).

The above findings were consistent with the findings of a much earlier study of Catbagan (2001) on the predictive validity of the admission criteria of UPCM on the academic performance [29]. Specifically, through multiple regression analysis, the study determined the correlation and predictive values of PMGWAG, NMAT scores, and interview scores with the performance on basic and clinical sciences during medical education. This unpublished study covered a ten-year period from 1986 to 1996. The same study concluded that PMGWAG and NMAT scores stood as valid predictors of future academic performance (both in basic and clinical sciences performance). He further posited that the structured interview score correlated moderately with clinical science performance, but not with basic science performance.

On the other hand, contradictory findings were uncovered in the study of Gonzales and Salonga which concluded that higher %PMGWAG on admission is not a strong predictor of

whether the student would graduate on time. Neither does lower %PMGWAG translate to delay in graduation. Furthermore, the same study concluded that although removing the NMAT cut-off of 90 percentiles would result in better and higher %PMGWAG among applicants, lower NMAT scores resulted in more students who were either delayed or did not continue with medicine. More importantly, the study concluded that an NMAT cut-off above the 85th percentile is a strong predictor of satisfactory class performance [30].

In terms of admissions category, all those accepted under the Special Categories had higher odds of delayed graduation or failure to graduate compared to those accepted under the Academic Category. Univariate logistic regression revealed the highest odds with the Special categories, with odds as high as OR=3.77, indicating an almost fourfold likelihood of not graduating on time. This was expected as those who were admitted through the special categories had a different, less competitive, less stringent set of admissions requisites. Thus, those accepted through the Special Categories had as well less impressive pre-admission academic credentials [31]. They, in fact, trailed behind those who were accepted through the Academic Category consistently in all performance parameters: %PMGWAG, NMAT, Entry Rank, %MGWAG, Board Rating, and Graduation Rank [32].

The basic admissions requisites for the Special Categories were plainly, NMAT >90 and PMGWAG< 2.5. Under these Special Categories, except for the Faculty/Employee category, the applicants are not evaluated and ranked according to their academic credentials and performance in their pre-med courses. The Regionalization and Indigenous People Program [24] and UPMAS/UPMASA Categories [28] have their own unique admission criteria that minimally consider or do not consider at all the applicants' PMGWAGs and NMATs. Thus, as expected, those in the Special Categories had lower average %PMGWAG and NMAT [33] upon entry to the college. Consequently, they had lower average %MGWAG, Board Rating, and Graduation Rank [32]. Off-hand and by mere observation, one could expect and predict easily that the odds of delayed graduation or failure to graduate would be higher with this group.

Among the Special categories, it was the UPMASA category that posted the highest odds of delayed graduation or failure to graduate, (OR of 3.77) almost four times higher than that of the Academic category. This was followed by the Indigenous People category at 3.4 times higher. These higher odds observed in these categories indicate poor academic performance in the College of Medicine. This could be attributed to the fewer applicants during the admission process and, therefore, less competition within these categories as well as the ease of complying with the basic admissions requisites (NMAT > 90, PMGWAG < 2.5). They (UPMAS and Indigenous People) had the lowest PMGWAG and NMAT among those who made it to the special categories [31]. Since the prior academic credentials and achievement were lower for these groups, it can reasonably be expected that they would perform not at par with those in the Academic category. Their academic performance in terms of %MGWAG, Board Rating, and Graduation Ranking were all indicative of this assertion [32].

With the information above, one could ponder if ethnicity, social dynamics, and socio-economic status of the students are factors that also affect the academic performance of those in the Special Categories especially those in the Indigenous and Regionalization categories. Likewise, by simple logic and common sense, one could easily draw the conclusion that those are factors of paramount importance, with significant implications and effects on students' performance. In fact, ethnicity has long been implicated and associated with the underperformance of students in the medical school [9]. Furthermore, these ethnic differences in academic performance have persisted for many years and widely pervasive across different medical schools.

As ethnicity is strongly associated with socioeconomic status, lower socioeconomic status is likewise strongly correlated with lower academic performance and achievement [35,36] that necessitates social support [37] and financial amelioration. Those under the Indigenous and Regionalization Programs were accepted mainly due to their commitment to practice and serve their domicile province, which is remote, underdeveloped, and underserved. Thus, indirectly they were accepted into those programs based on their socioeconomic status. They were not as financially well off as the rest of their class/batch.

Currently, those accepted under the Indigenous and Regionalization Programs are in full access of all financial supports in the UPCM like scholarships, tuition fee, book subsidy, and stipends and allowances. However, those support may only buffer or moderate, up to a certain degree the effect of the socioeconomic status on the academic performance [37]. Still quite a few of them in those programs performed poorly despite the supports extended to them by the college.

In between these special categories and the academic category, were those in the Faculty/Employee category who

had shown 2.5 times higher likelihood of not graduating on time or not graduating at all, followed by those in the Regionalization program at 1.6 times higher. Similarly, these higher odds could also be attributed to the ease in complying with basic admissions requisites (NMAT > 90, PMGWAG < 2.5) and relatively less competition for a fixed number of slots under these categories [33,34]. Thus, it is not surprising that these groups also had lower pre-admission %PMGWAG and NMAT [32] and less impressive academic performance in terms of %MGWAG, Board Rating, and Graduation Ranking [33].

Apart from the not-so-impressive pre-admission academic profile of those belonging to the Faculty/Employee category, another reason for their underperformance might be the parental expectation and pressure. While parental support, encouragement, and good role modeling may inspire good academic performance and achievement among offspring, but undue and excessive parental pressure and expectation could cause academic stress [38]. This academic stress, on top of other stressors in the medical school, could have adversely affected their performance [39].

At the UPCM, being a child of a faculty, especially being a child of a faculty of the same college, one could easily presume that such an "entitlement" provides some academic "privilege", security, and protection from attrition or being booted out from the program. But such is not the case as UP treats all students equally and fairly. No special favor or treatment is extended to the children of faculty members in UPCM as medical students. Pressure among UP faculty in dealing with peer's offspring as student is almost nonexistent. Fairness in giving grades to the students is solely based on what he/she truly deserved. Thus, it is not surprising to know that there were attritions, academic casualties, dismissals, and drop-outs among this special category.

Based on pre-med courses, those who had a degree in BS Biology had lower odds of not graduating on time or not graduating (OR=0.78 and adjusted OR=0.70) while those who were graduates of BS Psychology had higher odds (OR=1.39, adjusted OR=1.79). This could be attributed to the fact that BS Psychology graduates, although coming into the College of Medicine with higher %PMGWAG and Entry Rank [31], generally did not perform well academically in medicine proper in comparison with BS Biology graduates [32]. Apparently, this could probably be indicative of the undue advantage and edge in the admission process of BS Psychology graduates by virtue of having a higher %PMGWAG (inflated %PMGWAG) and Entry Rank. Their performance was not at par with BS Biology graduates during the medical school in comparison.

Lastly, the overall odds of delayed graduation or failure to graduate among non-UP pre-med graduates tend to be higher in comparison with UP pre-med graduates. The odds ratios for UP graduates, although not statistically significant were both below 1.0 (OR=0.69, adjusted OR=0.83). This may indicate a generally better academic performance of home grown UPCM students, even though non-UP students entered UPCM with generally higher %PMGWAG [32]. Familiarity with the setup, complexities, and peculiarities of the UP educational system among its graduates could probably provide better odds of graduating on time.

Conclusion

In view of the foregoing, with due consideration of the inferential implications of this study, the following conclusions and recommendations can be drawn:

From the results of the logistic regression analysis, it can be concluded that a UPCM student who failed to graduate on time or failed to graduate at all would most likely be a student who entered the College of Medicine with a lower NMAT, lower PMGWAG, and those who came in under the Special Admission Categories, either under the UPMASA (OR=3.8), Indigenous People (OR=3.4), Faculty/Employee Category (OR=2.5) or Regionalization Program (OR=1.6). Being a non-UP applicant (OR=1.5) for admission at UPCM and with BS Psychology (OR=1.4, adj. OR=1.7) as a pre-med course also carried higher odds of delayed graduation or failure to graduate.

These data should be taken into consideration when evaluating as well as crafting amendments to the admissions policy. The study has provided a well-grounded basis for the absolute and non-negotiable admissions requisite of NMAT of at least 90 percentiles. The screening cut-off of PMGWAG of 2.5 must be reconsidered as an absolute requisite for admission. This study provided substantial basis for raising the screening cut-off of PMGWAG to 2.25 as this would significantly lower the odds of not graduating on time or failure to graduate by half compared to a PMGWAG cut-off of 2.5.

Furthermore, the policy on the admission of those in Special Categories must be reviewed, reassessed, and amended, as those in these categories performed academically under par compared to those in the Academic

Category. A higher PMGWAG cut-off would be ideal as admissions requisite for those in the Special Categories and could improve the academic performance of those admitted under these categories.

It is worth mentioning that the policy related to admissions through these Special Categories deviates from the standard parameters and criteria used for the Academic Category. Applicants in the Academic Category are evaluated and ranked based exclusively on sixty percent (60%) PMGWAG, thirty percent (30%) NMAT, and ten percent (10%) Interview Score [28]. Except for the Interview Score, these are mainly academic and cognitive measures.

The Special Categories (RP/IP/UPMAS/UPMASA), on the other hand, have a totally different set of admissions parameters and criteria, setting aside the 60%-30%-10% contribution rule of PMGWAG, NMAT, and Interview Score for applicants' ranking. The Regionalization Program and Indigenous People Program select 17 students yearly based solely on their own interviews and assessments (Community Liaison Officer-30% and RP Committee-70%) [24], with very minimal consideration of the applicants' PMGWAG, and completely disregarding their NMAT and Interview Scores (Admissions Committee Interview).

The same is true for the UPMAS/UPMASA Category. This special category, which accepts six students yearly, neither considers nor puts any bearing on the applicants' PMGWAG, NMAT, and interview scores in the selection process. The UPMAS/UPMASA committee base their selection exclusively on the professional and civic credentials of the alumni-parent/s of the applicants. The alumni-parent/s are assessed and evaluated on point system-based criteria that measure their contributions to the university/college of medicine, to the medical professions, and to the society [26].

The study posits that the non-inclusions of PMGWAG and NMAT in the selection of these two Special Categories (Regionalization/Indigenous People and UPMAS/UPMASA) could be the reason for their relatively poorer performance and higher odds for delayed graduation from the college. It is therefore recommended that the admissions criteria of these categories be modified to include and give some weight on the applicant's PMGWAG and NMAT.

The differential academic performances between courses (*i.e.* BS Psychology vs BS Biology) and schools (*i.e.* UP graduates vs non-UP graduates) in UPCM could be attributed to the ease of getting higher PMGWAG in some of courses and schools and consequently the ease of being accepted in UPCM. Not a few of the graduates of these courses and of these schools entered UPCM with high admission rank because of high PMGWAG but graduated with below-median class rank [27,31,32]. This necessitated the formulation and administration of “adjustment factors” to standardize PMGWAG and level the playing field among different courses and schools/colleges in relation to admission [34].

Lastly, to reduce the likelihood of poor academic performance of those accepted under the Faculty/Employee slots, higher qualifying requisites in terms of PMGWAG and NMAT should be imposed. Although under this category, applicants are ranked according to the 60-30-10 rule (composite total of 60% PMGWAG, 30% NMAT, and 10% Interview Score), they entered with less competition for the 12 allotted admissions slots despite significantly lower PMGWAG and NMAT. Usually, there are less than 20 applicants yearly, competing for the 12 slots for the Faculty/Employee Category. It would be best to increase the qualifying cut-off of PGWAG from 2.5 to 2.0 and NMAT from 90 to 95 percentile, to improve the academic performance of those who are accepted under this category.

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