



Research paper

Factors associated with academic performance among clinical year medical students: A cross-sectional study in a Southern Thailand medical school

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ABSTRACT

Introduction: Medical education is well known for its difficulty. However, one of the ultimate aims of medical education is academic success. Therefore, undergraduate medical students are facing multiple factors during academic courses that correlate with their academic performance.

Aim: We aimed to study factors associated with academic performance among clinical year medical students in a Southern Thailand medical school.

Material and methods: 168 medical students in the fourth and fifth year of a southern Thailand tertiary teaching hospital participated in this cross-sectional questionnaire-based study; over March 2021. We developed the questionnaire to cover all factors affecting academic performance, indicated by accumulated grade point average (GPAX). The data were analyzed using the R Program (v. 4.0.4).

Results and discussion: Of 168 medical students, 55.5% were women. Median GPAX was 3.22. The multivariate analysis showed that a higher GPAX was associated with time spent on study more than 4 h per day ($P = 0.013$), time spent on social networks more than 4 h per day ($P = 0.004$), strong motivation to become specialists ($P = 0.007$) and having a good relationship with family ($P = 0.034$).

Conclusions: Medical students' academic achievement was associated with increased study hours, time spent on social networks, motivation to become specialists, and having a good relationship with the family. However, we recommend further longitudinal studies to evaluate and confirm factors that affect academic performance.

1. INTRODUCTION

Medical students' academic performance has always been the primary goal in medical education. Good academic performance can bring good opportunities to medical students' future careers.^{1,2} At the same time, low academic performance can delay graduation or result in a repeat of an academic year and may affect the success rate of medical students.³ Moreover, students' performances are associated with medical education personnel, reflecting their curriculum design.

Medical education is one of the most expensive courses. It also requires more academic years compared to other fields of study. For example, a six-year curriculum (three years of pre-clinical and another three years of clinical years) is required to get a medical degree and become a certified physician in Thailand. Therefore, the financial burden of paying tuition fees for the additional years may occur when students repeat their studies.

Academic achievement depends on many factors such as age, gender, support system, learning style, health status, relationships, mentality, and attitude.^{3–15} Many studies have positively and negatively reported factors that affect students' academic achievement. For example, Lumley, 2015 found no significance among genders.⁵ A study in Nigeria showed that a sound support system helps improve academic performance in medical students.¹⁶ On the other hand, a study in the United Kingdom reported that medical students who pay the tuition fee themselves had significantly lower academic performance.⁵ According to a study from Saudi Arabia, learning style also affects the grade point average (GPA).⁶ Learning-related emotions also influence the metacognitive learning strategies that affect academic performance.¹⁷ Moreover, a study from Pakistan found an association between low anxiety levels and good academic performance.¹⁸

2. AIM

We believe it is essential to identify the factors influencing medical students' academic performances. Therefore, this study planned to assess these factors and their correlation with academic performance among clinical year medical students in Southern Thailand.

3. MATERIAL AND METHODS

This cross-sectional questionnaire-based study was conducted in March 2021 in a southern Thailand tertiary care teaching hospital. A clinical year or fourth and fifth-year medical students were included in the study. Interested medical students could freely enroll in the study by anonymously completing and submitting the online questionnaire. Therefore, we excluded incomplete-filled questionnaires from our research. The first page of the online questionnaire contained information about the study and a consent form.

We developed an online questionnaire, initially in the Thai language, using Google forms, covering factors affecting academic performance, including general information, health information, educational information, and extracurricular activities. The cumulative GPA (GPAX), calculated from the grade received in each subject during study divided by each subjects' credits, was used as an outcome,¹⁹ as it is universally used to assess academic performance.²⁰ Three experts in medical education tested the content validity index. Internal consistency was evaluated via a pilot study among 30 medical students from another campus.

3.1. Data collection and outcome measured

Participants could access the online questionnaire via quick response (QR) code or uniform resource locator (URL) shown on advertised posters, which could be found both offline (classrooms, canteen, dormitory) and online (Facebook page of medical student association). Therefore, the participants could fill out the questionnaire freely and anonymously. This study included a total of 168 participants.

The primary outcome of this study is the GPAX. In Thailand, university students who graduate with a GPAX of more than 3.50 receive their degree with first-class honors, and those whose GPAX is more than 3.25 will receive a second-class honors degree. In our study, we defined good academic performance as GPAX at least 3.25. The difference in these factors between the higher GPAX group (≥ 3.25) and the lower GPAX group (< 3.25) will be explored.

3.2. Statistical analysis

The collected data was exported from google forms and then tabulated via Microsoft Excel 2019 software. The data was kept confidential through an encoding method. The R Program (v. 4.04) was used for analysis. We used stepwise methods for variable selection and then analyzed data using bivariate and multivariate linear regression methods.

4. RESULTS

The median (IQR) of the participants' age was 23 years (22.6, 23.5). The demographic data of the participants are shown in Table 1.

Regarding health factors, the hours of sleep, time spent on physical activity, smoking, alcohol consumption, and having underlying medical diseases were not significantly different between the higher GPAX group and the lower GPAX group. However, the students with higher GPAX have a significantly higher proportion of low body mass index (BMI < 25) individuals. In addition, the prevalence of psychiatric disorders and other mental health issues between the two groups is not significantly different (Table 2).

More than half (67.3%) of the participants preferred to study alone than in a group. However, the learning style is not significantly different between the two groups. The top three motivations for studying among medical students were high academic expectations (45.8%), enjoying learning

Table 1. Comparison of Demographic Data to GPAX.

Factors	GPA < 3.25	GPA ≥ 3.25	Total (N = 168)	P value
Gender, n (%)				
Female	46 (55.4)	49 (57.6)	95 (56.5)	0.892 ^a
Male	37 (44.6)	36 (42.4)	73 (43.5)	
Age, median (IQR)	23.2 (22.6,23.6)	23 (22.7,23.5)	23 (22.6,23.5)	
Allowance per month (Thai Baht), n (%)				
<8000	35 (42.2)	26 (30.6)	61 (36.3)	0.398 ^b
≥8000	48 (57.8)	59 (69.4)	107 (63.7)	
Year of study, n (%)				
4	37 (44.6)	28 (32.9)	65 (38.7)	0.165 ^a
5	46 (55.4)	57 (67.1)	103 (61.3)	
Educational Support, n (%)				
From family	66 (79.5)	72 (84.7)	138 (82.1)	
Scholarship	13 (15.7)	9 (10.6)	22 (13.1)	
Study loan	3 (3.6)	3 (3.5)	6 (3.6)	
Self-pay	1 (1.2)	1 (1.2)	2 (1.2)	
Relationship Status, n (%)				
Single	52 (62.7)	56 (65.9)	108 (64.3)	0.109 ^a
In relationship	21 (25.3)	26 (30.6)	47 (28)	
Open relationship	10 (12)	3 (3.5)	13 (7.7)	
Having a good relationship with family, n (%)				
Yes	55 (66.3)	68 (80)	123 (73.2)	0.066 ^a
No	28 (33.7)	17 (20)	45 (26.8)	
Having a good relationship with friends, n (%)				
Yes	79 (95.2)	82 (96.5)	161 (95.8)	0.718 ^c
No	4 (4.8)	3 (3.5)	7 (4.2)	

Comments: ^a Chi-squared test, ^b Ranksum test, ^c Fisher's exact test.

(38.1%), and expectation for specialist training (33.3%). Surprisingly, 37.3% of the participant reported not having any motivation. However, the expectation for specialist training is the only significantly different factor between the two groups. The higher GPAX group has a higher proportion of individuals who plan to be specialists. The top three reasons for enrolling in medical school were their preference (45.8%), no specific reason but a high enough score for registering (25.6%), and following social value (14.3%). The reasons for enrolling did not differ between the two groups (Table 3).

Regarding extraarticular activities, 51.8% spent 2–4 h on social networks, and 39.3% spent more than 4 h. Almost two-thirds (63.1%) of the participants spent time on games less than 2 h. There are 26.2% of the participant reported attending clubs or participating in volunteer work for at least 5 h per week. We did not find any significant difference between the high and low GPAX groups regarding these factors (Table 4).

Multivariate analysis revealed that GPAX was positively associated with increased studying time per day (>4 h),

Table 2. Comparison of Health-related factors to GPAX.

Factors	GPA < 3.25	GPA ≥ 3.25	Total (N = 168)	P value
BMI, median (Q1, Q3)	21 (19.8,23.9)	20.7 (19.1,22.2)	20.9 (19.5,22.7)	0.113 ^a
BMI				
<25	66 (79.5)	78 (91.8)	144 (85.7)	0.041 ^b
≥25	17 (20.5)	7 (8.2)	24 (14.3)	
Hours of sleep per day				
<6 h	35 (42.2)	39 (45.9)	74 (44)	0.405 ^c
6–8 h	46 (55.4)	41 (48.2)	87 (51.8)	
>8 h	2 (2.4)	5 (5.9)	7 (4.2)	
Hours spent on physical activity per week				
No	27 (32.5)	26 (30.6)	53 (31.5)	0.807 ^b
<2.5 h/week	21 (25.3)	19 (22.4)	40 (23.8)	
≥2.5 h/week	35 (42.2)	40 (47.1)	75 (44.6)	
Smoking				
Yes	4 (4.8)	0 (0)	4 (2.4)	0.057 ^c
No	79 (95.2)	85 (100)	164 (97.6)	
Alcohol consumption				
Yes	44 (53)	41 (48.2)	85 (50.6)	0.642 ^b
No	39 (47)	44 (51.8)	83 (49.4)	
Having an underlying medical disease				
yes	8 (9.6)	8 (9.4)	16 (9.5)	1 ^b
no	75 (90.4)	77 (90.6)	152 (90.5)	
Having been diagnosed psychiatric disorder				
yes	14 (16.9)	6 (7.1)	20 (11.9)	0.085 ^b
no	69 (83.1)	79 (92.9)	148 (88.1)	
Having mental health issues in the last 12 months				
yes	17 (20.5)	10 (11.8)	27 (16.1)	0.184 ^b
no	66 (79.5)	75 (88.2)	141 (83.9)	

Comments: ^a Ranksum test, ^b Chi-squared test, ^c Fisher's exact test.

motivation to enroll in specialist training, having good relationships with family, and increased hours spent on social networks (>4 h). However, there was a negative association between GPAX and increased BMI (≥25) and the presence of a psychiatric disorder (Table 5).

5. DISCUSSION

In this study, we can identify many factors in various areas that can affect the learning outcome of medical students in both positive and negative ways.

BMI is the only health factor that negatively affects academic performance among medical students in our setting. However, the result from a cross-sectional study cannot explain the cause-and-effect relationship. Medical students should have a healthy lifestyle; for example, healthy food, a safe environment, and adequate physical activity, which can promote overall well-being.

Table 3. Comparison of learning-related factors to GPAX.

Factors	GPA < 3.25	GPA ≥ 3.25	Total (N = 168)	P value
Reason for enrolling in medical school				
According to their own needs	37 (44.6)	40 (47.1)	77 (45.8)	0.326 ^a
Decided on the needs of the family	8 (9.6)	8 (9.4)	16 (9.5)	
Social values	10 (12)	14 (16.5)	24 (14.3)	
Having a high enough score to enroll in medical school	26 (31.3)	17 (20)	43 (25.6)	
Other reasons	2 (2.4)	6 (7.1)	8 (4.8)	
Learning style, N (%)				
Study alone	55 (66.3)	58 (68.2)	113 (67.3)	0.914 ^a
Study in group	28 (33.7)	27 (31.8)	55 (32.7)	
Hours spent on study per day, N (%)				
<2 h	49 (59)	40 (47.1)	89 (53)	0.01 ^a
2–4 h	33 (39.8)	34 (40)	67 (39.9)	
>4 h	1 (1.2)	11 (12.9)	12 (7.1)	
Motivation for studying, N (%)				
High academic expectation	30 (36.1)	47 (55.3)	77 (45.8)	0.02 ^a
Enjoy learning	29 (34.9)	35 (41.2)	64 (38.1)	0.501 ^a
Pressure from family	3 (3.6)	7 (8.2)	10 (6)	0.329 ^b
The expectation for specialist training	19 (22.9)	37 (43.5)	56 (33.3)	0.008 ^a
No motivation at all	31 (37.3)	23 (27.1)	54 (32.1)	0.207 ^a
Plan after graduation				
Internship	41 (49.4)	30 (35.3)	71 (42.3)	0.133 ^b
Residency training	24 (28.9)	38 (44.7)	62 (36.9)	
Private practice and other	4 (4.8)	2 (2.4)	6 (3.6)	
Not sure	14 (16.9)	15 (17.6)	29 (17.3)	

Comments: ^a Chi-squared test, ^b Fisher's exact test.

Our study found that more than 4 study hours per day is associated with higher academic performance. Lumley et al. Also showed a positive association between academic success and the number of study hours.⁵ In contrast, a study

Table 4. Comparison of extracurricular activities to GPAX.

Factors	GPA < 3.25	GPA ≥ 3.25	Total (N = 168)	P value
Hours spent on social networking per day				
<2 h	8 (9.6)	7 (8.2)	15 (8.9)	0.111 ^a
2–4 h	49 (59)	38 (44.7)	87 (51.8)	
>4 h	26 (31.3)	40 (47.1)	66 (39.3)	
Hours spent on games per week				
No	43 (51.8)	48 (56.5)	91 (54.2)	0.376 ^a
<2 h	5 (6)	10 (11.8)	15 (8.9)	
2–4 h	16 (19.3)	11 (12.9)	27 (16.1)	
>4 h	19 (22.9)	16 (18.8)	35 (20.8)	
Extracurricular activities (ex. volunteer, committee, club)				
No	14 (16.9)	10 (11.8)	24 (14.3)	0.445 ^a
1–2 time per year	38 (45.8)	35 (41.2)	73 (43.5)	
<5 h/week	10 (12)	17 (20)	27 (16.1)	
>5 h/week	21 (25.3)	23 (27.1)	44 (26.2)	

Comments: ^a Chi-squared test, ^f Fisher's exact test

by Al Shawwa et al. did not show any effects on academic performance.⁶ However, neither study focused on reading quality and technique and how it could affect academic performance.^{5,6} Thus, further studies focused on the quality and process of study should be conducted to fill this research gap.

We found that medical students motivated to become specialists achieved higher academic performance ($P < 0.001$). Enrolling in a specialist program is competitive, and GPAX is used as a selection tools.²⁰ Therefore, the motivation to become a specialist is associated with higher academic performance is vividly explainable. Moreover, according to Pekrun's study, intrinsic (own interest) and extrinsic (such as gaining rewards) motivations and academic emotions influenced academic achievement. Some scholars believe that positive emotions such as pride, enjoyment, and hope could increase the students' intrinsic and extrinsic motivation.^{17,21} In Iran, a study also shows that motivation is a critical factor contributing to desirable academic achievement among students in a medical context through appropriate learning strategies and effort.²²

Table 5. Association between all factors and GPAX

Factors	Crude OR (95%CI)	Adj. OR (95%CI)	P value (Wald's test)	P value (LR test)
Having diagnosed psychiatric disorder	0.37 (0.14, 1.03)	0.29 (0.09, 0.95)	0.041	0.031
BMI ≥ 25	0.35 (0.14, 0.89)	0.28 (0.09, 0.81)	0.019	0.013
Time spent on study				
<2 h per day	0.79 (0.42, 1.50)	0.99 (0.49, 2.03)	0.986	0.003
>4 h per day	10.68 (1.31, 87.32)	17.29 (1.85, 161.98)	0.013	
Motivation to enroll in specialist training after medical school	2.6 (1.33, 5.06)	2.85 (1.33, 6.09)	0.007	0.006
Having a good relationship with family	2.04 (1.01, 4.1)	2.38 (1.07, 5.32)	0.034	0.03
Time spent on social networking				
>2 h per day	1.13 (0.38, 3.39)	0.75 (0.21, 2.73)	0.662	0.007
>4 h per day	1.98 (1.04, 3.8)	3 (1.42, 6.34)	0.004	

According to our study, having a good relationship with a family is associated with higher academic performance. This issue is quite different from previous studies, which showed no association between relationship status and academic performance.⁶ However, families are still involved in Thailand, even at the university level. In our study, 82% of medical students' educational support was from their families. Moreover, 6% of our medical students reported 'pressure from family' as their motivation for study. However, the subgroup analysis was not performed because the number of cases was insufficient to create an adequate power.

Social networking is another issue to be discussed. According to our study, using social networks for up to 4 h per day is significantly associated with high academic performance ($P < 0.001$). In contrast, Ajay's study reported that the higher the use of social networks, the lower the academic performance among medical students.²³ However, our study did not identify what activities medical students used on social networks; we only defined these as non-academic activities. A study claimed that medical students do not use social networks just for entertainment purposes but also for health-related purposes. Those activities were not purely academic; for example, reading health-related news, helping to complete assignments, conference preparation, test preparation, and research-related purposes.²³ We suggest that further studies identify this factor, evaluate it better, and fill this research gap.

Psychiatric disorders such as major depressive disorder or generalized anxiety disorder are common among medical students.²⁴ Our study shows that having diagnosed psychiatric disorder negatively affected academic performance ($P = 0.021$). Among the participants in this study, major depressive disorder was most diagnosed, followed by dysthymia and adjustment disorder. Similarly, Moreira de Sousa's study showed that depressive symptoms are associated with poor academic performance.²⁵ To ensure that the medical students are not depressed, we believe a good mental health support system, especially an effective depression screening system or an accessible counseling service, should be provided in all medical schools. However, the psychiatric issue may not always be related to lower performance, as a study from Pakistan found that low anxiety levels may conversely help increase academic performance. Hirschi's study in 2015 found that people with narcissistic personalities succeed more in their careers²⁶ due to their obsession with self-improvement. Our study only mentioned diagnosed psychiatric disorders but not personality or traits, affecting students' academic performance.

The strength of this research is that all potential factors influencing academic performance among medical students were analyzed by a standard evaluating method. All information was randomized. However, the study employed a cross-sectional design, which might not detect changes over time. Therefore, an additional longitudinal study may be needed. In addition, future research may expand to cover the population from the first to the last year of medical training.

6. CONCLUSION

- (1) Factors associated with medical students' academic performance can differ in geographic areas according to different cultures or lifestyles.
- (2) Those factors should be adequately studied to design better medical curriculums.

Conflict of interest

We declared no conflict of interest.

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Ethics

Ethical approval was obtained from the Human Research Ethics Committee, Faculty of Medicine, Prince of Songkhla University; the reference number was REC.64-021-9-1.

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