A comparison study of student learning achievement between the first-year students of Bachelor of Nursing Science Program at Faculty of Nursing, Mahidol University admitted by Thai University Central Admission System between 2018-2019

การศึกษาเปรียบเทียบผลสัมฤทธิ์ทางการเรียนของนักศึกษาหลักสูตรพยาบาลศาสตรบัณฑิต ชั้นปีที่ 1 คณะพยาบาลศาสตร์ มหาวิทยาลัยมหิดล ที่เข้าศึกษาด้วยระบบการคัดเลือกกลางบุคคลเข้าศึกษาในสถาบันอุดมศึกษา ระหว่างปีการศึกษา 2561-2562

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Abstract

This research aimed to compare the academic achievement of first-year nursing students at the Faculty of Nursing, Mahidol University with their scores on O-NET, GAT, PAT2, and 7 common subjects, and admission rounds of the Thai University Central Admission System (TCAS), and study the relationship between academic achievement in high school and academic achievement in first-year university among nursing students admitted during Academic Year 2018-2019. This retrospective cohort study used a case report form to collect secondary data on 134 and 280 students admitted in Academic Year 2018 and 2019, respectively. The data consisted of 1) high school GPAX, 2) O-NET scores, 3) GAT scores, 4) PAT2 scores, 5) 7 common subjects' scores, 6) admission rounds, and 7) first-year university GPAX. Data analysis was performed using mean, standard deviation, One-way ANOVA, and Pearson's correlation. The results showed that nursing students admitted in Academic Year 2019 had higher high school GPAX, scores on O-NET, GAT, PAT2, and 7 common subjects, and first-year university GPAX than those admitted in Academic Year 2018. The study found a significant relationship between the first-year university GPAX of nursing students of both academic years and their scores on O-NET and 7 common subjects at a significance level of .01. It also found a positive relationship between high school

GPAX and first-year university GPAX among nursing students admitted in Admission Round 1 and Round 2 at a significance level of .01.

Keywords: Student learning achievement, Bachelor of Nursing Science Program, Thai University Central Admission System, TCAS

บทคัดย่อ

การวิจัยครั้งนี้ มีวัตถุประสงค์เพื่อเปรียบเทียบผลสัมฤทธิ์ทางการเรียนของนักศึกษาหลักสูตรพยาบาลศาสตรบัณฑิตชั้นปีที่ 1 คณะพยาบาลศาสตร์ มหาวิทยาลัยมหิดล กับคะแนน O-NET คะแนน GAT คะแนน PAT2 คะแนน 7 วิชาสามัญ และรอบของการเข้าศึกษาด้วยระบบการคัดเลือกกลางบุคคลเข้าศึกษาในสถาบันอุดมศึกษา และศึกษาความสัมพันธ์ระหว่างผลสัมฤทธิ์ทางการเรียนระดับมัธยมศึกษาตอนปลายกับผลสัมฤทธิ์ทางการเรียนระดับมหาวิทยาลัยชั้นปีที่ 1 ของการเข้าศึกษาแต่ละรอบระหว่างปีการศึกษา 2561 - 2562 โดยศึกษาแบบย้อนหลัง จากข้อมูลทุติยภูมิของนักศึกษาปีการศึกษา 2561 จำนวน 134 คน และปีการศึกษา 2562 จำนวน 280 คน ประกอบด้วย 1) เกรดเฉลี่ยสะสมระดับมัธยมศึกษาตอนปลาย 2) คะแนน O-NET 3) คะแนน GAT 4) คะแนน PAT2 5) คะแนน 7 วิชาสามัญ 6) รอบของการเข้าศึกษา และ 7) เกรดเฉลี่ยสะสมระดับมหาวิทยาลัยชั้นปีที่ 1 ใช้แบบบันทึกในการเก็บข้อมูล นำข้อมูลมาวิเคราะห์ค่าเฉลี่ย ค่าเบี่ยงเบนมาตรฐาน ความแปรปรวนทางเดียว และสหสัมพันธ์แบบเพียร์สัน ผลการวิจัยพบว่า เกรดเฉลี่ยสะสมระดับมัธยมศึกษาตอนปลาย คะแนน O-NET คะแนน GAT คะแนน PAT2 คะแนน 7 วิชาสามัญ และเกรดเฉลี่ยสะสมระดับมหาวิทยาลัยชั้นปีที่ 1 ของนักศึกษาที่เข้าศึกษาปีการศึกษา 2562 สูงกว่าปีการศึกษา 2561 เกรดเฉลี่ยสะสมระดับมหาวิทยาลัยชั้นปีที่ 1 ทั้งปีการศึกษา 2561 และปีการศึกษา 2562 กับคะแนน O-NET คะแนน 7 วิชาสามัญ มีความสัมพันธ์กันอย่างมีนัยสำคัญทางสถิติที่ระดับ .01 และเกรดเฉลี่ยสะสมระดับมัธยมศึกษาตอนปลายมีความสัมพันธ์ทางบวกกับเกรดเฉลี่ยสะสมระดับมหาวิทยาลัยชั้นปีที่ 1 ในการรับเข้าศึกษารอบรับตรงร่วมกันและรับกลางร่วมกันอย่างมีนัยสำคัญทางสถิติที่ระดับ .01

คำสำคัญ: ผลสัมฤทธิ์ทางการเรียน, หลักสูตรพยาบาลศาสตรบัณฑิต, ระบบการคัดเลือกกลางบุคคล

Introduction

Although Thailand's old university admission system known as Entrance was above board and reliable, it caused high school students to abandon their classes and focus only on the subjects required for the entrance examination (Sanguanrungsirikul, 2011). To solve such problems, Thailand introduced a new central admission system called Admission in 2006. The system was later developed into the Thai University Central Admission System or TCAS which has been used since 2018. The TCAS sprang from a former Education Minister's policy for the Council of University Presidents of Thailand (CUPT) to improve the university admission system to reduce the application fees, prevent students from applying to various institutes and reserving places, and ensure equality among applicants. The CUPT's call was joined by the Council of Rajabhat University Presidents of Thailand (CRUPT), the Council of Rajamangala University of Technology Presidents (CRP), and Association of Private Higher Education Institutions of Thailand (APHEIT). The three key principles of the TCAS are: 1) students are required to attend classes

until their completion of the upper secondary education (Matthayom 6); 2) each applicant can choose only one program in the end; and 3) all higher education institutions under the Ministry of Higher Education, Science, Research and Innovation will participate in the Clearing House System to manage students' one right to study (Council of University Presidents of Thailand, 2020).

The TCAS of Academic Year 2018-2019 consisted of Round 1 Portfolio, Round 2 Quota, Round 3 Admission 1, Round 4 Admission 2, and Round 5 Direct Admission. For nursing faculties under the Ministry of Higher Education, Science, Research and Innovation, the following scores are required: high school GPAX; scores on the Ordinary National Educational Test (O-NET) consisting of 5 subjects (i.e. Science, Mathematics, English, Thai, and Social Studies), the General Aptitude Test (GAT), and the Professional and Academic Aptitude Test 2 (PAT2); and scores on 7 common subjects (i.e. Science (Chemistry, Physics, and Biology), Mathematics, English, Thai, and Social Studies) (Council of University Presidents of Thailand, 2020). The selection criteria vary according to the program and institution.

The Faculty of Nursing, Mahidol University is a higher education institution under the Ministry of Higher Education, Science, Research and Innovation. Starting from 2018, students are required to pass any round of the TCAS to study in Mahidol University's Bachelor of Nursing Science Program. For Academic Year 2019, the criteria for TCAS Round 1 Portfolio consisted of a GPAX of 3.00 or above (5 semesters/Matthayom 4-5) and a minimum GPA of 2.75 in Physics, Biology, Mathematics, and English (not required in Academic Year 2018). In Round 2 Quota, students would be admitted through three special programs: the registered nurse program by the Golden Jubilee Medical Center, Mahidol University, the registered nurse program by the Faculty of Tropical Medicine, Mahidol University, and the nurse assistant development program by Mahidol University. The minimum GPAXs required for the first and second programs were 2.75 and 3.00 for the third program. Students were required to submit the following scores: a minimum total score of 30% on 7 common subjects (Science (Chemistry, Physics, and Biology), Mathematics, English, Thai, and Social Studies), a score of 20% or above on each subject except English (a score of 25% is required), GAT score, and PAT2 score. For Round 3 Admission 1, the criteria consisted of a minimum GPAX of 2.75, a minimum total score of 30% on 7 common subjects (Science (Chemistry, Physics, and Biology), Mathematics, English, Thai, and Social Studies), a score of 20% or above on each subject except English (a score of 25% is required), GAT score, and PAT2 score. For Round 4 Admission 2, the criteria consisted of a minimum GPAX of 2.75, O-NET scores of 30% or above on 5 subjects (Science, Mathematics, English, Thai, and Social Studies), a minimum GAT score of 30%, and a minimum PAT2 score of 30%. In Round 5 Direct Admission, students would be admitted through other programs such as the nurse development program for health promotion among people in border provinces inspired by Princess Srinagarindra. The selection criteria were determined by the Thailand Nursing and Midwifery Council.

However, the faculty has faced several problems after implementing the TCAS in 2018. Firstly, the number of students admitted through the TCAS in Academic Year 2018 was less than the faculty's intended number. Only 197 students were admitted despite the intended number of 320. The problem

was caused by the system design that failed to apply economic theories (Faugchun, 2019). Secondly, the dropout rate among students admitted in Academic Year 2018 and 2019 is high. As of 3 August 2020, the number of students admitted in Academic Year 2018 has decreased from 197 to 175, equaling 11.17% (7 students gave up their seats and 15 students dropped out), while the number of students admitted in Academic Year 2019 has decreased from 332 to 292, equaling 12.05% (40 students dropped out). The reasons provided by students in their resignation forms include lack of capability to study nursing and desire to study in a different field. The dropout rate tends to be higher. Lastly, 17 students have been placed on probation due to their academic performance in their first year in 2018 (7 students on Probation Type 1 and 10 students on Probation Type 2). The students were admitted through Round 5 Direct Admission (16 students) and Round 3 Admission 1 (1 student).

To the best of our knowledge, there has been research on academic achievement among students admitted through the direct admission and the central admission system before the TCAS, but no studies have examined academic achievement among students admitted through the TCAS. In addition, nursing faculties under the Ministry of Higher Education, Science, Research and Innovation, including the Faculty of Nursing, Mahidol University, have never analyzed admitted students' admission scores (i.e. high school GPAX, O-NET score, GAT score, PAT2 score, and 7 common subjects' scores) and their academic performance in university. The researchers aimed to use the results of this study to determine score criteria and the number of students to be admitted in each round to ensure that students with high potential are admitted and the intended number of students is achieved, and improve the nursing degree program at the Faculty of Nursing, Mahidol University.

Research Objectives

1. To compare the academic achievement (first-year university GPAX, high school GPAX, and scores on O-NET, GAT, PAT2, and 7 common subjects) of first-year nursing students at the Faculty of Nursing, Mahidol University between those admitted through the TCAS in Academic Year 2018 and those in Academic Year 2019.

2. To compare the first-year university GPAX of first-year nursing students at the Faculty of Nursing, Mahidol University admitted through different rounds of the TCAS during Academic Year 2018-2019.

3. To explore the relationship between academic achievement in high school and academic achievement in first-year university among first-year nursing students at the Faculty of Nursing, Mahidol University admitted through different rounds of the TCAS during Academic Year 2018-2019.

Research Framework

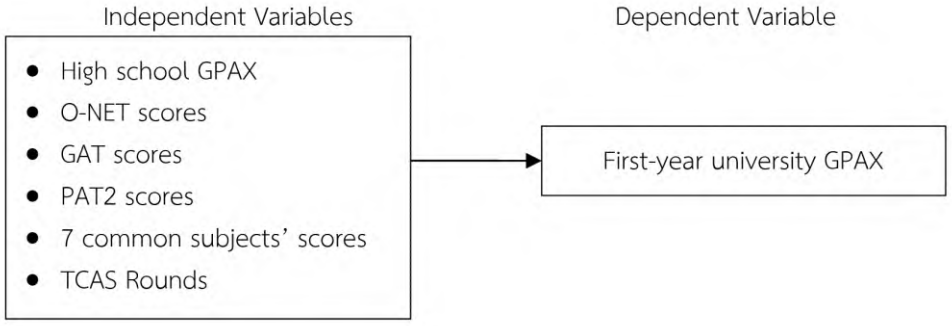

Figure 1 Conceptual framework

Methodology

A retrospective cohort study was performed as detailed below.

Population and sample

The study population consisted of secondary data related to first-year nursing students at the Faculty of Nursing, Mahidol University in Academic Year 2018 and 2019. The data were comprised of: 1) high school GPAX, 2) O-NET scores on 5 subjects: Science, Mathematics, English, Thai, and Social Studies, 3) GAT scores, 4) PAT2 scores, 5) scores on 7 common subjects: Science (Chemistry, Physics, and Biology), Mathematics, English, Thai, and Social Studies, 6) TCAS rounds, and 7) first-year university GPAX.

The sample consisted of complete secondary data related to 134 and 280 first-year nursing students at the Faculty of Nursing, Mahidol University in Academic Year 2018 and 2019, respectively (as of 1 October 2020).

Research instruments

The researchers developed a case report form and had it reviewed by academic experts. The form contained tables for recording data separately between Academic Year 2018 and 2019. The recorded data consisted of: 1) high school GPAX, 2) O-NET scores on 5 subjects: Science, Mathematics, English, Thai, and Social Studies, 3) GAT scores, 4) PAT2 scores, 5) scores on 7 common subjects: Science (Chemistry, Physics, and Biology), Mathematics, English, Thai, and Social Studies, 6) TCAS rounds (Round 1 Portfolio, Round 2 Quota, Round 3 Admission 1, Round 4 Admission 2, and Round 5 Direct Admission), and 7) first-year university GPAX.

Data collection

1) After receiving approval from the Institutional Review Board, Faculty of Nursing, Mahidol University, the researchers submitted a letter to the Dean of Faculty of Nursing, Mahidol University to request permission for accessing the university's database and gathering secondary data.

2) Once the permission was granted, the researchers contacted the Head of Academic Services to obtain student data from the Registrar Unit, Academic Services.

3) The researchers prepared the case report form for recording data on first-year nursing students in Academic Year 2018 and 2019.

4) The researchers gave the case report form to the Registrar Unit, Academic Services for the registrar to record secondary data.

5) Researcher No. 1 examined the completeness and accuracy of the secondary data recorded in the case report form.

6) Researcher No. 2 reexamined the completeness and accuracy of the secondary data recorded in the case report form.

7) The researchers performed data analysis and summarized the results.

Data analysis

1) Using descriptive statistics (i.e. arithmetic mean and standard deviation), the researchers compared the high school GPAX, O-NET scores, GAT scores, PAT2 scores, 7 common subjects' scores, and first-year university GPAX of the first-year nursing students in Academic Year 2018 with those of first-year nursing students in Academic Year 2019. The researchers also investigated the relationship between students' first-year university GPAX and their scores on O-NET, GAT, PAT2 and 7 common subjects, using Pearson's correlation.

2) Using one-way ANOVA, the researchers compared the first-year university GPAX of first-year nursing students admitted through different rounds of the TCAS during Academic Year 2018-2019. When a difference in pairs of means was detected, the researchers tested pairs of means, using Scheffe's method.

3) Using Pearson's correlation, the researchers analyzed the relationship between high school GPAX and first-year university GPAX among first-year nursing students admitted through different rounds of the TCAS during Academic Year 2018-2019.

Ethical Considerations

This research was reviewed and approved by the Institutional Review Board, Faculty of Nursing, Mahidol University (Project No. IRB-NS2020/31.2108). The researchers followed research ethics and protected the confidentiality of the secondary data by using codes in place of students' real names (the codes cannot be traced back to individual students). The research had no negative effect on the participants and no impact on teaching or classroom evaluation. The overall results were reported, excluding students' names. All of the data were destroyed after the completion of the project.

Results

1. The comparison of academic achievement among students admitted in Academic Year 2018 and 2019 found that students admitted in Academic Year 2019 had higher high school GPAX, scores on O-NET, GAT, PAT2, and 7 common subjects, and first-year university GPAX than those admitted in Academic Year 2018, as shown in Table 1. In addition, the study of the relationship between students' first-year university GPAX and their scores on O-NET, GAT, PAT2, and 7 common subjects found that the Pearson's correlation coefficients between the first-year university GPAX of students admitted in Academic Year 2018 and their scores on O-NET, GAT, PAT2, and 7 common subjects ranged from 0.576 to 0.920, indicating a significant relationship at a significance level of 0.01, as shown in Table 2. The study also found that the Pearson's correlation coefficients between the first-year university GPAX of students admitted in Academic Year 2018 and their scores on O-NET, GAT, PAT2, and 7 common subjects ranged from 0.216 to 0.502, indicating a significant relationship at a significance level of 0.01, except for GAT and PAT2 scores that were not significantly correlated. The results are shown in Table 3.

Table 1 High School GPAX, O-NET Scores, GAT Scores, PAT2 Scores, 7 Common Subjects' Scores, and First-year University GPAX of First-year Nursing Students Admitted in Academic Year 2018 and 2019

Details		Full Scores	Admitted in Academic Year			
			2018		2019	
			M	SD	M	SD
High School GPAX		4.00	3.47	0.32	3.61	2.67
O-NET	Science	100.00	45.01	11.86	46.68	9.30
	Mathematics	100.00	41.36	18.38	62.79	17.56
	English	100.00	36.92	13.12	49.30	11.09
	Thai	100.00	66.43	8.84	69.87	7.03
	Social Studies	100.00	44.93	7.33	46.55	6.18
	Total	500.00	234.65	47.87	276.18	32.57
GAT		300.00	185.91	38.84	207.44	26.42
PAT2		300.00	86.24	17.90	91.05	14.32
7 Common Subjects	Chemistry	100.00	46.52	13.14	31.89	6.76
	Physics	100.00	35.50	7.91	32.98	7.58
	Biology	100.00	32.66	7.37	35.48	6.58
	Mathematics	100.00	30.90	8.44	30.98	7.48
	English	100.00	34.05	12.82	40.71	8.75
	Thai	100.00	43.60	21.94	62.96	7.29

Details		Full Scores	Admitted in Academic Year			
			2018		2019	
			M	SD	M	SD
	Social Studies	100.00	34.66	12.55	46.12	7.11
	Total	700.00	257.89	48.08	279.92	17.90
First-year University GPAX		4.00	2.71	0.56	3.13	0.55

Table 2 Pearson's Correlation Coefficients between First-year University GPAX of First-year Nursing Students Admitted in Academic Year 2018 and Students' Scores on O-NET, GAT, PAT2, and 7 Common Subjects

	First-year University GPAX	O-NET	GAT	PAT2	7 Common Subjects
First-year University GPAX	1	0.815**	0.619**	0.666**	0.796**
O-NET		1	0.687**	0.758**	0.920**
GAT			1	0.576**	0.710**
PAT2				1	0.830**
7 Common Subjects					1

** At a significance level of .01

Table 3 Pearson's Correlation Coefficients between First-year University GPAX of First-year Nursing Students Admitted in Academic Year 2019 and Students' Scores on O-NET, GAT, PAT2, and 7 Common Subjects

	First-year University GPAX	O-NET	GAT	PAT2	7 Common Subjects
First-year University GPAX	1	0.387**	0.105	0.216**	0.251**
O-NET		1	0.444**	0.263**	0.502**
GAT			1	0.114	0.421**
PAT2				1	0.271**
7 Common Subjects					1

** At a significance level of .01

2. The comparison of first-year university GPAX among students admitted through different rounds of the TCAS in Academic Year 2018 and 2019 found that students admitted through different rounds of the TCAS had different first-year university GPAX. The results of the paired comparisons performed using Scheffe's method showed that students admitted through Direct Admission in Academic Year 2018 had lower first-year university GPAX than those admitted in the same academic year through Admission 2, Admission 1, and Quota, respectively. The results also showed that students admitted through Quota in Academic Year 2019 had lower first-year university GPAX than those admitted in the same academic year through Direct Admission, Portfolio, Admission 1, and Admission 2, respectively. The results are shown in Table 4.

Table 4 Comparison of First-year University GPAX Classified by Admission Academic Year and TCAS Round

TCAS Rounds	First-year University GPAX Classified by Admission Academic Year							
	2018				2019			
	M	SD	F	Sig	M	SD	F	Sig
Portfolio	-	-	3.898	0.000**	3.00	0.56	2.521	0.041*
Quota	3.18	0.45			2.85	0.58		
Admission 1	3.15	0.47			3.14	0.55		
Admission 2	2.86	0.40			3.28	0.48		
Direct Admission	2.22	0.39			2.88	1.59		

* At a significance level of .05 ** At a significance level of .01

3. The study of the relationship between high school GPAX and first-year university GPAX among students admitted through different rounds of the TCAS in Academic Year 2018 and 2019 found that high school GPAX had a low-level positive association with first-year university GPAX among students admitted through Admission 1 and Admission 2 in both academic years at a significance level of .05 and .01, respectively. No relationship was found between high school GPAX and first-year university GPAX among students admitted through Quota in both academic years. The results are shown in Table 5.

Table 5 Relationships between High School GPAX and First-year University GPAX Classified by Admission Academic Year and TCAS Round

TCAS Rounds	Levels of Relationships between High School GPAX and First-year University GPAX Classified by Admission Academic Year					
	2018			2019		
	Correlation Coefficient (r)	p-value	Interpretation of Correlation	Correlation Coefficient (r)	p-value	Interpretation of Correlation
Portfolio	-	-	-	0.606	0.000**	Medium
Quota	0.494	0.259	Low	0.175	0.533	Very low
Admission 1	0.380	0.042*	Low	0.366	0.000**	Low
Admission 2	0.403	0.004**	Low	0.484	0.000**	Low
Direct Admission	0.214	0.144	Very low	1.000	0.000**	Very high

* At a significance level of .05 ** At a significance level of .01

Discussion

In this section, three important results of the study will be discussed. Firstly, the comparison of academic achievement (first-year university GPAX, high school GPAX, and scores on O-NET, GAT, PAT2, and 7 common subjects) among first-year nursing students at the Faculty of Nursing, Mahidol University admitted through the TCAS in Academic Year 2018 and 2019 found that students admitted in Academic Year 2019 had higher academic achievement than those admitted in Academic Year 2018. The study also found a relationship between first-year university GPAX and scores on O-NET, GAT, PAT2, and 7 common subjects at a significance level of .01 among students admitted in both academic years. The results are consistent with a study by Sanguanrungsirikul (2011) that discovered a medium-high level of relationship between O-NET and PAT scores and first-year university academic achievement, and a study by Wittaya-u-dom (2012) that found a correlation between O-NET, GAT, and PAT scores and undergraduate academic achievement. However, some studies found that only some common subjects' scores were positively associated with academic achievement (Suksudaj et al., 2018). This might result from an overlap between the tests. For example, both O-NET and 7 common subject tests include English subject and aim at testing students' Matthayom 4 and 5 knowledge (Kothdee et al., 2018).

Secondly, the comparison of first-year university GPAX among first-year nursing students at the Faculty of Nursing, Mahidol University admitted through different rounds of the TCAS in Academic Year 2018 and 2019 found that students admitted through different rounds of the TCAS had different first-year university GPAX. The results are consistent with a study by Yamsaothong (2012) that found distinct differences in academic achievement or GPAX among university students admitted through different

admission systems. This present study also discovered that students admitted through Direct Admission in Academic Year 2018 had lower first-year university GPAX than those admitted through Admission 2, Admission 1, and Quota, respectively. The results are consistent with several previous studies such as Yamsaothong (2012), Thamcome (2017), and Boonyayothin et al. (2018). All of which found that university students admitted through the central admission system had higher university GPAX than those admitted through the quota system. The results of this study also revealed that students admitted through Quota in Academic Year 2019 had lower first-year university GPAX than those admitted through Direct Admission, Portfolio, Admission 1, and Admission 2, respectively. This might be explained by the fact that students are considered primarily based on their high school GPAX and 7 common subjects' scores in the quota round. The weight values of O-NET and PAT scores are not determined even though they are directly achieved by students and therefore can reflect student's actual knowledge and capability (Sanguanrungsirikul, 2011).

Lastly, the study of the relationship between high school GPAX and first-year university GPAX among first-year nursing students at the Faculty of Nursing, Mahidol University admitted through different rounds of the TCAS in Academic Year 2018 and 2019 found that high school GPAX was positively associated with first-year university GPAX among students admitted through Admission 1 and Admission 2 in both academic years at a significance level of .05 and .01, respectively. In other words, students with higher high school GPAX would have higher university GPAX. The results are consistent with previous research conducted among students in medicine and public health programs. For example, a study conducted among undergraduate medical students discovered a significant relationship between GPAX from Matthayom 6 and first-year university academic achievement at a significance level of .01 (Wattanaruangkowit et al., 2015). Another study found that academic achievement in high school was positively correlated with university academic achievement at a significance level of 0.05 among undergraduate students in the occupational health and safety program at the Faculty of Public Health (Boonyayothin et al., 2018). In addition, a study conducted among undergraduate dental students found that GPAX prior to studying in university was associated with GPAX in each academic year and overall GPAX in university (Suksudaj et al., 2018). However, although academic achievement in high school had a positive relationship with university academic achievement at a significance level of .01, no relationship was found in some fields of study (Wittaya-u-dom, 2012). Good knowledge from high school can enhance learning in university (Ngamsuntikul, 2015). And a study by Nunwong (2022) found that factors affecting the learning attention of upper secondary students can explain the variability of learning attention at 70.00 percent. For the first year of the undergraduate nursing program, most of the courses require students' scientific knowledge from high school. The present study found no relationship between high school GPAX and first-year university GPAX among students admitted through Quota in Academic Year 2018 and 2019, which hadn't been investigated before. However, previous research found that students with high GPAX prior to studying in university were likely to have high academic achievement in their early years of university and lower academic

achievement in their upper years (clinical years), which might result from the selection criteria that included subjects whose content was similar to the first-year courses in university (Suksudaj et al., 2018). And a study by Suwannasang (2019) found that learning behavior, attitude, family relationships, relationship with friends, and learning atmosphere also affect learning achievement. In addition, a study by Sukonthamut (2012) discovered no relationship between admission rounds and university academic achievement. It instead found that students' low levels of attention, teaching styles, and too difficult exams were associated with university academic achievement.

Suggestions

Suggestions for application

1. This study investigated academic achievement consisting of high school GPAX, O-NET scores, GAT scores, PAT2 scores, and 7 common subjects' scores based on the admission criteria of the nursing degree program at the Faculty of Nursing, Mahidol University. Other institutions are encouraged to take into account their own admission criteria before applying the results of this study.

2. This study analyzed the relationship between academic achievement in high school and first-year university academic achievement based on GPAX only. First-year university academic achievement could be affected by other factors such as student learning behavior, peers, teaching styles, and university environments.

3. The findings of this study showed us which group of students (admission round) had high first-year university academic achievement. The results can be used to adjust the number of students to be admitted in each round to ensure that students with knowledge and capability are admitted to nursing programs. Other institutions should study their students' academic performance based on their admission rounds before applying the results of this study.

Suggestions for future research

1. This study compared students' high school GPAX, O-NET scores, GAT scores, PAT2 scores, and 7 common subjects' scores with their first-year university GPAX only. Future research should compare or analyze the scores' prediction power over academic achievement in upper years.

2. The selection criteria for nursing programs should be studied and revised by, for example, increasing the criteria for high school GPAX, O-NET score, GAT score, PAT2 score, and 7 common subjects' scores to ensure that students with high levels of knowledge are admitted to nursing programs, which will benefit both students' academic success and the nursing profession.

3. Future studies should explore factors affecting academic achievement among nursing students admitted through different rounds of the TCAS.

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