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Research Note

Involvement of pharmacy students in scientific research activities in Vietnam



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ABSTRACT

Introduction: Scientific research is a crucial section of health-related student education to ensure the competence of graduates. This study is the first to explore attitudes on research, willingness and motivation to conduct research, and barriers preventing this amid pharmacy students in Can Tho, Vietnam.

Methods: A cross-sectional online survey was performed on undergraduate pharmacy students (years four and five) from three public and private universities in Can Tho, Vietnam between April and May 2021.

Results: Of the 576 respondents, the majority accredited the significance of conducting research to the field of pharmacy (85.9%) with the motivation of improving the profession (81.6%). Public university respondents were more than twice as likely to have a positive attitude toward research (odds ratio [OR] = 2.88, 95% CI = 1.32–6.27) and be willing to conduct research (OR = 5.73, 95%CI = 3.5–9.37) than their private university counterparts. Very good or excellent academic performance was associated with a positive attitude (OR = 3.09, 95% CI = 1.46–6.53), willingness (OR = 3.2, 95%CI = 1.7–6.03), and increased motivation (OR = 2.42, 95% CI = 1.26–4.64) toward conducting research compared to respondents with average or lower academic performance. A lack of experience (63.5%), knowledge and skills (46%), and research training (51.7%) were the most common personal and systemic barriers to conducting research.

Conclusions: Most students reported having a positive attitude and strong motivation toward research. These findings revealed an opportunity for pharmacy policymakers and educators to utilize national strategy to improve pharmacy education and the profession.

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Introduction

Scientific research can be defined as “creative and systematic work undertaken to increase the stock of knowledge.”¹ This knowledge supply further facilitates the creation of new knowledge in a continuous way, consequently constructing new applications and products.² Research has long been recognized as a crucial factor influencing a country’s prosperity and the intelligence of its people.³ As such, research has gained increasing attention in numerous countries of late. Nevertheless, the focus on scientific investigation differs significantly across countries and geographical regions. For instance, the Nature Index ranks countries according to their research in the natural sciences. In 2019, seven of the top 10 leading countries were from the Western world.⁴ Specifically, in Asia, only China, Japan, and South Korea made it into the top 10, and no countries from the Association of Southeast Asian Nations (ASEAN) on this list.⁴ Therefore, it is important to enhance scientific activity in these countries. To this end, policymakers should be presented with the factors associated with undertaking research activity, with the most crucial of these factors being attitudes toward research, willingness and motivation to conduct research, and barriers preventing research activity among students, especially undergraduates. Previous studies have been conducted in Karachi (Pakistan),⁵ Lahore (Pakistan),⁶ Pakistan,⁷ Bahrain,⁸ Zaria (Nigeria),⁹ Beirut (Lebanon),¹⁰ Riyadh (Saudi Arabia),¹¹ Shiraz (Iran).¹² However, to the best of our knowledge, such studies have been limited in the ASEAN countries (with the exception of Malaysia).¹³ No such data have yet been reported for Vietnam.

In Vietnam, programs in pharmacy education are promulgated by the Vietnam Ministry of Health (MoH). The undergraduate pharmacy course is a full-time course lasting five years. In the first three years, students are taught a general foundation of basic science, with the course material becoming more specialized in the final two years. Further, fourth- and fifth-year students are thoroughly instructed on research methodology, including different research designs and approaches to research, as well as other research-related issues specific to the pharmacy discipline. This structure aims to produce generalized pharmacists, who will be able to work in a diverse range of fields including clinical pharmacy in a hospital, manufacturing pharmacy in drug/chemical factories (i.e. quality control, drug analysis), and the pharmaceutical industry (i.e. medical representatives). Therefore, undergraduate students are exposed to various research fields, including laboratory(lab)-based, clinical-based, and fieldwork, covering the disciplines of (1) pharmacognosy and traditional medicine, (2) pharmaceutical economics and management, (3) pharmaceutical industry and pharmaceuticals, (4) pharmaceutical analytics and toxicology, (5) pharmacology and clinical pharmacy, and (6) pharmaceutical and biological chemistry.¹⁴ Consequently, both lab-based and clinical research projects are achievable at the undergraduate and graduate levels of Vietnam pharmacy programs. These research courses are elective and are regulated by the Vietnam Law on Higher Education, issued by the Ministry of Education. Moreover, owing to the limited numbers of postgraduate pharmacy research programs available, and worries about the received education quality, pharmacists in Vietnam often choose to pursue their studies overseas. As such, there is a need for pharmacy schools to acquire students’ beliefs to enhance education provided in Vietnam.¹⁴

For these reasons, this study aimed to investigate students’ attitudes toward research, their willingness and motivation to conduct research, and the potential barriers. Many previous studies conducted globally have investigated pharmacy student attitudes on primary health care, as well as willingness, motivation, and barriers to progress. Additionally, previous studies have addressed and investigated these factors in relation to scientific research activities among medical students,^{15–22} and reported that compensation provided a significant motive to undertaking research activities.^{23,24} However, no previous work has captured the opinions of Vietnamese pharmacy students in relation to undertaking scientific research.

Therefore, with a view to systematically improve Vietnamese scientific research, this article addressed, for the first time, the factors affecting students in the fourth and fifth years of a pharmacy course in their decision to undertake scientific research. Students were recruited from three main universities in Can Tho, the largest city in the Mekong Delta, Vietnam. A cross-sectional questionnaire-based design was utilized. The questionnaire addressed the objectives of the study thereby capturing participant sociodemographic characteristics, attitudes toward research, willingness and motivation to get involved in research, and barriers to doing so.

Methods

Study design and setting

A cross-sectional survey was performed in April and May 2021 utilizing an online self-administered questionnaire. The survey link was disseminated to university students, both private and public, in Can Tho city, in the Mekong Delta of Vietnam. There are currently three universities with pharmacy training programs in Can Tho, namely Can Tho University of Medicine and Pharmacy, Nam Can Tho University, and Tay Do University.⁴⁵ Can Tho University of Medicine and Pharmacy is a health science university, and the only public university reporting to the MoH in the Mekong Delta. Nam Can Tho University and Tay Do University are private universities with training programs covering multiple disciplines.

Pharmacy students were recruited through a self-administered Google Forms (Google, LLC) online questionnaire. The questionnaire link was sent by email to all fourth- and fifth-year students in each of the three universities using the institutions’ student mailing lists. Data collection was carried out between 25 April and 25 May 2021. A reminder email was also distributed to improve the response rate.

Questionnaire design

The questionnaire had four sections. The first consisted of four questions covering students’ demographic information, including

type of university attended (private or public), gender (woman, man), academic performance (poor, below average, average, good, excellent, and very good), and year of study (fourth or fifth). The second section included five questions on research activities. First, students were asked if they had an interest in research (yes or no). Students who answered “yes” were asked to respond to a further item about the specific areas of research interest (i.e. pharmacy economics and management, pharmacology, clinical pharmacy). Participants were asked if they had attended research courses (yes or no). Respondents were then asked if they had participated in research, with respondents who responded “yes” being asked to answer a further item about the nature of that participation (i.e. reading published articles, published a research paper). In addition, respondents were asked with which research activities they most needed support. The third section examined students’ attitudes toward research, their willingness and motivators using a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree). Respondents were asked to rate eight items regarding their attitudes to research, six items regarding their willingness to undertake research, and nine items regarding their motivation to undertake research. The items used in this section were selected and developed following a review of the relevant literature.^{6,9,25,26} The reliability of the third section of the survey covering attitudes, willingness, and motivation was assessed using Cronbach’s alpha and was found to have good internal consistency with values of 0.9, 0.9, and 0.96, respectively. The fourth section explored personal and systemic barriers using multiple-choice questions comprising several items that may contribute to preventing students from participating in research.

Ethical considerations

The present research was accepted by the Medical Ethics Council of Can Tho University of Medicine and Pharmacy, Can Tho, Vietnam. Participants gave informed consent online prior to participating in the study.

Data analysis

Analyses were performed using SPSS, version 20.0 (IBM, Corp.). Descriptive statistics were utilized to present data in the form of medians (with IQR) and frequencies (percentages). Variables representing student attitudes, willingness, and motivations toward research were grouped as negative/positive, less/more, and low/high, respectively. Median scores ≤ 3 were considered as negative/less/low, whereas median scores > 3 were considered as positive/more/high. Chi-square tests were utilized to denote the differences in attitudes, willingness, and motivation toward research associated with the demographic characteristics of pharmacy students. Factors found to be associated with student attitudes, willingness, or motivation were explored further using logistic regression. The odds ratio (OR) with 95% CI was calculated for student attitudes, willingness, and motivation and expressed for each participant demographic

Table 1
Participant characteristics (N = 576).

Variables		n	%
Sociodemographic			
Type of university	Public	135	23.4
	Private	441	76.6
Gender	Female	372	64.6
	Male	204	35.4
Students’ academic performance	Average/below average/poor	147	25.5
	Good	299	51.9
	Excellent/very good	130	22.6
Year of study	4	429	74.5
	5	147	25.5
Research-related			
Interested in research	No	107	18.6
	Yes	469	81.4
If interested in research (previous question = yes), area of research interest (n = 469)	Pharmacy economics and management	118	25.2
	Pharmacology	59	12.6
	Clinical pharmacy	161	34.3
	Pharmaceutical chemistry	15	3.2
	Pharmaceutical analytics and toxicology	58	12.4
	Pharmaceutical industry and pharmaceuticals	51	10.9
	Pharmacognosy and traditional medicine	91	19.4
Attended research courses	No	456	79.2
	Yes	120	20.8
Participated in research	No	409	71
	Yes	167	29
If participated in research (previous question = yes), nature of research participation (n = 167)	Reading previous studies/pharmacy journal articles	108	64.7
	Been an investigator on a research project	18	10.8
	Presented a research poster or oral presentation	34	20.4
	Participated in the writing-up of research	62	37.1
	Published a research paper	28	16.8
	Supported friends, colleagues, teachers in conducting research	79	47.3

characteristic. Statistical significance was considered at a threshold of $P < .05$.

Results

Of 1435 students who were initially contacted, a total of 576 pharmacy students (429 and 147 in years 4 and 5, respectively) completed the questionnaire, with a response rate of 40.1%. The majority of students were female (64.6%), from private universities (76.6%), and had achieved a good/higher level of academic performance (74.5%). The mean age \pm SD was 22.52 ± 1.5 years (Table 1).

More than 80% of students had an interest in research, but only 29% reported having participated in research activity, and 20.8% as having attended research training. Among the students who reported having an interest in research ($n = 469$), the most popular research areas were clinical pharmacy (34.3%), pharmacy economics and management (25.2%), and pharmacognosy and traditional medicine (19.4%). Among students who reported having participated in research ($n = 167$), the nature of this participation was most frequently reading journal articles (64.7%), supporting friends, colleagues, and teachers in conducting research (e.g., students volunteering to work in the lab to help their senior peers and colleagues in undertaking their research, thus consequently enhancing their own research skills) (47.3%), or participating in the writing-up of research (37.1%). Conversely, only 16.8% of respondents reported having an article published. Students reported wishing to receive support in conducting literature searches (57.6%), writing reports/papers (30.9%), and applying for funding (29.3%) as shown in Fig. 1.

Over 80% of students responding agreed on the significance of scientific research for the pharmacy major/pharmacist (85.9%). Pharmacy students agreed that it is necessary to obtain research experience (80.4%) in order to be best prepared for conducting research at a graduate level (81.4%). Less than half of respondents agreed that research was a waste of time and does not support one's future career (46%), or that it is not practical, and does not need to be undertaken (45.5%). Students generally expressed positive attitudes regarding scientific research with a high median score (IQR) of 4 (4, 5), out of a maximum of 5 (see Table 2).

Table 3 presents the data on students' willingness to participate in research. Most students perceived that they were able to arrange their time and were willing to participate in research (74.3% and 79.5%, respectively). Most students said they would be delighted to join a research project (76.9%). Only a little over half of the participants believed that they would only conduct research if they were paid (51.4%), and their workload would not allow them to participate in conducting research (52.4%). In general, students were less willing to conduct scientific research (median [IQR] = 3 [3, 3.5], out of a maximum score of 5).

The factors motivating students to take part in research are shown in Table 4. Most students agreed that improving their career in pharmacy (81.6%), enhancing their research skills (79.3%), adding to their curriculum vitae (79%), and practicing their teamwork/group work skills (78%) was a motivation to participate in conducting research. Only a little over 60% of participants expressed that the receipt of rewards/financial support and being motivated by their peers or lecturers were motivating factors for conducting research. Students had high motivation to participate in conducting scientific research, with a median score (IQR) of 4 (4, 5), out of a maximum score of 5.

Fig. 2 shows barriers limiting student involvement in research. Lack of experience (63.5%), lack of knowledge/skills (46%), difficulty identifying research areas (38%), and a lack of time (29.5%) were considered the most common personal barriers among students. The most commonly reported systemic barriers were lack of research training (51.7%), lack of funding (41.8%), lack of equipment/facilities (39.6%), and lack of scientific supervision (38.9%).

The results of the Chi-square test (Table 5) indicated that university type, academic performance, interest in research, research course attendance, and participation in research conduct were significantly related to the attitude, willingness, and motivation of



Fig. 1. Types of research-related activities requiring support (N = 576).

Table 2
Attitudes toward research and research participation (N = 576).

Attitude item	Disagree ^a n (%)	Neutral n (%)	Agree ^b n (%)	Median ^c (IQR)
Research has an important role for the pharmacy major/pharmacist	22 (3.8)	59 (10.2)	495 (85.9)	4 (4, 5)
Pharmacy students should participate in research	23 (4)	90 (15.6)	463 (80.4)	4 (4, 5)
Universities should organize courses on research methodology for pharmacy students	24 (4.2)	100 (17.4)	452 (78.5)	4 (4, 5)
Research experience at the undergraduate level is crucial for graduate-level research	24 (4.2)	83 (14.4)	469 (81.4)	4 (4, 5)
Participation in research increases the motivation to pursue research/academic-related occupations	25 (4.3)	92 (16)	459 (79.7)	4 (4, 5)
Participation in research increases the workload/study burden ^d	103 (17.9)	158 (27.4)	315 (54.7)	2 (2,3)
Research wastes time and does not support one's future career ^d	183 (31.8)	128 (22.2)	265 (46)	3 (2, 4)
Research at the undergraduate level is not practical and does not need to be conducted ^d	200 (34.7)	114 (19.8)	262 (45.5)	3 (2, 4)
Overall				4 (4, 5)

^a “Disagree” includes responses of 1 = strongly disagree and 2 = disagree.

^b “Agree” includes responses of 4 = agree and 5 = strongly agree.

^c The median was assessed by assigning the following values: 5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, and 1 = strongly disagree, except for three items that were reverse coded.

^d The median for this item was assessed by assigning codes in the reverse order of 5 = strongly disagree to 1 = strongly agree.

Table 3
Willingness to participate in research (N = 576).

Willingness item	Disagree ^a n (%)	Neutral n (%)	Agree ^b n (%)	Median ^c (IQR)
If have the chance, I would be willing to participate in research	23 (4)	95 (16.5)	458 (79.5)	4 (4, 5)
I can make time to conduct research in addition to my coursework	27 (4.7)	121 (21)	428 (74.3)	4 (3, 5)
I would be delighted to join a research project	22 (3.8)	111 (19.3)	443 (76.9)	4 (4, 5)
I would only participate in research if I were to get paid ^d	110 (19.1)	170 (29.5)	296 (51.4)	2 (2, 3)
I would only participate in research if I were to get a greater chance of getting a job/a good study opportunity ^d	60 (10.4)	146 (25.3)	370 (64.2)	2 (2, 3)
My daily routine tasks do not allow me to participate in research ^d	91 (15.8)	183 (31.8)	302 (52.4)	2 (2, 3)
Overall				3 (3, 3.5)

^a “Disagree” includes responses of 1 = strongly disagree and 2 = disagree.

^b “Agree” includes responses of 4 = agree and 5 = strongly agree.

^c The median was assessed by assigning the following values: 5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, and 1 = strongly disagree, except for three items that were reverse coded.

^d The median for this item was assessed by assigning codes in the reverse order of 5 = strongly disagree to 1 = strongly agree.

Table 4
Factors that are motivational in research participation (N = 576).

Motivational factor	Disagree ^a n (%)	Neutral n (%)	Agree ^b n (%)	Median ^c (IQR)
Personal interest	20 (3.5)	130 (22.6)	426 (74)	4 (3, 5)
To enhance research skills	19 (3.3)	100 (17.4)	457 (79.3)	4 (4, 5)
To promote teamwork/group work skills	19 (3.3)	108 (18.8)	449 (78)	4 (4, 5)
To improve their career in pharmacy	16 (2.8)	90 (15.6)	470 (81.6)	4 (4, 5)
To increase the chances of being accepted on a course/receive a scholarship at the graduate level	18 (3.1)	110 (19.1)	448 (77.8)	4 (4, 5)
To add to their CV	21 (3.6)	100 (17.4)	455 (79)	4 (4, 5)
Motivated by peers, lecturers	38 (6.6)	179 (31.1)	359 (62.3)	4 (3, 4)
To receive rewards/financial support	49 (8.5)	174 (30.2)	353 (61.3)	4 (3, 4)
To have a chance of presenting the research results/publishing scientific papers	24 (4.2)	153 (26.6)	399 (69.3)	4 (3, 4)
Overall				4 (4, 5)

CV = curriculum vitae.

^a “Disagree” includes responses of 1 = strongly disagree and 2 = disagree.

^b “Agree” includes responses of 4 = agree and 5 = strongly agree.

^c The median was assessed by assigning the following values: 5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, and 1 = strongly disagree.

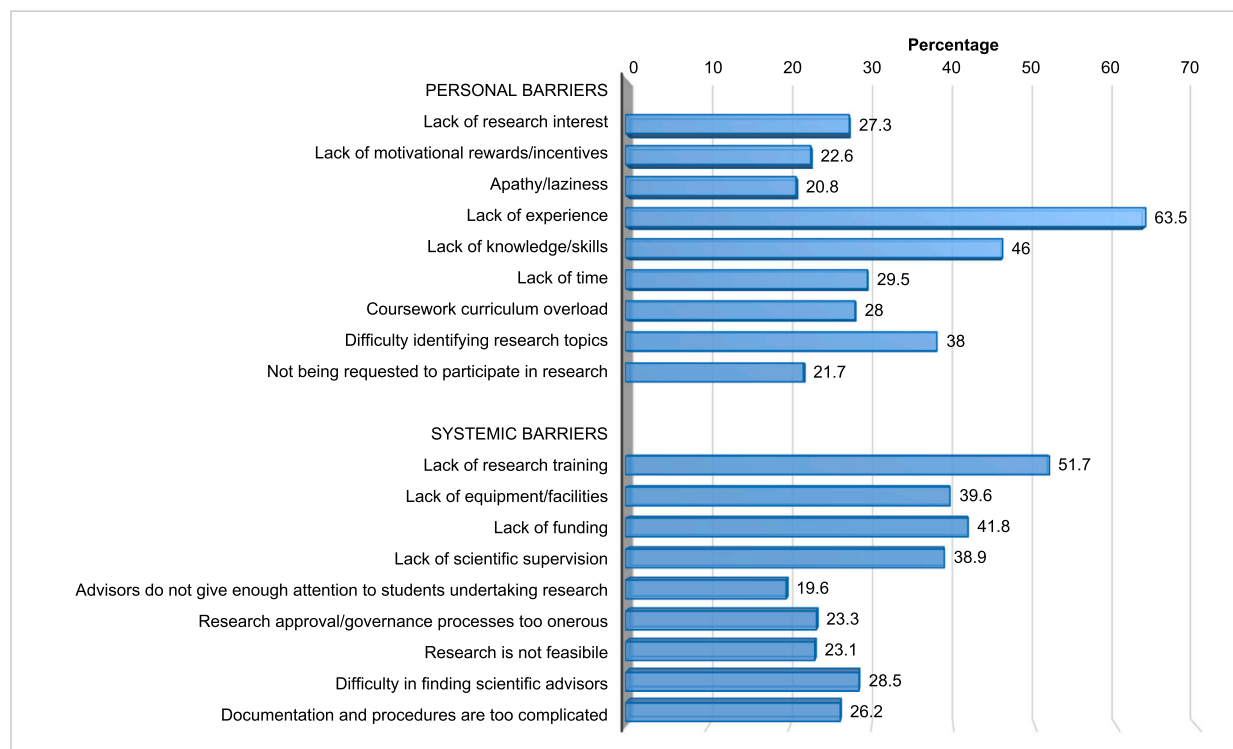


Fig. 2. Personal and systemic barriers preventing research participation (N = 576).

pharmacy students. There were no significant associations between student gender or year of study with attitude, willingness, or motivation.

Logistic regression analysis (Table 6) showed that the type of university, the student's academic performance, and their interest in research were independently related to the student having a positive attitude, greater willingness, and high motivation. The student's gender, year of study, research course attendance, and research participation were not contributing factors. Students in a public university (OR = 2.88, 95% CI = 1.32–6.27, $P = .008$), those with very good/excellent academic performance (OR = 3.09, 95% CI = 1.46–6.53, $P = .003$), and those reporting an interest in research (OR = 3.74, 95% CI = 2.25–6.22, $P < .001$) were more than twice as likely to have a positive attitude toward research compared to others. Similarly, students in a public university (OR = 5.73, 95% CI = 3.50–9.37, $P < .001$), those with good and very good/excellent academic performance (OR = 2.37, 95% CI = 1.37–4.11, $P = .002$; OR = 3.2, 95% CI = 1.70–6.03, $P < .001$, respectively), and those reporting an interest in research (OR = 2.69, 95% CI = 1.45–4.96, $P = .002$) were more than twice as likely to be willing to conduct research compared to others students. Students with excellent/very good academic performance had 2.42 times higher levels of motivation toward conducting research compared to those with average/below average/poor academic performance (OR = 2.42, 95% CI = 1.26–4.64, $P = .008$). Unsurprisingly, students with an interest in research were 3.5 times more motivated to conduct research than students reporting no interest in research (OR = 3.5, 95% CI = 2.17–5.63, $P < .001$).

Discussion

This study investigated sociodemographic and research-related factors associated with the attitude, willingness, and motivation of undergraduate pharmacy students toward participating in research activities, as well as barriers preventing them from doing so. The majority of students expressed having a positive attitude (82.3%) and high motivation (77.8%) toward conducting research activities. Students' main areas of interest were clinical pharmacy, and pharmacy economics and management. This may be due to research in these areas typically attracting lower costs, being less time-consuming, and providing the chance to communicate (and establish relationships) with patients, doctors, pharmacists, and other pharmacy staff. The main predictors of student attitude, willingness, and motivation were identified as the type of university (public/private), student academic performance, and having an interest in research. Barriers preventing participation in research were divided into personal and systemic barriers.

Female and male expressed very similar levels of positive attitude, willingness, and high motivation to conduct research, and gender was not associated with attitude, willingness, or motivation to conduct research. However, women rated scientific research as being more essential and expressed more positive attitudes to engaging in research activities in line with previous findings including those in undergraduate chiropractic students in the United Kingdom,²⁷ United States (US),²⁸ medical students in Ireland,²⁹ and fourth-year pharmacy students in the US³⁰ and Australia.³¹ These data inform pharmacy educators and policymakers of the need for targeted

Table 5

Test of the significance of the variation in the students' attitude, willingness, and motivation toward undertaking research with the students' characteristics (N = 576).

Variables		Attitude		P value	Willingness		P value	Motivation		P value
		n (%)			n (%)			n (%)		
		Negative	Positive		Less	More		Low	High	
Type of university	Public	9 (6.7)	126 (93.3)	< .001	50 (37)	85 (63)	< .001	17 (12.6)	118 (87.4)	.002
	Private	93 (21.1)	348 (78.9)		345 (78.2)	96 (21.8)		111 (25.2)	330 (74.8)	
Gender	Female	71 (19.1)	301 (80.9)	.24	248 (66.7)	124 (33.3)	.18	85 (22.8)	287 (77.2)	.63
	Male	31 (15.2)	173 (84.8)		147 (72.1)	57 (27.9)		43 (21.1)	161 (78.9)	
Students' academic performance	Average/below average/poor	42 (28.6)	105 (71.4)	< .001	125 (85)	22 (15)	< .001	48 (32.7)	99 (67.3)	.001
	Good	48 (16.1)	251 (83.9)		196 (65.6)	103 (34.4)		61 (20.4)	238 (79.6)	
	Excellent/very good	12 (9.2)	118 (90.8)		74 (56.9)	56 (43.1)		19 (14.6)	111 (85.4)	
Year of study	4	83 (19.3)	346 (80.7)	.08	296 (69)	133 (31)	.71	94 (21.9)	335 (78.1)	.76
	5	19 (12.9)	128 (87.1)		99 (67.3)	48 (32.7)		34 (23.1)	113 (76.9)	
Interested in research	No	41 (38.3)	66 (61.7)	< .001	91 (85)	16 (15)	< .001	48 (44.9)	59 (55.1)	< .001
	Yes	61 (13)	408 (87)		304 (64.8)	165 (35.2)		80 (17.1)	389 (82.9)	
Attended research course	No	89 (19.5)	367 (80.5)	.03	322 (70.6)	134 (29.4)	.04	110 (24.1)	346 (75.9)	.03
	Yes	13 (10.8)	107 (89.2)		73 (60.8)	47 (39.2)		18 (15)	102 (85)	
Participated in research	No	83 (20.3)	326 (79.7)	.01	307 (75.1)	102 (24.9)	< .001	106 (25.9)	303 (74.1)	.001
	Yes	19 (11.4)	148 (88.6)		88 (52.7)	79 (47.3)		22 (13.2)	145 (86.8)	
Total		102 (17.7)	474 (82.3)	NA	395 (68.6)	181 (31.4)	NA	128 (22.2)	448 (77.8)	NA

NA = not applicable.

Table 6

Logistic regression analysis of factors associated with students' attitude, willingness, and motivation toward undertaking research (N = 576).

Variables		Attitude		Willingness		Motivation	
		OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Type of university	Public	2.88 (1.32–6.27)	.008	5.73 (3.5–9.37)	< .001	1.8 (0.96–3.35)	.07
	Private	Ref (1)		Ref (1)		Ref (1)	
Gender	Female	Ref (1)		Ref (1)		Ref (1)	
	Male	1.38 (0.84–2.27)	.20	0.67 (0.43–1.02)	.06	1.12 (0.72–1.75)	.62
Students' academic performance	Average/below average/poor	Ref (1)		Ref (1)		Ref (1)	
	Good	1.91 (1.15–3.17)	.01	2.37 (1.37–4.11)	.002	1.79 (1.11–2.88)	.02
	Excellent/very good	3.09 (1.46–6.53)	.003	3.2 (1.70–6.03)	< .001	2.42 (1.26–4.64)	.008
Year of study	4	Ref (1)		1.72 (1.06–2.79)	.03	Ref (1)	
	5	1.11 (0.62–2)	.73	Ref (1)		0.65 (0.39–1.06)	.08
Interested in research	No	Ref (1)		Ref (1)		Ref (1)	
	Yes	3.74 (2.25–6.22)	< .001	2.69 (1.45–4.96)	.002	3.5 (2.17–5.63)	< .001
Attended research course	No	Ref (1)		Ref (1)		Ref (1)	
	Yes	1.23 (0.56–2.7)	.60	0.63 (0.36–1.13)	.12	0.89 (0.45–1.76)	.74
Participated in research	No	Ref (1)		Ref (1)		Ref (1)	
	Yes	0.77 (0.38–1.57)	.47	1.53 (0.89–2.64)	.13	1.42 (0.74–2.73)	.29

OR = odds ratio; Ref = reference.

interventions to improve the perceptions and attitudes of Vietnamese pharmacy students' through enhancing their research and transferable skills and also their self-confidence.³²

Conversely, modifiable factors influencing students, including attendance on research courses, were significantly associated with attitudes, willingness, and motivation toward research. The exposure of students to research (attendance of students on research

courses) and research participation were associated with positive attitudes, greater willingness, and higher motivation to conduct research in the field of pharmacy (Table 5). This outcome is in line with those of previous studies in pharmacy,³¹ chiropractic, and medical undergraduates.^{27,28}

Despite there being a mix of students both with and without research experience, most respondents acknowledged the significance of research in pharmacy (Table 2) and expressed a willingness to participate in research if the opportunity were presented (Table 3) with the aim of improving the pharmacy profession (Table 4). This was in line with findings in medical²⁸ and nursing^{33,34} students, as well as undergraduate pharmacy students, where notably, the finding was independent of student demographic factors.³³ Interactions with lecturers, tutors, supervisors, practitioners, and peers can significantly shape and influence positive perceptions of research,³⁵ and the availability of academic support reduces the anxiety students experience in the research setting.³⁶ For instance, pharmacists with previous experience in research were more likely to be interested in research and motivated to get involved. They were also more willing to have additional research involvement in the future in comparison to those who had no previous research experience.³⁷

The Vietnam Ministry of Education and Training and MoH regulate pharmacy schools. Most are public-based, nevertheless, the number of private schools is considerably increasing.¹⁴ In the present study, students at private universities expressed less positive attitudes, reduced willingness, and lower levels of motivation to conduct research than their public university counterparts. For students in private universities, there are limited available research funds, and limited access to research opportunities, in comparison to public universities. Lack of research funding is a significant limitation to conducting research for pharmacy students,³⁸ and has a significant negative impact on the attitudes of pharmacy students toward conducting research activities in general, especially in low to middle income countries. Further, it impacts the nature of research activities undertaken by undergraduate students, with research being less likely to be lab-based, and more likely to be observational in nature.³⁹

The present study identified both personal and systemic barriers (Fig. 2) to conducting research, including lacking in the necessary skills, knowledge, experience, interest, and incentives, as well as a lack of research supervision. These outcomes are consistent with previous studies conducted in pharmacy students worldwide.^{30,40–44} Interestingly, although time is generally an important factor preventing students from conducting research, this was not found to be the case in the present study. Only around 30% of the participants stated that lack of time was a barrier, and > 70% of students were able to allocate their time to undertaking research in addition to their coursework (Table 3).

Recommendations for practice and research

These findings revealed the need for further research into the demographic, educational, and organizational factors that influence students' attitudes, willingness to participate, and motivations toward conducting research activities. Further, there is a need for strategies to promote interest in research to be evaluated for their suitability and effectiveness. Additionally, it may be valuable to explore the nature of research activities that students do want to undertake, and how they can best be offered (i.e. as extracurricular activities during their university education, throughout their future career, or through completing master's or doctorate programs).

Recommendations for policy makers

Based on study findings the authors make the following recommendations: (1) the positivity of students toward research presents a fundamental opportunity to contribute to the national strategy aiming to improve pharmacy education and the profession; (2) government financial strategies supporting research activities should not overlook the importance of research exposure during undergraduate study, particularly in private education; and (3) appropriate interventions and policies are needed to address and overcome the barriers identified in this investigation and enhance the research exposure pharmacy students receive, thereby improving their future career prospects and the profession as a whole.

Limitations

It is difficult to infer causality when using a cross-sectional study design. As such, we explored the concept of student "motivation" in order to gain insight into the causality behind attitudes and willingness. The timing of the study was such that it was conducted near the academic break, and as such, some fifth-year students were likely to have been preoccupied with finding employment, consequently lowering their response rate. Further, the levels of participation between private and public universities were unbalanced. However, this did not affect the absolute number of participants responding from private and public universities, as the total population of pharmacy students attending private universities was significantly greater than that in public universities. Other limitations are the limited scope of the study to one city encompassing three large universities in the Mekong Delta. As the data collection instrument was a self-administrated questionnaire, responses may have been subject to social desirability response bias.

Conclusions

The present study investigated factors associated with the attitude, willingness, and motivation of undergraduate pharmacy students toward undertaking research, as well as the potential barriers limiting this endeavor. In general, students expressed positive attitudes and high levels of motivation toward conducting research. The type of university, academic performance, and level of interest in research were statistically related to attitudes, willingness, and motivation of pharmacy students. The most common barriers to research were the lack of experience, knowledge/skills, research training, and funding. These findings reveal opportunities for policy

makers to act upon in line with the national strategy in Vietnam that aims to improve pharmacy education and the pharmacy profession.

Disclosure(s)

None.

CRediT authorship contribution statement

Van De Tran: Conceptualization, Methodology, Validation, Resources, Writing – original draft, Writing – review & editing. **Duy Toan Pham:** Conceptualization, Validation, Resources, Writing – original draft, Writing – review & editing, Supervision. **Hien Thu Thi Nguyen:** Methodology, Investigation. **Tho Kieu Anh Pham:** Methodology, Investigation. **Cuong Minh Nguyen:** Methodology, Investigation. **Huy Thanh Nguyen:** Methodology, Investigation. **Mohamed Bahlol:** Writing – original draft, Writing – review & editing. **Rebecca Susan Dewey:** Writing – review & editing.

Declaration of Competing Interest

None.

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