

## Factors influencing critical thinking skills among nursing students: Reports from a cross-sectional study



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### ABSTRACT

Studying the relationship between critical thinking and academic achievement is of great importance because both are crucial in producing nurses that would deliver quality care and nurses who would be critical thinkers in the midst of constant evolution in the health care delivery system. This study aims to determine the relationship between critical thinking skills and academic achievement among undergraduate nursing students. Further, it aims to determine factors that may influence the critical thinking of students. This study used a descriptive correlational design. It was conducted at the Nursing Department, College of Health Sciences Prince Sultan Military College, Saudi Arabia. There were 67 female participants from two types of nursing pathways. The data collection was conducted between March and May 2021. The overall averages of HSRT scores of the Baccalaureate and Bridging were 2.35 and 2.25, respectively. The HSRT scores indicated that the critical thinking skills of participants from both nursing pathways were low. There was no significant relationship between critical thinking skills and academic performance ( $r=.11$ ;  $p<.05$ ). Critical thinking skills were not manifested among the student nurses. Further, there was no found significant relationship between age, nursing pathway, and year level. Moreover, there is no significant relationship found between academic performance and the components of HSRT. These results are useful for understanding group characteristics, comparing and contrasting similar groups on specific attributes or skills, and for guiding the development of more targeted educational or training programs.

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### 1. Introduction

Over the years, there has been a continuous evolution of the healthcare delivery system worldwide, owing to the development of state-of-the-art lifesaving technologies, advanced diagnostic measures, patient demographic changes, increase in chronic diseases, and emerging infections (Von Colln-Appling and Giuliano, 2017). These developments necessitate nurses to multi-task, expand their roles, and perform multidisciplinary

health care duties. Moreover, nurses play a key role in the prevention of mental and physical illnesses, infections, medical errors, and fatalities and in the promotion of safe healthcare practices. Thus, it is crucial that nurses have the ability to apply higher-order thinking, such as critical thinking, to be able to deliver quality care (Chang et al., 2011). Nurses who are critical thinkers can solve varied problems in patients' conditions in the clinical setting using their intellectual capability to process information and in decision-making (Levett-Jones et al., 2011). However, new registered nurses with less than a year of experience do not portray clinical judgment ability in the workplace (Del Bueno, 2005). As such, this lacks critical thinking in new graduates can be attributed to the nursing curriculum's primary concentration on knowledge acquisition rather than application to real-world circumstances.

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An understanding of significant predictors of nursing students' critical thinking skills is important to explore because it helps in developing the skill. Critical thinking is a cognitive ability that includes the skills of interpretation, analysis, evaluation, inference, explanation, and self-regulation (Korkmaz, 2009). The development of critical thinking skills among nursing students and professionals depends on many factors. However, the key element in its acquisition lies in nursing education. Nursing education has a big role in laying the foundations of critical thinking skills and ensuring that it is in parallel with high academic achievement since critical thinking skills is a predictor and a contributing factor to having better grades (Akpur, 2020).

Studies have shown that students with high critical thinking scores are more successful in professional practice (Bowles, 2000), improves problem-solving capabilities (Tümekaya, 2011), and increases students' academic achievement, success, and education quality (Forawi, 2016; Peng and Kievit, 2020; Spinath, 2012). Therefore, if nursing education can establish the foundational constructs of critical thinking, it is expected that nursing students will achieve high grades or high-grade point averages in their theoretical and practical subjects which will lead to academic success. Moreover, academic achievement refers to performance outcomes in intellectual domains taught at school which is measured quantitatively and qualitatively (Reiger, 2011). It is strongly linked to stable employment (Spinath, 2012), and individual and societal prosperity (Shirazi and Heidari, 2019). As such, this can make academic achievement a vital concern in correlating it to critical thinking.

The relationship between critical thinking and academic achievement in nursing students is important to understand because both are crucial in producing nurses that would deliver quality care and nurses who would be critical thinkers in the midst of constant evolution in the healthcare delivery system (Spinath, 2012). Additionally, both are pre-requisite for academic success (Hamshire et al., 2019). Early recognition during nursing education of these factors that affect academic success ensures students' progress, and completion of the course, and lessens the attrition rate (Pitt et al., 2012). Further, the academic success of these nursing students would boost the number of nursing graduates would eventually fill international workforce shortages (Aghaei et al., 2013). According to the result of related studies, the relationship between critical thinking and academic achievement revealed conflicting results. Some studies have emphasized no statistically significant relationship between critical thinking and academic achievement (Shirazi and Heidari, 2019; Kanbay et al., 2017) while some indicated a statistically significant relationship (Afshar and Movassagh, 2017). These contradictory results and culturally diverse students, the disparity in the nursing curriculum, different nursing pathways, and the educational system in the context

of nursing education motivated the impetus to determine the relationship between critical thinking and academic achievement among nursing students from two different nursing pathways. Determining the relationship between critical thinking and academic achievement is necessary because both factors are determinants of academic success (Orhan, 2022).

Early recognition of these factors ensures students' progress, and completion of the course within the time span, and lessens the attrition rate (Kaya and Leite, 2017). In addition, there were related studies on critical thinking in Saudi Arabia but there were no studies that correlated critical thinking to academic achievement among undergraduate nursing students. Given the potential effects of many factors on critical thinking disposition, such as educational environment and atmosphere, the social structure of the educational environment, technologies used in teaching, and cultural context, it is recommended that similar studies be conducted in different universities (Mousazadeh et al., 2021). Therefore, stronger evidence through research is needed to confirm the relationship. This study aims to determine the relationship between critical thinking skills and academic achievement among undergraduate nursing students and factors that may influence the critical thinking of students.

## 2. Methods

### 2.1. Design

This study used a cross-sectional correlational design to determine the relationship between critical thinking skills and academic achievement among undergraduate nursing students. Further, it aims to determine factors that may influence the critical thinking of students.

### 2.2. Participants/setting

The participants of this study were the 67 student nurses of the College of Health Sciences, Prince Sultan Military College Saudi Arabia. The first and second-year levels of the Baccalaureate program were excluded as participants since their professional nursing subjects were not present in the Bridging curriculum. The Baccalaureate nursing pathway is a 4-year course and admitted students who did not finish any kind of nursing course. The Bridging nursing pathway is a 2-year course and admitted students who finished a diploma course in nursing and were coming back to fulfill a bachelor's degree. All students who were currently enrolled in the Bridging program pathway during the conduct of the study were included as participants due to the small population of enrollees. On the other hand, convenience sampling was used for the participants in the Baccalaureate program pathway.

## 2.3. Instrument

This study utilized a questionnaire that was composed of two parts. Section A was self-designed and intended to gather the participants' demographic characteristics, including age, year level, nursing program pathway, and the final grades of the nursing professional subjects (Adult health nursing theory, Adult health nursing clinical, Pharmacology, Nutrition, Critical health nursing theory, Critical health nursing clinical, Psychiatric-mental health nursing theory, and Psychiatric-mental health nursing clinical) of the first semester of the academic school year 2020–2021. The final grades of the nursing professional subjects represented academic achievement. A final grade is the grade assigned to a student in a course by the instructor at the end of each academic term or semester and was submitted to the school's registrar's office.

Section B was a standardized questionnaire called the Health Science Reasoning Test (HSRT), a 33-point version, to measure the manifestation of critical thinking skills of deduction, induction, analysis, evaluation, and inference. The HSRT is a profession-specific adaptation of the California Critical Thinking Skills Test. It was designed on the basis of the American Philosophical Association Delphi study which is called the Delphi Report (Facione, 1990). The instrument is composed of 33 scenario-based multiple-choice questions with four alternative answers that are meant to be answered in 50 minutes. The HSRT is presented in many languages such as English, Arabic, Chinese, Dutch, Korean, Norwegian, Portuguese, Malay, and Spanish. However, this study utilized the Arabic version (Facione, 1990). The qualitative description of the overall score is as follows: Not manifested (0–14), moderate (15–20), strong (21–25), and superior (26–33). After testing the reliability of HSRT using the Arabic version, the instrument demonstrated internal consistency reliability of .71–.80 using Cronbach's alpha and .70 using Kuder Richardson which means that the tool is reliable in Saudi Arabia.

## 2.4. Data collection

The survey data was obtained using a self-administered questionnaire. An informed consent form outlining the study, the study protocol, the purpose, the risks and benefits, and voluntary participation was included in the instrument. Prior

to their participation, the student nurses were invited for orientation, during which they were given full information about the study. They were given at least five days to decide whether should they participate or not. The data collection was conducted between March and May 2021.

## 2.5. Statistical analysis

All statistical analyses were conducted using SPSS version 25 by IBM Corporation, New York. Descriptive statistics were applied to summarize the demographic characteristics and final grades of the professional nursing subjects. Spearman's rank correlation coefficient was employed to measure the strength of association between critical thinking skills and demographic profile such as age, nursing program pathway, and year level, where the value  $r=1$  meant a perfect positive correlation and  $r=-1$  meant a perfect negative correlation. Spearman's rank correlation was used to measure the relationship between critical thinking skills and academic performance with less than a .05 probability value considered as statistically significant.

## 3. Results

Of the 67 participants, 32 were from third- and fourth-year levels of the Baccalaureate program pathway, and 35 were from first- and second-year levels of the Bridging program pathway. On the demographic characteristics and their relationship with critical thinking skills, the demographic characteristics in terms of age were 20–31 years old and peaked between 26–27 years old. Participants from the Bridging and Baccalaureate programs comprised 53.1% and 46.9% respectively. Regarding participants from different year levels, 20.4% of participants from the Bridging program were from the first year and 40.8% from the second year, while 28.6% of participants from the Baccalaureate program were from the third year and 10.2% from the fourth year.

Table 1 has shown that the demographic characteristics of age, nursing pathways, and year level were not statistically associated with the participant's critical thinking skills of deduction, induction, analysis, evaluation, and inference, as reflected by the following findings: For age  $r=-.186$ ,  $p>.05$ ; nursing pathway,  $r=-.071$ ,  $p>.05$ ; and year level,  $r=-.032$ ,  $p>.05$ .

**Table 1:** Relationship between demographic characteristics and critical thinking skills

Critical thinking skills	Demographic profile					
	Age		Nursing pathway		Year level	
	Spearman $r_s$	P value	Spearman $r_s$	P value	Spearman $r_s$	P value
Induction	-.160 <sup>NS</sup>	.273	-.146 <sup>NS</sup>	.318	.112 <sup>NS</sup>	.444
Deduction	.102 <sup>NS</sup>	.484	.189 <sup>NS</sup>	.192	-.246 <sup>NS</sup>	.089
Evaluation	-.234 <sup>NS</sup>	.105	-.190 <sup>NS</sup>	.192	.140 <sup>NS</sup>	.337
Inference	-.282 <sup>NS</sup>	.051	-.109 <sup>NS</sup>	.456	.075 <sup>NS</sup>	.609
Analysis	.112 <sup>NS</sup>	.445	.093 <sup>NS</sup>	.526	-.147 <sup>NS</sup>	.314
Overall	-.186 <sup>NS</sup>	.202	-.071 <sup>NS</sup>	.626	-.032 <sup>NS</sup>	.828

NS: Not Significant

On the extent of manifestation of critical thinking skills and significant difference of manifestation between participants from the Bridging and Baccalaureate program, [Table 2](#) has shown that the Baccalaureate program students manifested moderate skill of induction with a mean score of 4.09. The skills of deduction, analysis, inference, and evaluation were not manifested with a mean score of 2.83, 2.00, 2.91, and 2.35, respectively. They had an overall average mean of 2.35, which was interpreted as not manifested. The participants from the

Bridging program showed moderate manifestation of skill of induction with a mean score of 3.65. The skills of deduction, analysis, inference, and evaluation were not manifested with a mean score of 3.27, 2.19, 1.51, and 1.92, respectively. They had an overall average mean of 2.25, which was interpreted as not manifested. Further, [Table 2](#) has shown that there was no statistically significant relationship of manifestation of critical thinking skills between the Bridging and Baccalaureate program participants.

**Table 2:** Manifestation of critical thinking skills and significant relation of manifestation between participants from the bridging and baccalaureate programs

Critical thinking skills	Mean score				T value	P value
	Baccalaureate	DE	Bridging	DE		
Induction	4.09	M	3.65	M	1.009 <sup>NS</sup>	.319
Deduction	2.83	NM	3.27	NM	1.322 <sup>NS</sup>	.192
Analysis	2.00	NM	2.19	NM	0.638 <sup>NS</sup>	.526
Inference	2.91	NM	1.51	NM	0.752 <sup>NS</sup>	.456
Evaluation	2.35	NM	1.92	NM	1.324 <sup>NS</sup>	.192
Overall Average	2.35	NM	2.25	NM	0.491 <sup>NS</sup>	.626

0.00-3.33: Not Manifested (NM); 3.34-6.67: Moderate (M); 6.68-10.00: Strong (S); NS: Not Significant; DE: Descriptive Equivalent

On the relationship between critical thinking skills and academic performance of participants from the Bridging and Baccalaureate programs, it has shown in [Table 3](#) that the critical thinking skills of participants from the Bridging and Baccalaureate programs had no statistically significant relationship

with their academic performance. ( $r=.061$ ,  $p>.05$  and  $r=.002$ ,  $p>.05$  respectively). Therefore, the relationship between overall academic performance and overall critical thinking skills was found to be not statistically significant with  $r=.011$ , and  $p>.05$ .

**Table 3:** Relationship between critical thinking skills and academic performance of participants from the bridging and baccalaureate programs (Academic performance per program)

Critical thinking skills	Bridging		Baccalaureate		Overall	
	Spearman $r_s$	P value*	Spearman $r_s$	P value*	Spearman $r_s$	P value*
Induction	-.112 <sup>NS</sup>	.554	-.104 <sup>NS</sup>	.637	-.124 <sup>NS</sup>	.395
Deduction	-.135 <sup>NS</sup>	.509	.115 <sup>NS</sup>	.603	.004 <sup>NS</sup>	.977
Evaluation	.029 <sup>NS</sup>	.890	.070 <sup>NS</sup>	.753	-.061 <sup>NS</sup>	.679
Inference	.197 <sup>NS</sup>	.334	.003 <sup>NS</sup>	.988	.106 <sup>NS</sup>	.470
Analysis	.040 <sup>NS</sup>	.846	-.031 <sup>NS</sup>	.888	.021 <sup>NS</sup>	.887
Overall	.061 <sup>NS</sup>	.766	.002 <sup>NS</sup>	.994	.011 <sup>NS</sup>	.940

NS: Not Significant; \*: 0.5 level of significance

## 4. Discussion

In this study, the critical thinking skills of induction, deduction, evaluation, inference, and analysis were assessed and correlated with age, nursing pathway, year level, and academic performance among undergraduate and bridging nursing students. Indeed, the student nurses were found not manifesting critical thinking based on their scores in HSRT. This means that nurse educators need to shift focus on the learning activities and sophisticated teaching methodologies that enhance students' critical thinking. Similar results have been obtained through research on the Baccalaureate pathway in Iran ([Arli et al., 2017](#)), Kazakhstan ([Babazhanova, 2020](#)), and Canada ([Profetto-McGrath, 2003](#)). Another study in Turkey using a meta-analysis method indicated that nursing students were not able to develop their critical thinking skills ([Kantek and Yildirim, 2019](#)). The scores predict the capacity for success in educational or workplace settings, which demand reasoned decision-making and thoughtful problem-solving. These results are useful for understanding group

characteristics, comparing and contrasting similar groups on specific attributes or skills, and guiding the development of more targeted educational or training programs.

The age of student nurses was not a factor in critical thinking skills. This can be credited to the fact that learning activities, methods, and assessments are the same as long as they are in the same year and course level. This result of the present study agrees with [Hasanpour et al. \(2015\)](#) and [Harrison \(2019\)](#) who found that age has no significant difference with critical thinking. This indicates that regardless of age, the need to be taught how to build their critical spirit as well as how to use critical thinking as a helpful tool is a must so that students' decision-making capacity and performance in difficult clinical situations improve after graduation.

There is no statistically significant difference between critical thinking skills and nursing pathways. According to research, the low manifestation of critical thinking skills is related to the absence of a theoretical model of critical thinking including appropriate teaching strategies in the nursing curriculum that would instruct teachers on



how to develop the different skills of CT in the classroom (Chan, 2013). It is also related to the lack of learning activities in the classroom and in clinical practice requiring analysis, synthesis, and evaluation skills (Azizi-Fini et al., 2015; Kim and Choi, 2014).

Furthermore, this study does not show a statistically significant relationship between critical thinking skills and the academic performance of participants from both the Bridging and Baccalaureate pathways. Similar results were obtained through research (Shirazi and Heidari, 2019; Kanbay et al., 2017; Kim and Ko, 2015; Oliveira et al., 2016). The insignificant relationship between critical thinking skills and academic achievement suggested a discipline specificity of critical thinking in some cultures (Vierra, 2014). However, a study in Australia of 134 participants revealed that there is a significant relationship between critical thinking skills and academic performance (Pitt et al., 2012).

Overall, the results of this study imply an extensive review of the teaching strategies, learning activities, and assessment methods used in professional nursing subjects. It also implies assessing the nursing curriculum for the integration of critical thinking concepts.

## 5. Conclusion

Critical thinking skills were not manifested among the student nurses. Further, no significant differences between critical thinking skills and age, nursing pathway, and year level were found. Moreover, there is no significant relationship found between academic performance and the components of HSRT. These results are useful for understanding group characteristics, comparing and contrasting similar groups on specific attributes or skills, and guiding the development of more targeted educational or training programs.

### 5.1. Study limitation

One of the study's drawbacks is that the convenience sample may have resulted in over or under-representation of participants. The limited sample size (female only) affected the study's generalizability.

## Compliance with ethical standards

### Ethical consideration

This study was approved by the Institutional Review Board of Prince Sultan Military College of Health Sciences with the number IRB-2021-NUR-032. All participants gave their voluntary written informed consent and were guaranteed that all data would be treated with confidentiality. The participants were allowed to withdraw at any stage of the study without giving any reason and with no further repercussions.

## Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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