## RESEARCH

BMC Nursing



Factors influencing undergraduate and newly graduated nursing students' competence and attitudes toward nursing research: a structural equation modeling analysis

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## Abstract

**Background** Nursing research is integral to advancing evidence-based practice (EBP), providing the foundation for informed decision-making in the nursing profession. Moreover, nurse-led research plays a pivotal role in enhancing patient outcomes, underscoring the importance of cultivating robust research competencies among nursing students.

**Aim** The study investigated the factors influencing attitudes toward nursing research and their impact on perceived competence in learning nursing research among undergraduate nursing students and newly graduated nursing students.

**Methods** A cross-sectional research design was employed, utilizing convenience sampling of 309 undergraduate and newly graduated nursing students from various universities and hospitals in Saudi Arabia. The Revised Attitudes Toward Research (R-ATR) and the Perceived Competence Scale (PCS) were employed to assess attitudes and perceived competence. The data were analyzed utilizing IBM SPSS version 27.0 and IBM SPSS AMOS version 24.0, using confirmatory factor analysis and structural equation modeling.

**Results** Satisfaction with research skills significantly predicted research anxiety, while research participation, satisfaction with research skills, and college support were significant predictors of research usefulness and positive research predispositions. English proficiency level was the only demographic variable impacting nursing students' perceived competence.

**Conclusions** The study underscores the intricate interplay between attitudes toward research and perceived competence among undergraduate and newly graduated nursing students. Targeted interventions promoting research skills, active participation, and college support are recommended to foster positive attitudes and competence among nursing students.

Keywords Evidence-based practice, Nursing research, Perceived competence, Nursing students

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## Introduction

The healthcare system in Saudi Arabia is improving to accomplish the objectives outlined in the Saudi Vision 2030 [1]. In particular, the nursing profession is receiving significant attention due to the high demand for competent nurses. In response to this demand, several universities provide undergraduate nursing education programs to help grow the nursing profession [2]. The aim of these programs is to produce graduates with the competencies required to practice nursing in the health field [3]. Several nursing competencies need to be achieved by nursing students before their graduation, including clinical competency, which encompasses knowledge, skills, and attitudes toward nursing practice [4], communication competency, cooperation and leadership competency, and research competency [5]. In addition, graduates need to be capable of conducting research and implementing evidence-based practice [6].

Nursing research plays a pivotal role in advancing evidence-based practice (EBP), serving as a foundation for the development of information and evidence that will be utilized in nursing practice [7]. According to Grove and Gray [8], the primary objective of nursing research is to generate novel information that can significantly impact the nursing profession. Nurse-led research has received increasing attention due to its vital role in developing practical, efficacious, and cost-effective approaches to enhance patient outcomes [9]. Consequently, the cultivation of robust research competencies among nursing students is imperative for navigating the exigencies of contemporary nursing practice.

Nursing students who actively engage in the research process and cultivate essential skills are poised to contribute valuable insights to enhance the landscape of nursing practice. Consequently, the importance of attitudes toward nursing research cannot be overstated, acting as a critical determinant of nursing students' level of involvement in this process [10-12]. In this context, attitudes refer to the individual's responses to specific entities within their environment, such as items, behaviors, people, institutions, or events [13]. Essentially, the attitudes of nursing students toward research are reflective of their reactions to the field of nursing research.

Moreover, an in-depth exploration of certain characteristics is imperative to comprehend their profound impact on the attitudes of students towards nursing research. Among these characteristics, the perceived competency of undergraduate nursing students in acquiring research skills is a particularly salient factor influencing their inclination to engage in research. Competence, in this context, is construed as individuals' self-assessment of their aptitude to effectively undertake a particular task and their evaluative judgment of the associated responsibilities [14]. Understanding these multifaceted components is fundamental for developing effective strategies to foster a positive and conducive environment for nursing students to embrace and actively participate in the research domain.

## Background

#### Evidence-Based Practice (EBP) through nursing research

EBP has become a cornerstone of nursing competence within educational programs, emphasizing the combination of the most recent research, patient values, and clinical experience to ensure the delivery of safe and effective patient care [15, 16]. Acknowledged for its pivotal role in enhancing healthcare quality [17], EBP requires nursing students to identify and apply the most robust evidence in clinical practice [7, 18]. Specifically, nursing students must develop the ability to identify and apply best practices based on knowledge and research findings to effectively navigate the complexities of healthcare [19].

#### Attitudes toward nursing research

Numerous studies have investigated the attitudes of undergraduate nursing students toward nursing research. A study conducted in Saudi Arabia found that senior undergraduate nursing students exhibited a favorable disposition toward nursing research, although their enthusiasm waned when it came to implementing research findings in practical scenarios [20]. This observation suggests a gap in understanding among students regarding the practical application of research principles in the context of EBP. Another study in Saudi Arabia reported that 68% of nursing students harbored positive attitudes toward nursing research, although a substantial proportion characterized their research courses as demanding [10]. Notably, the study recommended the incorporation of specialized statistical instruction alongside research courses as a potential avenue for enhancing students' perspectives on individual research pursuits [10]. In contrast, a survey conducted in Australia indicated generally favorable opinions about nursing research among the participants [21]. This study explored the impact of an educational program on students' attitudes and engagement with nursing research, revealing no statistically significant differences between pre- and post-program evaluations [21]. Despite these insights, there remains a scarcity of comprehensive investigations into the multifaceted factors influencing nursing students' attitudes toward nursing research. Further research is needed to understand the intricate elements that shape these attitudes and subsequently inform targeted strategies for fostering a positive and pragmatic approach to research within nursing education.

#### Perceived competence in learning nursing research

In accordance with self-determination theory (SDT), three fundamental psychological needs must be met for individuals to be motivated and productive in their learning endeavors [22]. SDT posits that a sense of competence fulfills students' psychological drive to adeptly execute challenging tasks autonomously [22]. Attainment of this psychological need for competence is associated with heightened student success and overall well-being. Conversely, the absence of competence fulfillment may lead to the manifestation of negative behaviors among students [22]. Perceived competence is operationally defined as individuals' self-assessment of their skills in executing a given task and their overall impression of the associated activity [14].

Existing literature has predominantly focused on students' reported competence in performing clinical practical procedures [23] and self-assessed competency in EBP among nursing students [14, 24], leaving a notable gap in research on perceived research skills, especially within the context of nursing education in Saudi Arabia. The exploration of perceived research skills is pivotal for a comprehensive understanding of the factors influencing nursing students' competence perceptions and, subsequently, for informing targeted educational interventions that enhance research capabilities within this demographic.

## Aims

Exploring attitudes and competencies pertaining to nursing research among undergraduate and newly graduated nursing students is imperative, including an investigation of contributing variables. Such inquiry is essential for nurse educators seeking to devise strategies to enhance students' attitudes and competencies in nursing research. Furthermore, an examination of undergraduate and newly graduated nursing students' competencies and attitudes toward nursing research holds significant potential for enriching the overall student learning experience. Consequently, this study aims to evaluate the attitudes and competencies of undergraduate and newly graduated nursing students regarding nursing research as well as the factors influencing their perspectives. The existing body of evidence indicates that various factors may influence the attitudes of undergraduate and newly graduated nursing students toward nursing research [25]. Accordingly, the research has two main objectives:

1. Investigate the influence of attitudes toward nursing research on undergraduate and newly graduated nursing students' perceived competence in learning nursing research.

2. Identify and examine the factors that exert an impact on the attitudes of undergraduate and newly graduated nursing students toward nursing research.

## Methods

## Study design and sample

A cross-sectional research design was employed to investigate the factors influencing the attitudes of nursing students toward nursing research and their research learning capabilities. A convenience sampling method was used to enroll a total of 309 undergraduate nursing students and newly graduated students from diverse universities and hospitals in Saudi Arabia. The newly graduated students were either unemployed or enrolled in the pre-employment training programs. This sampling strategy was employed because of the participants' simple accessibility and availability. The inclusion criteria for the study sample were as follows: (a) fourth-year nursing students who were actively enrolled in the program at the time of the study, (b) nursing interns currently undergoing their internship training, and (c) recent graduates who had completed the nursing program within the past 12 months [26]., G-Power was utilized to determine the sample size. The following parameters were employed for sample size estimation: effect size (f2) = 0.05; alpha = 0.05; power = 0.80; and number of predictors = 8. This method resulted in a calculated sample size of 309 participants. Data were recruited via an online survey sent to nursing and newly graduated nurses.

#### **Research instruments**

The Revised Attitudes toward Research (R-ATR), a psychometrically validated instrument developed by Papanastasiou [27], was employed in this study. Consisting of 13 items, the R-ATR assesses three key dimensions: research usefulness (4 items, Cronbach's alpha = 0.90), research anxiety (5 items, Cronbach's alpha = 0.86), and favorable tendency toward research (4 items, Cronbach's alpha = 0.92) [27]. Operationally, research usefulness pertains to students' perceptions of the utility of research in their professional life, research anxiety captures negative feelings and stress experienced during research activities, and positive research predispositions measure students' positive feelings and interests related to their research tasks. Responses were recorded on a Likert scale ranging from 1 to 7, with 1 indicating "strongly disagree" and 7 indicating "strongly agree."

In addition, the study utilized the Perceived Competence Scale (PCS) developed by Rayan and used by Williams [22], a succinct four-item questionnaire recognized for its face validity in assessing SDT components. The PCS was used to gauge undergraduate nursing students' attitudes regarding their competence in understanding nursing research. Respondents provided ratings on a Likert scale ranging from 1 to 7, where 1 represented "not at all true" and 7 represented "highly true." The PCS, adapted to reflect learning research, included items like "I am confident in my capacity to study nursing research" and "I am capable of mastering the material." This instrument has exhibited robust reliability, with Cronbach's alpha ranging from 0.90 to 0.94 [28, 29]. Variables considered in this study included gender, academic level, grade point average (GPA), perceived English competence (English Level), weekly study hours, research interest, perceived satisfaction with research abilities (research skills satisfaction), and previous research involvement (research participation).

#### Statistical analysis

IBM SPSS version 27.0 and IBM SPSS AMOS version 24.0 were used in the analysis. Frequency distribution was used to provide a comprehensive overview of the demographic distribution of the participants. Descriptive statistics were then utilized to present the means and standard deviations of the study variables. Subsequently, theoretical structural equation modeling of the research variables was performed using AMOS 25 path analysis after the reliability and validity of the variables were rigorously assessed through confirmatory factor analysis.

#### Table 1 Demographic characteristics (N = 309)

Characteristics	Categories	Frequency	Percentage
Gender	Male	78	25.2%
	Female	231	74.8%
Current BSN Year	Fourth Year	143	46.3%
	Internship	78	25.2%
	New Graduate	88	28.5%
University Type	Government	236	76.4%
	Private	56	18.1%
	Military	17	5.5%
Hours Spent	Less than an hour	20	6.5%
Studying Per	1 to 2 h per week	26	8.4%
Week	3 to 4 h per week	49	15.9%
	5 to 6 h per week	53	17.2%
	7 to 10 h per week	48	15.5%
	More than 10 h a week	113	36.6%
English Profi-	Beginner	3	1.0%
ciency Level	Intermediate	137	44.3%
	Advanced	133	43.0%
	Proficient	36	11.7%
Taken any Nurs-	Yes	238	77.0%
ing Research Courses	No	71	23.0%
Interested in Be- coming a Future Nurse Researcher	Yes	124	40.1%
	No	86	27.8%
	Maybe	99	32.0%
Participated in	Yes	130	42.1%
any Research	No	179	57.9%

## **Ethical considerations**

Approval for the study was obtained from the institutional review board at the College of Nursing at Taibah University and King Abdullah International Medical Research Center (KAIMRC) (referral number: ro/ om/2023/r0/014). The researchers adhered to the principles outlined in the Declaration of Helsinki for the duration of the study. All study participants electronically signed and submitted informed consent. The first page of the electronic survey presented study information and informed consent. To maintain participants' confidentiality, all data collected was anonymized, and participants were not asked about their personal identifiers. Moreover, the researcher only accessed research data, and all electronic files were securely stored with password protection.

## Results

## **Demographic characteristics**

As shown in Table 1, a cohort of 309 participants, primarily comprising female individuals (74.8%), was included in the study. Nearly half of the respondents were enrolled in the fourth year of the Bachelor of Science in Nursing (BSN) program (46.3%). A substantial majority pursued their education at government-level universities (76.4%), and a noteworthy percentage dedicated over 10 h per week to academic studies (36.6%). Regarding English proficiency, a significant proportion demonstrated an intermediate level (44.3%), while a substantial number exhibited an advanced proficiency (43.0%). Most participants had completed nursing research courses (77.0%), expressed an interest in becoming future nurse researchers (40.1%), and had engaged in research activities (57.9%).

## Confirmatory factor analysis

Confirmatory factor analysis (CFA) was employed to scrutinize the standardized factor loadings, reliability, and validity of the variables under investigation, as outlined in Tables 2 and 3. The standardized factor loadings for items "RATR12" and "RATR8" were 0.551 and 0.588, respectively, falling below the recommended threshold of 0.70 proposed by Hair et al. [30]. Consequently, these items were excluded from the model. Conversely, the item "RATR1" was retained with a standardized factor loading of 0.634, surpassing the threshold of 0.60 suggested by Awang [31]. The values for Cronbach's alpha ( $\alpha$ ) and composite reliability (CR) ranged from 0.773 to 0.927 for all variables, surpassing the 0.70 threshold, indicative of adequate reliability (refer to Table 2). Additionally, the average variances extracted (AVEs) for all variables, ranging from 0.534 to 0.762, exceeded the 0.50 threshold, signifying acceptable levels of convergent validity (Table 2). Furthermore, the square-root

Variables	Items	M (SD)	Standardized Factor Loadings (SFL)	Cronbach's Alpha (α)	Composite Reli- ability (CR)	Average Variances Extracted (AVE)
Anxiety	RATR1_r	2.93 (1.308)	0.634	0.764	0.773	0.534
	RATR3_r	3.26 (1.234)	0.813			
	RATR9_r	2.87 (1.208)	0.734			
Usefulness	RATR4	3.90 (1.222)	0.802	0.881	0.882	0.651
	RATR7	3.78 (1.196)	0.843			
	RATR10	3.81 (1.157)	0.814			
	RATR11	3.61 (1.237)	0.767			
Positive Research	RATR2	3.17 (1.274)	0.764	0.897	0.898	0.689
Predispositions	RATR5	3.13 (1.319)	0.881			
	RATR6	3.25 (1.273)	0.879			
	RATR13	3.32 (1.186)	0.790			
Perceived Competence	PCS1	3.37 (1.287)	0.866	0.927	0.927	0.762
Scale	PCS2	3.58 (1.229)	0.879			
	PCS3	3.57 (1.261)	0.884			
	PCS4	3.53 (1.252)	0.864			

## **Table 2** Confirmatory factor analysis - reliability and convergent validity

 Table 3
 Confirmatory factor analysis – reliability and discriminant validity

		-	,				
CR	AVE	MSV	MaxR(H)	PRP	Usefulness	Anxiety	PCS
0.898	0.689	0.530	0.908	0.830			
0.882	0.651	0.648	0.884	0.718	0.807		
0.773	0.534	0.177	0.791	0.421	0.256	0.731	
0.927	0.762	0.648	0.928	0.728	0.805	0.375	0.873
	CR 0.898 0.882 0.773 0.927	CR         AVE           0.898         0.689           0.882         0.651           0.773         0.534           0.927         0.762	CRAVEMSV0.8980.6890.5300.8820.6510.6480.7730.5340.1770.9270.7620.648	CRAVEMSVMaxR(H)0.8980.6890.5300.9080.8820.6510.6480.8840.7730.5340.1770.7910.9270.7620.6480.928	CRAVEMSVMaxR(H)PRP0.8980.6890.5300.9080.8300.8820.6510.6480.8840.7180.7730.5340.1770.7910.4210.9270.7620.6480.9280.728	CR         AVE         MSV         MaxR(H)         PRP         Usefulness           0.898         0.689         0.530         0.908 <b>0.830</b> 0.882         0.651         0.648         0.884         0.718 <b>0.807</b> 0.773         0.534         0.177         0.791         0.421         0.256           0.927         0.762         0.648         0.928         0.728         0.805	CR         AVE         MSV         MaxR(H)         PRP         Usefulness         Anxiety           0.898         0.689         0.530         0.908 <b>0.830</b> <t< td=""></t<>

AVE values for all variables exceeded the inter-construct correlation values, indicating satisfactory discriminant validity (Table 3). Lastly, the measurement model exhibited excellent fit across all measures (CMIN/ DF = 2.137 < 3.00; CFI = 0.970 > 0.90, GFI = 0.934 > 0.90, AFGI = 0.907 > 0.90, TLI = 0.962 > 0.90, IFI = 0.970 > 0.90, RMSEA = 0.061 < 0.08, SRMR = 0.0407 < 0.08).

## Structural equation modelling

Structural equation modeling was employed to assess the relationship between the attitude toward research scale and the perceived competence scale as well as the factors influencing the attitude toward the research scale (Fig. 1). The results revealed that anxiety, usefulness, and positive research predispositions had a significant, direct, and positive impact on the perceived competence scale (anxiety:  $\beta = 0.138$ , *p* <.001; usefulness:  $\beta = 0.68$ , *p* <.001; positive research predispositions:  $\beta = 0.165$ , p < .001). Consequently, overall attitude toward research significantly enhanced the perceived competence scale. In examining the factors affecting attitudes toward research, research interest, research participation, research skill satisfaction, and college support were considered. The results indicated that only research skill satisfaction had a significant direct impact on anxiety ( $\beta = 0.258$ , p < .001). However, research participation, research skill satisfaction, and college support had a significant direct impact on usefulness (research participation:  $\beta = 0.133$ , *p* <.01; research skill satisfaction:  $\beta = 0.272$ , *p* <.001; college support:  $\beta = 0.244$ , *p* <.001). Finally, concerning positive research predispositions, only research participation, research skills satisfaction, and college support had a significant direct impact (research participation:  $\beta = 0.121$ , p < .05; research skill satisfaction:  $\beta = 0.458$ , p < .001; college support:  $\beta = 0.151$ , p < .01). Among all demographic variables, only the level of proficiency in English had a significant positive impact on the perceived competence scale ( $\beta = 0.094$ , p < .001). The structural model demonstrated excellent fit across all measures (CMIN/ DF = 2.456 < 3.00; CFI = 0.986 > 0.90, GFI = 0.980 > 0.90,AFGI = 0.924 > 0.90, TLI = 0.957 > 0.90, IFI = 0.986 > 0.90, RMSEA = 0.069 < 0.08, SRMR = 0.0414 < 0.08) and accounted for 13.4%, 26.8%, 36.3%, and 78.1% of the variances in anxiety, usefulness, positive research predispositions, and the perceived competence scale, respectively.

## Discussion

The study sought to identify the factors influencing undergraduate and newly graduated nursing students' attitudes toward research and the subsequent impact on their perceived competence in learning nursing research. Notably, satisfaction with research skills emerged as a significant predictor of research anxiety, consistent with prior research by Erfanmanesh and Didegah [32],



Fig. 1 Structural model

Ashrafi-Rizi et al. [33], and Razavi et al. [34]. This finding underscores the pivotal role of research skills in mitigating anxiety and burnout, emphasizing the need for interventions that enhance these skills, including anxiety management and time management. Additionally, the study identified research participation, satisfaction with research skills, and college support as significant predictors of research usefulness and positive research predispositions. Consistent with Sobczuk et al. [35], active engagement in research projects and supportive environments positively influenced the students' attitudes toward scientific research. Landa-Blanco and Cortés-Ramos [36] further demonstrated the importance of students' satisfaction with research skills in fostering positive attitudes. With these findings, the study suggests that nursing faculty should encourage students' active involvement in research activities to promote positive perceptions of research usefulness and predispositions.

The nuanced relationship between satisfaction with research skills, research participation, and college support was highlighted. While satisfaction with research skills contributed to research anxiety, combining it with research participation and college support enhanced research usefulness and positive research predispositions. While individual limitations, such as inadequate experience in research, unfamiliarity with research methodologies, and unfamiliarity with words used in published publications, are the main obstacles to research [37], other aspects like social, cultural, economic, and organizational factors also play a role [38]. This emphasizes the multifaceted nature of the factors influencing attitudes toward research and the need for comprehensive support structures within nursing programs.

Regarding perceived competence in learning nursing research, all dimensions of attitude toward nursing research (research anxiety, research usefulness, and positive research predispositions) emerged as significant predictors. This aligns with the findings of Afolabi [39], emphasizing the integral role of overall attitudes, perceived usefulness, and positive predispositions in shaping nursing students' research competence. The study underscores the importance of incorporating research courses into nursing curricula to foster positive experiences and enhance students' understanding of research basics. Identifying barriers to research can enhance communication between researchers and end users, facilitating a more efficient problem-solving process and promoting the effective utilization of research findings [40]. Failure to address these barriers may result in delays in the research process, and these interruptions could potentially lead to irreversible setbacks, rendering the research unsuccessful. Therefore, a proactive approach to identifying and mitigating barriers is imperative for ensuring the smooth progression of research endeavors and maximizing the impact of research outcomes.

Among the demographic variables, only English proficiency level significantly impacted perceived competence. This echoes findings by Tan et al. [41], highlighting the need for outcome-based education (OBE) to address language proficiency gaps among nurses. OBS significantly promotes the development of higher-order thinking skills and mental information processing among learners, especially in intricate learning contexts, such as those encountered in nursing education [42]. This insight underscores the importance of language proficiency as a foundational element for elevating nurses' competencies. In contrast, the study by Razavi et al. [34] found that there was no relationship between demographic characteristics like gender and education variables and self-efficacy' in research.

## Limitations

The study is subject to certain limitations that warrant consideration. First, the research design was crosssectional, involving data collection at a singular point in time. Employing a longitudinal research design with experimental components would offer a more nuanced understanding of how ongoing research activities impact anxiety, usefulness, and positive research predispositions. Such an approach would facilitate a more dynamic exploration of these variables and their reflection in the perceived competence of nursing students. Second, the study relied on convenience sampling techniques for data collection. While the use of this method was expedient, a probability sampling technique, such as stratified sampling, could have enhanced the study's rigor. Stratification based on nursing levels or departments, considering the diverse contexts in which nurses operate, might have provided a more representative and nuanced sample. Third, the study did not delve into individual and institutional factors, such as the personality traits and motivation of participants or the resources available in their respective universities. These factors could be substantial contributors to the perceived competence of nurses. A more comprehensive investigation into the influence of personal attributes and institutional support systems would provide a richer understanding of the myriad factors influencing nurses' perceived competence.

These limitations highlight the need for future studies to adopt more dynamic research designs, employ rigorous sampling techniques, and explore a broader spectrum of influencing factors. Addressing these aspects would contribute to the refinement and robustness of research in this domain.

## Conclusions

This study elucidated the fundamental factors influencing the attitudes of undergraduate and newly graduated nursing students toward nursing research and examined the correlation between these attitudes and perceived competence in learning nursing research among the same cohort. The findings revealed that satisfaction with research skills was the sole significant predictor of research anxiety. Additionally, research participation, satisfaction with research skills, and college support emerged as the pivotal predictors of research usefulness and positive research predispositions. Notably, among the demographic variables, only English proficiency level had a significant impact on perceived competence level.

In conclusion, the study posits that the perceived competency level of undergraduate and newly graduated nursing students is intricately linked to their perceptions of research utility, positive inclinations toward research activities, and the manifestation of anxiety and stress during research endeavors. Specifically, when they perceive research as useful, harbor positive sentiments toward and interest in engaging with research, and experience anxiety or stress during their research work, their perceived competency levels soar. These nuanced insights underscore the intricate interplay between attitudes toward research and the perceived competence of nursing students, shedding light on the intricate interplay between determinants that can significantly impact the quality and efficacy of research engagement among this demographic. The findings advocate for targeted interventions to enhance research skills, encourage active research participation, and provide adequate college support, ultimately fostering positive attitudes and competence among nursing students. Future research could focus on evaluating the effectiveness of specific research training programs or courses tailored to undergraduate and newly graduated nursing students. Future research could also aim to identify the sources of anxiety and stress during research activities and develop strategies to

# mitigate these factors among undergraduate and newly graduated nursing students.

#### Abbreviations

CB-SEM	Covariance-based structural equation modelling
α	Cronbach's alpha
CR	Composite reliability
AVE	Average variances extracted
CFI	Comparative fit index
NFI	Normed fit index
IFI	Incremental fit index
RMSEA	Root mean square error of approximation
SRMR	Standardized root mean square residual

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#### Author contributions

Abdulaziz Mofdy Almarwani: Conceptualization, preparation, methodology, investigation formal analysis, data curation, writing-original draft, writing-review & editing.

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#### Data availability

The corresponding author can provide the datasets utilized and/or analyzed in the present study upon a reasonable request.

#### Declarations

#### Ethics approval and consent to participate

Approval for the study was obtained from the institutional review board of the College of Nursing at Taibah University and King Abdullah International Medical Research Center (KAIMRC) (referral number: ro/om/2023/r0/014). The researchers adhered to the principles outlined in the Declaration of Helsinki for the duration of the study. All study participants electronically signed and submitted informed consent. The first page of the electronic survey presented study information and informed consent. To maintain participants' confidentiality, all data collected was anonymized, and participants were not asked about their personal identifiers. Moreover, the researcher only accessed research data, and all electronic files were securely stored with password protection.

#### **Consent for publication**

Not applicable.

## Informed consent

Written consent was obtained from all participants who agreed to participate in the study.

#### **Competing interests**

The authors declare no competing interests.

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