International Journal of Nursing Sciences 10 (2023) 97–103

HOSTED BY

Contents lists available at ScienceDirect

International Journal of Nursing Sciences

journal homepage: http://www.elsevier.com/journals/international-journal-of-nursing-sciences/2352-0132

Research Paper

Clinical environmental stressors and coping behaviors among undergraduate nursing students in Saudi Arabia: A cross-sectional study

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ARTICLE INFO

Article history:
Received 11 August 2022
Received in revised form
26 November 2022
Accepted 18 December 2022
Available online 23 December 2022

Keywords:
Clinical clerkship
Nursing students
Psychological adaptation
Psychological stress
Saudi Arabia

ABSTRACT

Objectives: This study aimed to explore the level of stress, stressors sources, and coping strategies used among female Saudi undergraduate nursing students during their clinical practice.
Methods: A cross-sectional design was used. Using a convenience sampling technique, female nursing students in Riyadh, Jeddah, and Alahsa who enrolled in clinical courses were recruited from a governmental university from January to May 2022. Data were collected using a self-report questionnaire including socio-demographic characteristics, the Perceived Stress Scale (PSS), and the Coping Behavior Inventory (CBI).
Results: The degree of stress perceived by the 332 participants ranged from 3 to 99 (54.77 ± 0.95). Stress from assignments and workload was the most common type of stressor perceived by nursing students, with a score of 2.61 ± 0.94, followed by stress from the environment, with a score of 1.18 ± 0.47. Meanwhile, the students used staying optimistic as the most adopted strategy, with a score of 2.38 ± 0.95, followed by the transference strategy, a score of 2.36 ± 0.71, and the problem-solving strategy scored 2.35 ± 1.01. The coping strategy of avoidance is positively correlated with all of the stressor types ($P < 0.01$), while the problem-solving strategy is negatively correlated with stress from peers and daily life ($r = -0.126$, $P < 0.05$). Transference is positively correlated with stress from assignments and workload ($r = 0.121$, $P < 0.05$), and stress from teachers and nursing staff ($r = 0.156$, $P < 0.01$). Lastly, staying optimistic is negatively correlated with stress from taking care of patients ($r = -0.149$, $P < 0.01$), and with stress from lack of professional knowledge and skills ($r = -0.245$, $P < 0.01$).
Conclusions: These research findings are significant for nursing educators to identify nursing students' main stressors and coping strategies used. Effective countermeasures should be taken to promote a healthy learning environment, decrease the level of stressors and improve students' coping strategies during clinical practice.

What is known?

- Clinical training is an integral part of any nursing education program.
- Undergraduate nursing students experience some degree of stress during their clinical practice.
- A high level of stress may cause undesirable effects.

What is new?

- Stress from assignments and workload is the most common type of stressors.

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Peer review under responsibility of Chinese Nursing Association.

https://doi.org/10.1016/j.ijnss.2022.12.007

- The major source of stress is the students' experience of "worrying about grades."
- Staying optimistic as a coping strategy is the most reported among nursing students.
- The strategy of avoidance is the least used among nursing students.

1. Introduction

Clinical training is integral to any nursing education program because it allows nursing students to apply their knowledge and enhance their cognitive, affective, and psychomotor skills [1,2]. It is essential to highlight that there are still myriad challenges and stressors in nursing practice, especially for students during their clinical training [3,4]. Furthermost, nursing programs dedicate most nursing students' time to clinical exposure to increase their application of knowledge in the real world [3,4].

Current literature supports that nursing students' clinical experience may have some issues in common [5]. For instance, it has been found that students' involvement in patient care may increase stress levels [6]. The students' involvement includes using advanced technical instrumentation, performing specific nursing skills, administering medications, and other competencies that may increase the risk of impairment among patients [3].

Nursing in Saudi Arabia was initiated in 1954 under the administration of the Ministry of Health (MOH). Since then, nursing education has experienced fast modifications throughout the past few decades, such as shifting from diploma to baccalaureate degree [7,8]. According to the MOH statistics, in 2013, the number of nurses who obtained diploma degrees was over 10,000 [9]. In Saudi Arabia, since 1948, the nursing profession has been through many transformations and is still under development [7]. Therefore, nursing students in Saudi Arabia face challenges during their clinical period, which may increase their stress levels. Thus, in response to the stressors that nurses face in clinical and to enhance the standards and quality of nursing education in Saudi Arabia, the MOH, in collaboration with the Ministry of Higher Education (MOHE), requires a baccalaureate degree in nursing as the minimum required degree to practice nursing [3].

Stress is defined as any worry perceived by a person that is activated by actions that are too intensely and frequently perceived, which exceeds the person's coping abilities and resources to manage such stress. Effectively stress management depends on the person's capability to recognize and adjust by using coping strategies [10]. Clinical practice has been reported as a significant aspect of stress among nursing students [11]. A study in Bahrain reported that nursing students experienced moderate to severe stress levels during their clinical practice [12].

Everyone experiences stress at some point in their lives; some experience it more frequently than others, and some have trouble dealing with it [13]. Stress can be caused by any situation or thought that causes an individual to feel frustrated, angry, or nervous [14]. Not only the student academic performance may be impacted by high-stress levels, but also students' physical and mental health, including increasing their risk for hypertension, heart disease, and depression [15,16].

Coping is defined as dynamic, behavioral, and cognitive efforts to control internal and external stress. There is a minimum of two types of coping strategies: emotional-focused and problem-focused. Each individual can use one of these strategies based on the type of stressor and the previous beliefs [17]. Most students (79.7%) reported using a problem-focused strategy to cope with stress [18]. Problem-solving, remaining optimistic, and transference coping strategies were the most commonly used among nursing students [2]. Other strategies such as praying, deep breathing exercises, relaxation, and listening to music are also helpful in releasing stress. Studies on stress and coping reported a relationship between stress and definite coping strategies among students: self-distraction, disengagement, escaping, denial, substance use, humor, and self-blame [19,20]. As the stress level increases, individuals utilize coping strategies to alleviate the stress to some extent.

The education program's role is to provide an ideal teaching environment that facilitates students' learning experiences and promotes nursing skills and competencies [21]. Preparing a positive and comfortable learning environment with all resources needed for the students is one of the essential requirements for achieving the bachelor of science in nursing (BSN) program in the nursing profession [22]. A study has been conducted in Saudi Arabia and have shown that Saudi nursing students experience anxiety during their clinical because they are afraid of making errors that harm patients [8]. Moreover, it has been found that the main reason nursing students quit the BSN program is anxiety and stress during clinical training [3]. Furthermore, a published study reported that emotional and psychological problems among groups exposed to a high-stress level, such as nursing students, may impact their lifetime risk of mental health disorders [23].

Thus, examining the stress level, stressors, and coping strategies used by female undergraduate nursing students in Saudi Arabia at their clinical sites is crucial to develop the encouragement and guidance needed to relieve stress and promote an optimistic clinical experience. Although nursing students experience higher stress levels than any other health-related professionals, there is limited data determining stress for these students in a Saudi context [24]. Hence, the current study was conducted to gain a comprehensive understanding of the stress levels, stressors' sources, and coping behaviors of female nursing students during their clinical practice in Saudi Arabia, as well as to have evidence used as a base for clinical training.

This study aimed to 1) assess the level and types of stress that undergraduate Saudi female nursing students perceive during their clinical practice; 2) explore the coping strategies that students utilized to overcome their stress, and 3) investigate the relationship between the types of stressors and the used coping behaviors.

2. Methods

2.1. Study design and setting

A cross-sectional design was utilized for this study. Participants were recruited from January 1 to May 1, 2022, at King Saud bin Abdulaziz University for Health Sciences (KSAU-HS). KSAU-HS is a governmental university specializing in health sciences and is known for its various programs for undergraduate and postgraduate degrees. The reporting of this research followed the Strengthening the Reporting of Observational Studies in Epidemiology Statement (STROBES).

2.2. Participants

A convenience sampling technique was used to select the study sample from the sampling frame of the nursing students at KSAU-HS. G *power software (3.1) was used to calculate the sample size. Based on the criteria of α 0.05, power 80, and medium effect size, and considering the confidence level of 95% and confidence interval of 5%, the required sample size is 134 nursing students to fulfill this study's aims and objectives. However, the sample size was increased to 300 participants to be more representative. The study participants were recruited based on the inclusion and exclusion

criteria. All KSAU-HS female nursing students in Riyadh, Jeddah, and Alahsa enrolled in clinical courses were eligible to participate in this study. However, students diagnosed with severe psychiatric or cognitive disorders were excluded as this would affect their responses.

2.3. Measurements

Data were collected using a self-report questionnaire that involved three sections. The first section included socio-demographic characteristics, including age, marital status, college region, academic level, and cumulative grade point average (CGPA) level. The second section had the Perceived Stress Scale (PSS) for Nursing Students in Clinical Practice, and the third included the Coping Behavior Inventory (CBI). Since all eligible students are proficient in English, all measurements were used in the English version.

2.3.1. Perceived Stress Scale

The Perceived Stress Scale (PSS) was used to investigate the stressors perceived by nursing students and their degrees during clinical practice. PSS was created by Sheu et al., 1997 and consists of 29 items categorized into six factors based on the source of stress [25]. These factors are as follows: stress from taking care of patients, stress from teachers and nursing personnel, stress from assignments and workload, stress from peers and daily life, stress from the clinical environment, and stress from deficiency of professional knowledge and skills [25]. Each item is rated using a 5-points Likert scale ranging from 0 (never) to 4 (always). The total scores of this tool ranged from 0 to 116, with a higher score indicating a higher degree of stress [25]. The PSS is a reliable and valid tool widely used in the literature. Cronbach's α coefficient ranged from 0.87 to 0.92 [25,26]. In the current study, Cronbach's α coefficient is 0.938, indicating excellent internal consistency reliability.

2.3.2. Coping Behavior Inventory

The Coping Behavior Inventory (CBI) was used to assess nursing students' strategies to cope with stress during their clinical practice. The CBI was created by Sheu et al. (2002) and consists of 19 items which are categorized into four strategies: avoidance behaviors include six items (efforts to avoid stressful situations); problem-solving behavior consists of six items (efforts to manage stressful situations); optimistic coping behavior contains four items (efforts to keep a positive attitude toward the stressful situations), and transference behavior includes three items (efforts to transfer one's attention from the stressful situations to other things) [26]. Each item is rated using a 5- points Likert scale ranging from 0 (never) to 4 (always). The sum of each strategy's items calculates the total score of each strategy. Higher scores for each strategy suggest more repeated use and effective coping behavior strategies [26]. The CBI is a reliable and valid tool widely used in the literature. Cronbach's α coefficient was reported with a value of 0.76 [26]. In this study, Cronbach's α coefficient value is 0.839, indicating good internal consistency reliability.

2.4. Data collection

Students were invited to participate in this research via their university's email using a Microsoft form e-survey. The e-survey approach is an excellent method to reach many participants. Moreover, this method facilitates self-disclosure among research participants, especially for sensitive topics such as stress [27]. The results from the e-survey questionnaire research are equivalent to findings obtained using standard techniques for data collection [27].

2.5. Data analysis

Data were analyzed using the latest Statistical Package for the Social Sciences (SPSS, version 28). Descriptive statistics were used to describe the study's variables. Spearman's rho correlation is also used to estimate a rank-based measure of association between students' stress and coping strategies. The critical value of the significance in all analyses was set at $P < 0.05$. To address potential sources of reporting bias, complete reporting of all pre-specified outcomes was done. All questions in the survey were mandatory, so there were no missing data.

2.6. Ethical considerations

IRB approval was obtained from King Abdullah International Medical Research Center (KAIMARC) with IRB approval No (IRB/0081/22). A consent form was obtained from participants before filling out the survey. Participants were fully informed regarding the study's subjects and aims. Also, the researchers clarified that there were no potential risks associated with their involvement, and they could withdraw from the research at any time without penalty. Privacy and confidentiality were maintained; no identifiers or personal information was collected or stored, including participants' name IDs and others. All data were kept confidential and discarded after completing the study.

3. Results

3.1. Demographic characteristics of the nursing students

A total of 332 female students participated in this study. Most of the participants were between the age of 21 and 22 years old, single, from Riyadh, senior students (level 8), and had high CGPAs (>4) (Table 1).

3.2. Level and types of stress perceived by female nursing students

All participants in this study indicated that they experienced some degree of stress. The degree of stress perceived by the participants ranged from 3 to 99, with a mean of 54.77(SD = 20.95).

Table 1
Demographic characteristic of participants (n = 332)

Characteristic	n	%
Age		
18–20	40	12.0
21–22	244	73.5
>23	48	14.5
Marital status		
Single	300	90.4
Married	32	9.6
Region		
Riyadh	190	57.2
Jeddah	83	25.0
Alahsa	59	17.8
Academic level		
Level 5	31	9.3
Level 6	68	20.5
Level 7	57	17.2
Level 8	176	53.0
CGPA		
< 2.5	6	1.8
2.6–3.0	43	13.0
3.1–3.5	68	20.5
3.6–4.0	78	23.5
> 4.0	137	41.3

Note: CGPA = cumulative grade point average.

The mean of all items' related stress was 1.88/item among the participants. Stress from assignments and workload was the most common type of stressor perceived among undergraduate nursing students (2.61 ±, 0.94), followed by stress from the environment (1.18 ± 0.47), and stress from peers and daily life (1.80 ± 0.89). However, the major stress was from the student' experience of "worrying about grades" (3.24 ± 1.06), followed by their experience of "pressure from the nature and quality of clinical practice" (2.64 ± 1.09), and their feeling of that "dull and inflexible clinical practice affects one's family and social life" (2.61 ± 1.24) (Table 2).

3.3. Coping strategies utilized by female nursing students

According to the results of the CBI, participants' coping behavior ranged between 11 and 76, with a mean of 38.23 ($SD = 12.14$). The mean of all items' related coping was 2.01/item among the participants. The most reported coping strategy among the participants was staying optimistic (2.38 ± 0.95), followed by transference (2.36 ± 0.71) and problem-solving (2.35 ± 1.01). The strategy of avoidance was least used among the participants (1.25 ± 0.95). However, among all items, the most frequently utilized coping strategy was "cry, feel moody, sad, and helpless" (2.62 ± 1.25), followed by relaxing via TV, movies, a shower, or physical exercises (2.54 ± 1.06) and making plans, listing priorities, and solving stressful events (2.52 ± 1.26) (Table 3).

3.4. The relationship between stressors and coping behaviors

As shown in Table 4, the coping strategy of avoidance is positively correlated with all of the stressor types ($P < 0.01$). While the problem-solving strategy is negatively correlated with only one type of stress, which is stress from peers and daily life ($r = -0.126$, $P < 0.05$). Moreover, transference as a coping strategy is positively correlated with stress from assignments and workload ($r = 0.121$, $P < 0.05$), and stress from teachers and nursing staff ($r = 0.156$, $P < 0.01$). The strategy of staying optimistic is negatively correlated with stress from taking care of patients ($r = -0.149$, $P < 0.01$), and with stress from lack of professional knowledge and skills ($r = -0.245$, $P < 0.01$).

4. Discussion

Nursing students are vulnerable to stress and burnout, which could manifest during their undergraduate clinical practice and before employment. The findings in this study showed that all participants experienced some degree of stress. This result is expected from a profession such as nursing, which involves continuous close human contact and emotional engagement. Female Saudi undergraduate nursing students in this research reported moderate stress levels during clinical practice. This result is in line with other studies in Saudi Arabia and other countries [8,22,28–31]. However, according to Alsaqri, nursing students in Saudi Arabia experience a high level of stress. This might have undesirable mental and psychological effects on nursing students, impacting their academic performance and negatively affecting their bio-psycho-social health. Also, high-stress levels can lead to burnout, anxiety, and depression [8].

During nursing training, nursing students are commonly

Table 2
Level and types of stress perceived by nursing students ($n = 332$).

Stress factor/item	Factor ranking	Item ranking	*Mean*	*SD*	*Median*(P_{25}, P_{75})
Overall perceived stress			1.88	0.72	1.96 (1.41, 2.27)
I. Stress from taking care of patients	4		1.75	0.91	1.75 (1.00, 2.37)
Lack of experience and ability in providing nursing care and in making judgments.		13	1.90	1.08	2.00 (1.00, 3.00)
I do not know how to help patients with physical-psycho-social problems.		18	1.67	1.06	2.00 (1.00, 2.00)
Unable to reach one's expectations.		21	1.57	1.25	1.00 (1.00, 2.00)
Unable to provide appropriate responses to doctors', teachers', and patients' questions.		19	1.61	1.07	1.00 (1.00, 2.00)
Worry about not being trusted or accepted by patients or patients' families.		14	1.82	1.26	2.00 (1.00, 3.00)
Unable to provide patients with good nursing care.		22	1.54	1.18	1.00 (1.00, 3.00)
I do not know how to communicate with patients.		23	1.54	1.29	2.00 (0.00, 2.00)
Experience difficulties in changing from the role of a student to that of a nurse.		5	2.37	1.28	2.00 (2.00, 3.00)
II. Stress from assignments and workload	1		2.61	0.94	2.40 (2.00, 3.40)
Worry about bad grades.		1	3.24	1.06	4.00 (3.00, 4.00)
Experience pressure from the nature and quality of clinical practice.		2	2.64	1.09	2.00 (2.00, 4.00)
Feel that one's performance does not meet teachers' expectations.		7	2.16	1.36	2.00 (1.00, 4.00)
Feel that the requirements of clinical practice exceed one's physical and emotional endurance.		4	2.39	1.31	2.00 (1.00, 4.00)
Feel that dull and inflexible clinical practice affects one's family and social life.		3	2.61	1.24	3.00 (2.00, 4.00)
III. Stress from lack of professional knowledge and skills.	6		1.49	0.94	1.33 (0.66, 2.00)
Unfamiliar with medical history and terms.		29	1.29	0.99	1.00 (1.00, 2.00)
Unfamiliar with professional nursing skills.		24	1.49	1.04	1.00 (1.00, 2.00)
Unfamiliar with patients' diagnoses and treatments.		17	1.68	1.14	2.00 (1.00, 2.00)
IV. Stress from the environment.	2		1.18	0.47	1.2 (0.80, 1.40)
Feel stressed in the hospital environment where clinical practice takes place.		16	1.71	1.14	2.00 (1.00, 2.00)
Unfamiliar with the ward facilities.		6	2.17	1.15	2.00 (1.00, 3.00)
Feel stressed from the rapid change in the patient's condition.		9	2.04	1.14	2.00 (1.00, 3.00)
V. Stress from peers and daily life	3		1.80	0.89	1.75 (1.25, 2.50)
Experience competition from peers in school and clinical practice.		26	1.45	1.00	1.00 (1.00, 2.00)
Feel pressure from teachers who evaluate students' performance by comparison.		10	2.02	1.43	2.00 (1.00, 3.00)
I feel that clinical practice affects one's involvement in extracurricular activities.		8	2.16	1.28	2.00 (2.00, 3.00)
Cannot get along with other peers in the group.		20	1.58	1.20	1.00 (1.00, 2.00)
VI. Stress from teachers and nursing staff.	5		1.69	0.87	1.67 (1.00, 2.16)
Experience discrepancy between theory and practice.		11	2.00	1.20	2.00 (1.00, 3.00)
Do not know how to discuss patients' illness with teachers or medical and nursing personnel.		27	1.43	1.33	1.00 (0.00, 2.00)
Feel stressed that the teacher's instruction is different from one's expectations.		12	1.98	1.23	2.00 (1.00, 3.00)
Medical personnel lack empathy and are not willing to help.		25	1.48	1.14	1.00 (1.00, 2.00)
Feel that teachers do not give a fair evaluation of students.		15	1.80	1.33	2.00 (1.00, 3.00)
Lack of care and guidance from the teacher.		28	1.43	1.07	1.00 (1.00, 2.00)

Table 3
Coping strategies utilized by female nursing students ($n = 332$).

Stress factor/item	Factor ranking	Item ranking	*Mean*	*SD*	*Median* (P_{25}, P_{75})
Overall Coping strategies use			2.01	0.63	2.00 (1.78, 2.36)
I. Avoidance	4		1.25	0.95	1.33 (0.33, 1.83)
To avoid difficulties during clinical practice.		14	1.66	1.19	2.00 (1.00, 2.00)
To avoid teachers		16	1.34	1.33	1.00 (0.00, 2.00)
To quarrel with others and lose their temper.		18	1.00	1.18	1.00 (0.00, 2.00)
To expect miracles so one does not have to face difficulties.		17	1.17	1.12	1.00 (0.00, 2.00)
To expect others to solve the problem.		19	0.98	1.13	1.00 (0.00, 2.00)
To leave it to fate.		15	1.38	1.21	1.00 (0.00, 2.00)
II. Problem-solving	3		2.35	1.01	2.41 (1.66, 3.00)
To adopt different strategies to solve problems.		5	2.40	1.12	2.00 (2.00, 3.00)
To set up objectives to solve problems.		13	2.14	1.16	2.00 (1.00, 3.00)
To make plans, list priorities, and solve stressful events.		3	2.52	1.26	3.00 (2.00, 4.00)
To find the meaning of stressful incidents.		9	2.32	1.17	2.00 (1.00, 3.00)
To employ experience to solve problems.			2.44	1.15	3.00 (2.00, 3.00)
To have confidence in performing as well as senior schoolmates.		10	2.30	1.22	2.00 (1.00, 3.00)
III. Stay optimistic	1		2.38	0.95	2.50 (1.75, 3.00)
To keep an optimistic and positive attitude in dealing with everything in life.		12	2.18	1.32	2.00 (1.00, 3.00)
To see things objectively.		6	2.36	1.17	2.00 (2.00, 3.00)
To have confidence in overcoming difficulties.		7	2.35	1.25	2.00 (1.00, 3.00)
To cry, to feel moody, sad, and helpless.		1	2.62	1.25	3.00 (2.00, 4.00)
IV. Transference	2		2.36	0.71	2.33 (2.00, 2.66)
To feast and take a long sleep.		11	2.21	1.07	2.00 (2.00, 3.00)
To save time for sleep and maintain good health to face stress.		8	2.33	1.06	2.00 (2.00, 3.00)
Relax via TV, movies, a shower, or physical exercises.		2	2.54	1.06	3.00 (2.00, 3.00)

Table 4
The relationship between the stressors and coping behaviors ($n = 332$).

Variable	Stress from taking care of patients	Stress from assignments and workload	Stress from lack of professional knowledge and skills	Stress from the environment	Stress from peers and daily life	Stress from teachers and nursing staff
Avoidance	0.423**	0.354**	0.394**	0.413**	0.519**	0.622**
Problem-solving	−0.069	−0.013	−0.107	0.004	−0.126*	−0.021
Stay optimistic	−0.149**	0.054	−0.245**	0.023	0.075	−0.057
Transference	−0.045	0.121*	−0.027	0.059	0.950	0.156**

Note: $^{**}P < 0.01$, $^{*}P < 0.05$.

exposed to different stressors which may directly or indirectly hinder their learning and academic performance. The main stress source in the current study is from assignments and workload, followed by stress from the environment, and stress from their peers and daily life, which is similar to previous findings in Saudi Arabia and Jordan [8,22,28,30,32]. According to previous studies, stress from assignments and workload was the most common stressor perceived by nursing students in Saudi Arabia [8,29,30]. Moreover, like other nursing students in Saudi Arabia, the nursing students in this study worry about their grades and experience pressure from the nature and quality of clinical practice [22]. Stress might influence almost every profession. However, high-stress levels are prevalent among nursing students because of the nature of their clinical training.

As most of the students experienced stress from assignments and workload, the clinical environment, and peers and daily life, course instructors should revise the assignments load, especially on clinical parts. In addition to the theory assignments, students are required to do many nursing care plans, patient reports, case studies, and clinical logbooks. These requirements were perceived to increase the students' stress levels. Moreover, clinical instructors should orient the students about the clinical environment before they start the clinical training. This is crucial to support a well-balanced, healthy academic environment to enhance the learning experience during clinical practice.

Nursing students must figure out how to cope with their stress. In the current study, staying optimistic is the most used coping strategy by nursing students, followed by transference and problem-solving. This result is found in other findings that reported problem-solving and staying optimistic among the most used approaches to minimize stress levels [8,22,28–30]. However, it does not conform to other findings. For example, the transference approach was identified as the least utilized coping strategy [28]. Our result relating to avoidance as the least utilized coping behavior was parallel to previous research findings [28]. Academic advisors should encourage their students to acquire effective coping strategies to relieve their clinical stressors, particularly stressors such as lack of knowledge and clinical skills, which in return help them to be mentally and psychologically ready for clinical placement.

The results of this study are comparable to those of Saudi studies in terms of coping strategies. Female undergraduate nursing students significantly used avoidance as a coping strategy to manage overall perceived stress sources. Several studies were consistent with this finding, while other studies revealed that this correlation was found between avoidance and one or two perceived stress sources [22,30]. Staying optimistic is negatively correlated with stress from taking care of patients and with stress from a lack of professional knowledge and skills. Moreover, staying optimistic as another coping strategy was significantly used to overcome stress from peers and daily life [22,29]. Our results echo the findings of Pacheco & Kamble, who studied the role of being optimistic in stress and coping with stress among undergraduate students and reported a noticeable negative relationship between optimism and

mental and behavioral disengagement, focus on and venting of emotions, denial, and religious coping [33].

In parallel with previous findings, transference as a coping strategy was more significantly utilized to overcome stress due to assignments, workload, teachers, and nursing staff [22,29]. Clinical instructors should recognize the different coping styles of each student, which can affect the nature and intensity of their stress responses and coping techniques. Also, having specialized social workers and psychologists as resources for the students according to their needs will positively impact their coping abilities.

5. Limitation

In this cross-sectional research design, the results may have limited inferences regarding causal effects between sample variables. The non-probability sampling methods (convenience sampling) used to approach the participants with certain inclusion criteria signifies that the findings are likely to limit the generalization among other students. In addition, this study targeted only females, and including different genders for future research is recommended.

6. Conclusions

This study aimed to explore the stress, stressors sources, and coping strategies used among female Saudi undergraduate nursing students during their clinical practice and to identify their relationships. The results showed that stress from assignments & workload was the most common stressor. In contrast, staying optimistic was the most adopted coping strategy. The coping strategy of avoidance is positively correlated with all of the stressor types, while the problem-solving strategy is negatively correlated with stress from peers and daily life, transference is positively correlated with stress from assignments and workload and stress from teachers and nursing staff, while staying optimistic is negatively correlated with stress from taking care of patients and with stress from lack of professional knowledge and skills.

These findings are significant for clinical educators to identify the main stressors among nursing students to try to minimize them and enhance the different coping strategies students use. Decreasing the number or the levels of stressors through curriculum revision and improving students' coping strategies could reduce their stress levels. Academic advising, counseling, and enhancing the clinical environment conducive to clinical practice are necessary to minimize perceived stress, improve learning and academic performance, and prevent burnout among nursing students.

Declaration of competing interest

The authors have declared no conflict of interest.

Data availability statement

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

CRediT authorship contribution statement

Mona Rkhiyes Alanazi: Conceptualization, Methodology, Software, Formal analysis, Supervision. **Nouf Afit Aldhafeeri:** Validation, Formal analysis, Writing - review & editing. **Samah Saad Salem:** Validation, Formal analysis, Writing - review & editing. **Tarfah Mousa Jabari:** Investigation, Data curation. **Ryenad khalid Al Mengah:** Investigation, Data curation.

Acknowledgments

We would also like to express our gratitude to the research participants for their kind cooperation and to the King Abdullah International Medical Research Center (KAIMRC). Riyadh, Saudi Arabia.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijnss.2022.12.007.

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