

RESEARCH

Open Access



Evaluation of stress, bio-psycho-social response and coping strategies during the practical training in nursing students: a cross sectional study

Müjgan Solak¹ , Sevcan Topçu^{2*} , Zuhale Emlek Sert² , Satı Doğan³ and Fatma Savan²

Abstract

Background The aim of the study was to identify stress level, bio-psycho-social response and coping behavior of nursing students during the practical training.

Methods A cross-sectional study was carried out with the 1st, 2nd, 3rd, 4th-year nursing students ($n = 1181$) between September 2018–May 2019. Data was collected using by Socio-Demographic Questionnaire, The Student Nurse Stress Index, The Bio-Psycho-Social Response Scale and Coping Behavior Inventory.

Results The fourth-grade nursing students' stress level was found to be statistically significantly higher than of other graders. Nursing students have shown emotional symptoms and social-behavioral symptoms the most. To cope with stress, nursing students used the strategies transference, staying optimistic, problem-solving and avoidance, respectively.

Conclusions These findings highlight the need to routinely evaluate nursing students for stress, bio-psycho-social response, and coping strategies during practical training. Thus, counseling units can be constituted by the nursing schools, and nursing students who have higher stress levels and inadequate coping strategies benefit from these units.

Keywords Practical training, Coping strategies, Education, Nursing students, Stress

Background

According to Lazarus and Folkman's transactional theory of stress and coping, stress is a two-way process. Stress is defined as exposure to stimuli (as harmful, threatening, or challenging) that exceed the individual's coping capacity [1]. There is a complex transaction between individual subjective reactions to stressors and stressors produced by the environment complex transaction. Transactional theory consists of cognitive appraisal, and coping. After a primary appraisal of the threat or challenge is made, a secondary appraisal process of identifying and selecting available coping options is made. Coping processes

*Correspondence:

Sevcan Topçu

sevcan.topcu@ege.edu.tr; sevcan.topcu@hotmail.com

¹Surgical Nursing, Faculty of Nursing, Ege University, Izmir 35030, Turkey

²Public Health Nursing, Faculty of Nursing, Ege University, Izmir

35030, Turkey

³Psychiatric Nursing, Faculty of Nursing, Ege University, Izmir

35030, Turkey



© The Author(s) 2024. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

produce an outcome, which is reappraised as favorable, unfavorable, or unresolved [1, 2].

Stress is accepted as a disease of the 20th century that affects many professions [3]. Health professionals, especially nurses encounter higher levels of stress and stress factors when their level of exposure to stress and the number of stress-sources are evaluated [4]. For nurses, stress starts from the beginning of training period and they experience the negative effects of stress on health for many years [5–7].

Nursing students experience different levels of stress both during their theoretical and practical training [8, 9]. Sources of theoretical stress are constantly subjected to examinations, assignments about courses, length of lecture time despite the lack of free times and preparation process before practical evaluations [10–12]. But sources of practical training stress comprise of the followings; starting to practice for the first-time, clinical evaluations, feeling inadequate in practice, scaring to give patients any harm, caring for patients, relationships with healthcare workers, friends and patients [13, 14]. Although nursing students experience stress due to many reasons both in practical and theoretical settings, practical training periods are expressed as periods in which nursing students experience the highest levels of stress [15, 16].

Stress can sometimes be a source of motivation, however, high stress can affect coping, self-confidence, concentration, motivation, academic performance [9, 17]. In addition, high stress levels may cause students to experience health problems such as hypertension, heart diseases, nutritional disorders, stammering, nausea, vomiting, exhaustion and depression [5, 6]. It is stated that nursing students experience higher levels of stress and relevant physical and psychosocial symptoms when compared with the students of other health-related disciplines [15, 18].

This situation makes coping strategies crucial for stress management. Coping is defined as constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person [1]. The impact of stress on health depends on the adequacy of coping strategies that play a vital role in managing the stress [6]. As a strategy to cope with stress, nursing students prefer problem solving the most [8, 11, 19] and avoiding the least [5, 6, 8].

It was found in previous studies that the stress levels of nursing students differed according to classes. It is reported that stress levels are higher in nursing students in the upper grades and the initial clinical practice affects their stress levels [20–22]. In order to reduce the stress and its negative effects in nursing students, first of all, to determine their stress levels, their responses to stress,

coping strategies and the factors affecting their stress levels is very important.

The aim of the study was to identify stress level, bio-psycho-social response and coping behavior of nursing students during the practical training.

Research questions

1. What are the stress levels, bio-psycho-social responses, and coping behavior of nursing students during the practical training?
2. Which variables affect the stress level of nursing students?

Methods

Design

A cross-sectional design was used.

Procedure and samples

The study's population consisted of 1st, 2nd, 3rd, and 4th-year students [$n=1181$] of nursing school. A cross-sectional study was conducted between September 2018-May 2019. Since it was aimed to reach the entire population, no sample selection method was used. The inclusion criteria for the study were (1) voluntary acceptance of study participation (2) being during the period of practical training. The number of students was 300 for first grade, 309 for second grade, 285 for third grade and 287 for fourth grade. All of the students [$n=996$] who meet inclusion criteria are included in the study. The response rate of the questionnaires is 84%. ($n=996/1181$).

Data was collected during the practical training for each grade. The Faculty of Nursing has an integrated education system. The integrated education system is based on holistic learning. It enables the student to see the big picture instead of learning small parts and subject areas are associated according to a subject. The integrated education programme, which includes a structuring from health to disease, is organised to include basic knowledge, attitudes and skills related to the subjects related to care. In the first, second and third years of the integrated education programme, courses are conducted as modules, active education methods are used, and skills training is provided in laboratories and clinics. The fourth year is organised as an internship programme. Practical training starts to in the second term of the first year in the Faculty of Nursing. 1st-year students have practical training consist of 13 h per week for one month in Primary and Secondary Schools. 2nd and 3rd-year students have practical training in Hospitals and Primary Care. The practical training of 2st-year students in the third semester consists of 24 h per week for one month in dermatology, otolaryngology clinics, eye clinics, etc. In the

fourth semester, their practical training includes 24 h per week for two months in Internal Medicine and Surgery clinics. The practical training of 3rd-year students comprises 24 h per week for three months in pediatrics, obstetrics (fifth semester) clinics and psychiatry clinics, primary care (sixth semester). 4th-year students (internship) are in practical training (eight different nursing fields fundamentals of nursing, internal nursing, surgery nursing, pediatric nursing, obstetric and gynecological nursing, psychiatric nursing, public health nursing) during the seventh and eighth semesters. They have practical training 32 h per week each semester.

Data collection tools

Data was collected using by Socio-Demographic Questionnaire, The Student Nurse Stress Index (SNSI), The Bio-Psycho-Social Response Scale (BPSRS) and Coping Behavior Inventory (CBI) Socio-Demographic Questionnaire consists of seven questions such as age, gender, grade, employment status, smoking status, choosing nursing profession willingly and academic status.

The student nurse stress index (SNSI): SNSI that developed by Jones & Johnstone (1999), consisted of 22 items, and four subscales which include academic load, clinical concerns, personal problems, and interface worries [23]. SNSI is a five-point Likert-type scale ranging from 1 [not stressful] to 5 [extremely stressful]. The Turkish validity and reliability study was conducted by Sarikoç, Demiralp, Oksuz, Pazar, [24]. Its Cronbach α coefficient was 0.86. Turkish version of the scale consists of four subscales as personal problems, clinical concerns, interface worries,

and academic load. The higher scores obtained from SNSI indicate the high-stress level.

The bio-psycho-social response scale (BPSRS): The BPSRS, developed by Sheu, Lin, Hwang (2002), consist of 21 items and three subscales about symptoms relating to the students' physical, psychological and social health [25]. BPSRS five-point Likert-type scale from 0 to 4. Its Cronbach's alpha coefficient was 0.90. A higher score indicated the presence of more symptoms and poorer physio-psychosocial status [25]. The Turkish validity and reliability study was conducted by Karaca et al. [26]. The Cronbach's alpha coefficient of the Turkish version was found to be 0.91 [26].

Coping behavior inventory (CBI): The original version of CBI that developed by Sheu, Lin, Hwang, (2002), consists of 19 items and four subscales as avoidance, problem solving, stay optimistic and transference [25]. The scale is a five-point Likert-type scale from 0 to 4. Its Cronbach's alpha coefficient was 0.76. A higher score in one factor indicated more frequent use of this type of coping behavior [25]. The Turkish validity and reliability study was conducted by Karaca et al. (2015) and its Cronbach's alpha coefficient was 0.69 [26].

Data analysis

The data were evaluated using the SPSS 21 (Statistical Package for the Social Sciences). Descriptive statistics was used as mean and standard deviation. One way anova test was used to compare scale scores (SNSI, BPSRS, CBI) according to graders. Multiple regression analysis was used to determine the variables (gender, employment status, smoking status, willingness of the choice of the nursing profession, academic achievement status) affecting stress level. For all effects, we used the standard significance level of $\alpha=0.05$.

Ethical considerations

This study was approved by Ege University Scientific Research and Publication Ethics Committee (Approval Number: 56/2018). The participants received information about the research objectives and procedures, and their written permission was obtained by means of informed consent form before data collection.

Results

The mean age of nursing students is 21.32 ± 1.57 years. Of the students, 91.9% are females and 26.5% are freshmen, and 5% are working outside the school (Table 1).

When nursing students' total and subscale SNSI mean scores were compared, a statistically significant difference was found between the mean scores of total SNSI and academic loads, interface worries and clinical concerns subscale (Table 2). The first grade nursing students' mean score of academic load subscale was found to be

Table 1 Socio-demographic characteristics of nursing students

Variables	Nursing students (n = 996)	
	n	%
Age (Mean \pm SD)	21.32 \pm 1.57	
Gender		
Female	915	91.9
Male	81	8.1
Grade		
First grade students	264	26.5
Second grade students	259	26
Third grade students	252	25.3
Fourth grade students	221	22.2
Willingness of the choice of the nursing profession		
Yes	557	55.9
No	439	44.1
Employment status		
Yes	50	5.0
No	946	95.0
Smoking status		
Yes	124	12.4
No	872	87.6

SD: standard deviation

Table 2 Comparison of student nurse stress index total and Subscale Scores of Nursing Students as per grades ($n=996$)

SNSI	Total NS ($n=996$) $\bar{x} \pm Sd$	1st Grade ($n=264$) $\bar{x} \pm Sd$	2nd Grade ($n=259$) $\bar{x} \pm Sd$	3rd Grade ($n=252$) $\bar{x} \pm Sd$	4th Grade ($n=221$) $\bar{x} \pm Sd$	F	p
Academic load	11.71 ± 2.28	12.14 ± 1.81	11.42 ± 2.58	11.49 ± 2.32	11.80 ± 2.31	5.37 [†]	0.00*
Personal problems	12.28 ± 3.93	12.68 ± 3.76	12.03 ± 3.18	11.91 ± 4.11	12.49 ± 4.62	2.22 [†]	0.08
Interface worries	15.10 ± 2.52	14.17 ± 2.97	14.62 ± 2.42	15.65 ± 2.12	16.13 ± 1.85	34.57 [†]	0.00*
Clinical concerns	14.17 ± 3.23	12.20 ± 3.46	15.44 ± 2.43	14.20 ± 3.50	15.01 ± 2.17	59.86 [†]	0.00*
SNSI total	53.27 ± 7.19	51.21 ± 7.96	53.54 ± 5.53	53.26 ± 7.89	55.44 ± 6.42	14.65 [†]	0.00*

* $p < 0.05$ **Table 3** Comparison of Bio-psycho-social Responses Scale Total and Subscale scores of nursing students as per grades ($n=996$)

BPSRS	Total NS ($n=996$) $\bar{x} \pm Sd$	1st Grade ($n=264$) $\bar{x} \pm Sd$	2nd Grade ($n=259$) $\bar{x} \pm Sd$	3rd Grade ($n=252$) $\bar{x} \pm Sd$	4th Grade ($n=221$) $\bar{x} \pm Sd$	F	p
Physical symptoms	1.05 ± 0.87	1.07 ± 0.97	1.06 ± 1.00	0.98 ± 0.61	1.08 ± 0.82	0.69 [†]	0.55
Emotional symptoms	2.19 ± 0.91	1.96 ± 0.70	2.24 ± 0.90	2.27 ± 0.88	2.27 ± 1.13	7.09 [†]	0.00*
Social-behavioral symptoms	2.18 ± 0.96	2.03 ± 0.87	2.11 ± 1.21	2.16 ± 0.70	2.45 ± 0.95	8.54 [†]	0.00*
BPSRS total	1.75 ± 0.79	1.64 ± 0.75	1.76 ± 0.91	1.75 ± 0.63	1.87 ± 0.84	3.34 [†]	0.02*

* $p < 0.05$ [†]Between grades**Table 4** Comparison of coping Behavior Inventory Total and Subscale scores of nursing students as per grades ($n=996$)

CBI	Total NS ($n=996$) $\bar{x} \pm Sd$	1st Grade ($n=264$) $\bar{x} \pm Sd$	2nd Grade ($n=259$) $\bar{x} \pm Sd$	3rd Grade ($n=252$) $\bar{x} \pm Sd$	4th Grade ($n=221$) $\bar{x} \pm Sd$	F	p
Avoidance	1.16 ± 0.57	1.17 ± 0.63	1.12 ± 0.44	1.14 ± 0.52	1.21 ± 0.68	1.26 [†]	0.28
Problem-solving	2.19 ± 0.77	1.85 ± 0.63	2.01 ± 0.54	2.25 ± 0.67	2.74 ± 0.91	72.63 [†]	0.00*
Stay optimistic	2.36 ± 0.60	2.41 ± 0.54	2.32 ± 0.60	2.36 ± 0.54	2.31 ± 0.70	1.54 [†]	0.20
Transference	2.61 ± 0.69	2.65 ± 0.61	2.64 ± 0.76	2.60 ± 0.63	2.54 ± 0.76	1.27 [†]	0.28

* $p < 0.05$ [†]Between grades

statistically significantly higher than of second and third graders ($p < 0.05$). The third and fourth grade nursing students' interface worries subscale scores were also statistically significantly higher than of the first and second graders. In the clinical concerns subscale, the second and fourth grade nursing students had significantly higher clinical anxiety than the other graders and the first-year nursing students had lower clinical concerns than other graders. When the total SNSI mean scores were compared, fourth grade nursing students' stress level was found to be statistically significantly higher than of other graders, and the first grade nursing students' stress level was statistically lower than of other graders.

It was established that nursing students have shown emotional symptoms and social-behavioral symptoms the most, whereas physical symptoms were shown the least (Table 3). When the total and subscale mean scores of BPSRS were compared according to nursing students' grades, a statistically significant difference was detected in subscales of total BPSRS, emotional symptoms and social behavioral symptoms. In the emotional symptoms subscale, the first year nursing students had less

emotional symptoms than other graders. In the social behavioral symptoms subscale, the mean scores of fourth grade nursing students were found to be significantly higher than of other graders. When total BPSRS mean scores were compared, it was observed that the fourth grade students had more bio-psycho-social behavioral symptoms than the first grade students.

It was found that to cope with stress, nursing students used the strategies transference, staying optimistic, problem-solving and avoidance, respectively (Table 4). When nursing students' behaviors related to coping with stress were evaluated according to grades, no statistically significant difference was found between the subscale scores of avoidance, staying optimistic and transference, whereas only the problem-solving subscale was statistically significant. In the problem-solving subscale, the problem-solving skills have increased significantly as the class increased ($F=72.63$; $p=0.00$).

The relationship between nursing students' stress level and gender, willingness to choose nursing profession, smoking status, employment status and academic achievement status was evaluated using regression

Table 5 Multiple regression analysis of variables affecting student nurse stress index scores ($n = 996$)

Variables	SNSI		Confidence interval	
	β	p	Lower bound	Upper bound
Sex (Reference: Male)	0.22	0.00	4.84	6.77
Employment Status (Reference: No)	0.14	0.00	3.28	5.85
Smoking Status (Reference: No)	0.28	0.00	5.23	7.02
Willingness of the choice of the Nursing Profession (Reference: No)	-0.27	0.00	-4.42	-3.31
Academic Achievement Status	-0.34	0.00	-3.42	-2.68
R		0.84		
Adjusted R²		0.70		
F		468.19		
p		0.00		

analysis (Table 5). The extent to which nursing students' stress levels were predicted by variables such as gender ($\beta = -0.22, p = 0.00$), choosing nursing profession willingly ($\beta = -0.27, p = 0.00$), smoking status ($\beta = 0.28, p = 0.00$), employment status ($\beta = 0.14, p = 0.00$) and academic achievement status ($\beta = -0.34, p = 0.00$) was determined by applying linear multiple regression. As a result of this process was detected as $R = 0.84$, $R^2 = 0.70$, and 70% of the total variance on stress level was explained by these variables. The stress level was found significantly higher in female students, working students, smokers, those who did not want to choose the nursing profession and those with low academic achievement.

Discussion

One of the most important stress factors for nursing students is practical training periods especially an initial period of practical training [21]. It is stated that nursing students experience more stress in clinical practice periods than other periods [16, 21]. In the literature, studies investigating the effects of grade on the stress level of nursing students have shown mixed results. Eswi, Radi, Youssri reported that there was no relationship between grade and stress level [27]. In a study conducted by Shaban, Khater, Akhu-Zaheya, it was found that nursing students were more sensitive to stress due to reasons such as transition to university life, managing their own needs and gaining new social skills, especially during the first years of education. In this study, unlike other studies, the first-year nursing students' stress level was found lower than of other graders [6]. Aedh, Elfaki & Mohamed, reported that nursing students who are in the second year of nursing education have experienced higher level of stress than other grades [28]. In this study, although the second grade was not the highest stress level group, the stress level showed a rapid increase compared to

the first grade and the clinical concerns subscale scores were found higher than other grades. Third and fourth grade nursing students' mean interface worries scores were found high the other grades. Several studies have similarly reported that, nursing students' stress level was found higher in the last period of nursing education compared to other periods [15, 22]. In a qualitative study conducted by Admi et al. (2018) it was found that conflict between professional beliefs and the reality of hospital practice were stressors for final year students [19]. In the study conducted by Bhat (2021) et al. it was reported that training on invasive procedures (safe catheter etc.) should be standardised in undergraduate education and this should be made part of the annual or biannual compulsory training for healthcare personnel [29]. Similarly, in this study, the stress level of fourth-grade nursing students was found higher than of other graders, and fourth-grade nursing students' mean scores of clinical concerns and interface worries were higher than of other graders. The results of our study indicate that the first-grade nursing students had problems adapting to the intensive pace of nursing education and that they experienced stress; accordingly, second-grade nursing students who first-time took to practical training and fourth-grade nursing students who had the longest practical training period also experienced stress due to practical training.

In several studies found that nursing students experienced higher levels of stress, physical and psychological symptoms than the students in other health disciplines [6, 30]. Chen & Hung reported that nursing students demonstrated physical symptoms toward stress mostly, and social-behavioral symptoms the least [8]. In the study carried out by Kassem & Abdou, when the bio-psycho-social responses experienced by nursing students were evaluated, it was found that emotional symptoms were the most common and social-behavioral symptoms were the least [11]. In another study conducted by Durmuş & Gerçek with nursing students, it that bio-psycho-social responses were found to be occurred mostly in fourth grade students [31]. In all classes, the most often emotional symptoms were observed in nursing students followed by social behavior symptoms and physical symptoms respectively [31]. The present study showed that nursing students demonstrated emotional symptoms and social-behavioral symptoms the most, whereas physical symptoms were demonstrated the least, and these results were consistent with results from most of previous similar studies. It was found that fourth-grade nursing students experienced more Bio-Psycho-Social Responses than freshmen and emotional symptoms were higher in second, third and fourth grade nursing students and social behavioral symptoms were higher in fourth-grade nursing students. This difference may be explained by the fact that because fourth-grade nursing students'

stress levels were higher than of other graders, they showed more Bio-Psycho-Social Responses.

Durmuş & Gerçek found that first, and the third-year nursing students have usually used strategies for coping with stress such as stay optimistic and avoidance, respectively [31]. Also, the same study showed that second and fourth-year nursing students have used problem-solving most [31]. Many studies found that nursing students have generally used problem solving as a coping strategy [5, 8, 11, 19, 32] and the avoidance at least [5, 6, 8]. Sheu, Lin, Hwang reported that using effective ways of coping with the problem will facilitate returning to stable status by allowing reduction of negative consequences of stress [25]. The present study showed that nursing students most often used transference and least avoidance strategies to cope with stress, and as the students' grade levels increased, also the level of using problem-solving skills increased. This situation indicates that the problem-solving competencies involving in nursing education are being provided to the students. The fourth grade of nursing students who has highest practical-training hours possess problem-solving skills more than other grades because of the positive effects of the practical applications encountered in a large number of complicated situations on the problem-solving skills of the nursing students.

In the present study, when the interaction between nursing students' stress level and gender, working status, smoking status, willingness to choose nursing profession and academic achievement status was evaluated, it was found that female students, employees, smokers, those that have chosen nursing profession unwillingly, and those with low academic achievement had significantly higher stress levels. It was reported in different studies that academic success [11,20,], gender [20, 21, 33] have affected students' stress levels and also their working hours outside of nursing education have affected their stress level [11]. Although it is important for all students to reduce stressors and to provide support for the use of coping mechanisms; especially female students, employees, smokers, those that choose the nursing profession unwillingly, and those with poor academic achievement should be supported more.

Limitations

This study has some limitations. Unlike other nursing schools in our country, this research was carried out in a nursing school where an integrated education system was applied. The findings could be specific to this college of nursing. Therefore, the generalizability of results may be limited. Besides, the small number of male students is another limitation of the study. SNSI, BPSRS, and CBI are a self-reported questionnaire. This can lead to social desirability bias in respondents.

Recommendations

It is recommended that long-term studies be conducted to understand the long-term effects of stress experienced during nursing education and to develop sustainable support mechanisms. Support mechanisms may decrease stress levels and their negative effects on nursing students and can promote nursing students' well-being and academic success, especially during practical training. Exploring what is nursing students of stress levels and coping strategies during education, can inform post-graduation preventive strategies. Also, evaluating the current stress levels and coping strategies in different nursing education programs is crucial for identifying gaps and areas for improvement. Interventional and qualitative studies are crucial to providing concrete recommendations for educational institutions and policy-makers to address stress among nursing students.

Conclusions

According to results of the present study, the stress levels of fourth-grade nursing students were higher than of other graders and causes of stress varied as regards grades. The higher level of stress in the senior nursing students that have the maximum responsibilities and stay times of practical training and the bio-psycho-social responses given by students associated depending on this stress indicate that those clinical practices are one of the main sources of stress for nursing students. Due to the nature of nursing education and nursing practices, students use their problem solving skills as a coping strategy. However, the presence of stress-related emotional and social-behavioral symptoms in nursing students indicates that they cannot cope with stress sufficiently. Internship, which is the preparation period for the transition to professional life for nursing, is the period in which nursing students experience the most stress. Students' learning to cope with stress in this period will enable them to use these strategies in their professional lives. Nursing schools can consider this period as an opportunity period to reduce and cope with stress, which is one of the important risk factors for nurses.

To develop stress management and the stress-coping mechanism of nursing students, it was recommended that courses or counseling units should be available, nursing educators should support students in the clinical areas, receive regular feedback from the students about practical training, and cooperate with clinical nurses to increase nursing students' clinical compliance. Also, in particular, female students, working students, smokers, those that have chosen nursing profession unwillingly, and those with low academic achievement should be encouraged to receive individualized or group support for stress management and in coping with stress.

Author contributions

M. S Conception and design, data acquisition, data analysis and interpretation, writing, give final approvals. S. T Conception and design, data acquisition, data analysis, writing, give final approvals. Z. E. S Data acquisition, data interpretation, give final approvals. S. D Data acquisition, data analysis, give final approvals. F. S Conception, writing, give final approvals.

Funding

The authors declared research is not funded.

Data availability

The data that support the findings of this study are not openly available due to reasons of sensitivity and are available from the corresponding author upon reasonable request.

Declarations

Ethical approval

All subjects gave their informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of Ege University [Approval Number: 56/2018].

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Received: 30 June 2024 / Accepted: 14 August 2024

Published online: 02 September 2024

References

1. Lazarus RS, Folkman S. Stress, appraisal, and coping. Springer publishing company; 1984.
2. Biggs A, Brough P, Drummond S. Lazarus and Folkman's psychological stress and coping theory. *The handbook of stress and health: A guide to research and practice*, 2017;349–364.
3. Evans W, Kelly B. Pre-registration diploma student nurse stress and coping measures. *Nurse Educ Today*. 2004;24(6):473–82.
4. Sossah L, Asiedu Y. Stress management and resilience in junior and senior nursing students in Ghana. *EJRRES*. 2015;3(2):46–53.
5. Al-Gamal E, Alhosain A, Alsunaye K. Stress and coping strategies among Saudi nursing students during clinical education. *Perspect Psychiatr Care*. 2018;54(2):198–205.
6. Shaban IA, Khater WA, Akhu-Zaheya LM. Undergraduate nursing students' stress sources and coping behaviours during their initial period of clinical training: a Jordanian perspective. *Nurse Educ Pract*. 2012;12(4):204–9.
7. Watson R, Deary I, Thompson D, Li G. A study of stress and burn out in nursing students in Hong Kong. *Int J Nurs Stud*. 2008;45(10):1534–42.
8. Chen YW, Hung CH. Predictors of Taiwanese baccalaureate nursing students' bio-psycho-social responses during clinical practicum. *Nurse Educ Today*. 2014;34(1):73–7.
9. McCarthy B, Trace A, O'Donovan M, Brady-Nevin C, Murphy M, O'Shea M, et al. Nursing and midwifery students' stress and coping during their undergraduate education programmes: an integrative review. *Nurse Educ Today*. 2018;61:197–209.
10. Gibbons C, Dempster M, Moutray M. Index of sources of stress in nursing students: a confirmatory factor analysis. *J Adv Nurs*. 2009;65(5):1095–102.
11. Kassem F, Abdou R. Stress, coping strategies and perceived faculty support among nursing students in alexandria. *ASJN*. 2015;17(1):113–30.
12. Yucha C, Kowalski S, Cross C. Student stress and academic performance: home hospital program. *J Nurs Educ*. 2009;48(11):631–7.
13. Al-Zayyat A, Al-Gamal E. A review of the literature regarding stress among nursing students during their clinical education. *Int Nurs Rev*. 2014;61(3):406–15.
14. Labrague LJ, McEnroe-Petitte DM, De Los Santos JAA, Edet OB. Examining stress perceptions and coping strategies among Saudi nursing students: a systematic review. *Nurse Educ Today*. 2018;65:192–200.
15. Edwards D, Burnard P, Bennett K, Hebden U. A comparative, longitudinal study of stress in nursing students in five countries: Albania, Brunei, the Czech Republic, Malta and Wales. *Nurse Educ Today*. 2010;28(2):134–45.
16. Singh C, Sharma S, Sharma R. Level of stress and coping strategies used by nursing interns. *Nurs Midwifery Res J*. 2011;7(4):152–60.
17. Wolf L, Stidham A, Ross R. Predictors of stress and coping strategies of US accelerated vs. generic baccalaureate nursing students: an embedded mixed methods study. *Nurse Educ Today*. 2015;35(1):201–05.
18. Pulido-Martos M, Augusto-Landa JM, Lopez-Zafra E. Sources of stress in nursing students: a systematic review of quantitative studies. *Int Nurs Rev*. 2012;59:15–25.
19. Al-Zayyat A, Al-Gamal E. Perceived stress and coping strategies among Jordanian nursing students during clinical practice in psychiatric/mental health course. *Int J Ment Health Nurs*. 2014;23:326–35.
20. Admi H, Moshe-Eilon Y, Sharon D, Mann M. Nursing students' stress and satisfaction in clinical practice along different stages: a cross-sectional study. *Nurse Educ Today*. 2018;68:86–92.
21. Doğan S, Yıldırım D. The relationship between vocational motivation and sources of stress among interns at a faculty of nursing. *STED*. 2019;28(6):418–29.
22. Ismaile S. Perceived clinical stressors among Saudi nursing students. *Open J Nur*. 2017;7(04):463.
23. Jones MC, Johnston DW. The derivation of a brief student nurse stress index. *Work Stress*. 1999;13(2):162e81.
24. Sarikoc G, Demiralp MB, Oksuz E, Pazar B. Turkish version of the student nurse stress index: validity and reliability. *Asian Nurs Res*. 2017;11(2):128–33.
25. Sheu S, Lin H, Hwang S. Perceived stress and physio-psycho-social status of nursing students during their initial period of clinical practice: the effect of coping behaviors. *Int J Nurs Stud*. 2002;39(2):165–75.
26. Karaca A, Yıldırım N, Ankaralı H, Acikgoz F, Akkuş D. The Turkish adaptation of perceived stress scale, bio-psycho-social response and coping behaviours of stress scales for nursing students. *J Psychiatr Nurs*. 2015;6:15–25.
27. Eswi AS, Radi S, Youssri H. Stress/stressors as perceived by baccalaureate Saudi nursing students. *Middle East J Sci Res*. 2013;14(2):193–202.
28. Aedh AI, Elfaki NK, Mohamed IA. Factors associated with stress among nursing students. *IOSR-JNHS*. 2015;4(6):33–8.
29. Bhatt NR, Davis NF, Thorman H, et al. Knowledge, skills, and confidence among healthcare staff in urinary catheterization. *Can Urol Assoc J*. 2021;15(9):E488–94.
30. Sheu S, Lin HS, Hwang SL. The relationships among stress, physio-psycho-social status, coping behaviors and personality traits of nursing students during first time clinical practice. *J Nurs Res*. 2001;9(3):233–45.
31. Durmuş M, Gerçek A. A research on assessing the factors affecting perceived stress situations, bio-psychological social situations and coping behaviors of stress in university students. *JASSS*. 2017;3:616–33.
32. Onieva-Zafra MD, Fernández-Muñoz JJ, Fernández-Martínez E, García-Sánchez FJ, Abreu-Sánchez A, Parra-Fernández ML. Anxiety, perceived stress and coping strategies in nursing students: a cross-sectional, correlational, descriptive study. *BMC Med Educ*. 2020;20:1–9.
33. Hamaideh SH, Abuhammad S, Khait AA, Al-Modallal H, Hamdan-Mansour AM, Masa'deh R, Alrjoub S. (2024). Levels and predictors of empathy, self-awareness, and perceived stress among nursing students: a cross sectional study. *BMC Nurs* 2024;23(1):131.

Publisher's note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.