

Psychometric Evaluation of the Arabic Version of the Higher Education Inventory Scale for nursing students

Dina Masha'al

Jordan University of Science and Technology

Audai Hayajneh (✉ aahayajneh@just.edu.jo)

Jordan University of Science and Technology <https://orcid.org/0000-0002-8141-3530>

Loai Issa Tawalbeh

Al-al-Bayt University

Research article

Keywords: Psychometric, Evaluation, Arabic, Higher Education Inventory Scale, Nursing, Students, Jordan

Posted Date: August 28th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-59379/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Version of Record: A version of this preprint was published on February 6th, 2021. See the published version at <https://doi.org/10.1186/s12888-021-03082-9>.

Abstract

Background

Studies in the literature have relied on a single instrument to assess stress levels and sources among nursing students in Jordan and in other Arab countries. Thus, there is a need for adopting Arabic versions of psychometrically validated instruments for evaluating a wider range of aspects related to stress and stressors. The Higher Education Stress Inventory (HESI) is an instrument used to assess various features of stress and stressors related to higher education in different educational settings and among different student populations. To date, no exploratory or confirmatory factor analyses (EFA) (CFA) have been conducted to study the factor structure of the Arabic version of the HESI. The current study aimed to evaluate the psychometric properties of the Arabic version of the HESI (Arabic-HESI) among nursing students in Jordan.

Methods

The structure of the instrument was tested using EFACFA and using maximum likelihood estimation among a sample of 355 nursing students at five Jordanian universities.

Results

The Arabic-HESI proved to have excellent content validity (CVI = 0.92). The instrument showed good internal consistency reliability (Cronbach's α was 0.75), as well as for the two emerged factors "challenges" and "dissatisfaction" (Cronbach's α were 0.75, 0.72 respectively). The results support the two-factor model for the Arabic-HESI because it has robust structure and acceptable goodness-of-fit indices.

Conclusion

The Arabic-HESI is a reliable and valid instrument for assessing stress levels and stressors among nursing students in Jordan. Using the reduced version of the HESI to assess stress among nursing students is recommended. Identifying new features of stress and stressors among nursing students in Jordan will enable universities and nursing faculties to better support their students.

Background

Stress is a natural physical, emotional, and mental reaction to a stimulus that disturbs the normal functioning of the body [1]. It is experienced when people recognize that the demands are greater than their individual and social resources [2]. Human beings respond to stress differently depending on their social, economic, environmental, and genetic backgrounds [3].

Nursing education-related stress levels range from medium to high [4, 5, 6, 7]. While some stressors are considered motivational and may encourage achievement [8], experiencing prolonged stress threatens the physical, mental, and psychological health of students [9]. Furthermore, experiencing unresolved chronic

stress may have adverse effects on students' academic performance [5, 10, 11]. Eventually, high levels of unresolved stress may discourage students from pursuing nursing education, therefore impacting the nursing workforce [5].

Studies in the literature have highlighted several education-related stressors among nursing students, including academic, clinical, and personal/social stressors [4, 11, 12]. Examples of academic stressors include heavy workloads, exams and assignments, the fear of failing and achieving low grades, and the lack of sufficient guidance from tutors [6, 13, 14, 15]. Clinical stressors include students' heavy responsibilities in clinical settings, students' uncertainty regarding what is expected from them, the pressure of meeting the expectations of staff, the fear of making mistakes and harming patients, and criticism from peers, senior staff, and physicians [6, 13, 15]. Personal and/or social stressors entail students' health issues, family events, lack of recreation time, high parental expectations, and financial issues [6, 13, 14, 15].

Previous studies have indicated a link between certain sociodemographic characteristics and increased stress levels among nursing students. For example, students from low-income families have been found to experience higher levels of stress in comparison to other students, as they may worry about not being able to meet their scholastic requirements, tuition fees, basic needs (food, accommodation, and transportation), or personal needs [7, 14, 16]. Further, with many universities now using blended learning and/or e-learning, students from low-income families may worry about the costs of purchasing appropriate electronic devices, good internet services, and information applications [17]. Gender has also been found to impact students' stress levels, with female nursing students frequently reporting higher levels of stress compared to males [7, 11, 16, 18]. Previous studies have attributed this to the hormonal disturbances generally experienced by females and the fact that females are more prone than males to psychological disorders [11]. As for the impact of academic year on students' stress levels, studies in the literature have reported conflicting findings. For example, Aslan and Akturk [18] and Ribeiro et al. [7] found stress levels to be higher among senior students than students in other years, mainly due to the nature of the advanced theoretical and clinical courses that senior students must take. Meanwhile, Admi and colleagues [10] found that junior nursing students experience the highest levels of stress, attributing this to their lack of knowledge and training experience required for future courses.

Identifying stress levels, sources of stress, and the impacting factors is crucial for creating effective measures that help nursing students adapt and improve their educational performance. Moreover, identifying the stress levels and stressors experienced by students enables nursing faculties and administrators to resolve the causes of stress, support students, and gain the trust of students [15, 18]. Studies which have aimed to measure stress levels and sources among nursing students in Arab countries, including Jordan, are numerous [19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29]. However, all of these studies have used a single instrument which assesses clinical-related stress only and which was only recently psychometrically validated in the Arabic language [30]. Therefore, there is a need for a wider range of validated tools in order to ensure that various aspects of academic and clinical stress and stressors among nursing students are considered.

The Higher Education Stress Inventory (HESI) is a tool characterized by its ability to capture various aspects of higher education related stressors regardless of the setting or the student population. The instrument was developed by a group of psychiatry professors in Sweden to measure stress among medical students [31]. It has previously been used to assess stress levels among medical students [31, 32] and distance learning students [33]. Although the language of education in all nursing schools in Jordan is English, the presence of a translated and validated instrument in Arabic (the official language of Jordan) would yield more accurate results and a better understanding of the context [30]. Considering the fact that stress levels and stressors vary depending on various sociocultural aspects [34, 35], the psychometric properties of the Arabic-HESI needs to be evaluated using robust analyses like EFA and CFA. Therefore, the current study aimed to 1) translate the HESI from English into Arabic, and 2) examine the psychometric properties of the Arabic-HESI, which is to be used to measure education-related stress among nursing students in Jordan, by applying EFA and CFA.

Methods

Participants

Three hundred and fifty-five nursing students from five public universities, located in the three territories of Jordan, participated in the study. Students who were enrolled in nursing programs full-time and whose first language was Arabic were recruited, whilst students who dropped out for the semester during data collection or whose first language was not Arabic were excluded from the study. The mean age of the students was 20.02 (SD = 1.12), 72.7% of the participants were female, and most of the students were in their second year of study (62.54%).

Procedure

Google forms was used to create an online survey. After the institutional review board approval from the authors' university was obtained and the facilitating requests from the other universities were granted, the survey was distributed to the nursing students through the websites of the five universities. The participants were informed that their participation was voluntary and that they had the right to withdraw from the study at any time without consequences. Further, the contact details of the researchers were provided in case the participants had any questions. The survey included the HESI items in Arabic and questions about the participants' sociodemographic characteristics. Students who agreed to participate in the study were asked to click the "submit" button at the end of the survey.

Measures

The HESI was developed by Dahlin et al [31] to measure higher education related stress among medical students. The inventory is neutral to educational settings, which allows for the comparison between different students populations. Four of the inventory items were borrowed and three of them were slightly modified from the Perceived Medical School Stress (PMSS) scale [36]. The inventory consists of 33 items describing the presence and absence of stressful aspects in higher education. The items are scored on a

4-point Likert scale, where 1 = totally disagree, 2 = somewhat disagree, 3 = somewhat agree, and 4 = totally agree. The items 2, 6, 8, 10, 13, 17, 19, 26, 27 and 33 are reversed items because they indicate the absence of stress. The original HESI factor analysis identified seven factors and included 24 items. The total variance explained by the factors was 48.7%. The Cronbach's α was .85 for the instrument and was satisfactory for the seven factors as follow: worries about future endurance/competence ($\alpha = .78$); nonsupportive climate ($\alpha = .71$); faculty shortcomings ($\alpha = .69$); workload ($\alpha = .65$); insufficient feedback ($\alpha = .65$); low commitment ($\alpha = .62$); and financial concerns ($\alpha = .59$).

Translation

After permission for use and translation was granted from the original author, the English version of the HESI was translated into Arabic by two bilingual independent nursing professors. One of the professors is specialized in psychiatry and the other in education, and both professors are fluent in both Arabic and English. Then, the HESI was back translated into English by another professor specialized in translation. The two English versions of the HESI were then compared by a native speaker, showing no differences. The translated HESI was evaluated by 4 nursing experts who have experience in tools translation and validation. The researchers were asked to rate each instrument item on a 4-point Likert scale ranging from 1= "not relevant" to 4= "highly relevant". The content validity index (CVI) was 0.92. The translated HESI was piloted on 15 nursing students from one of the five universities, and no significant issues were reported by the students.

Statistical analysis

The statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 25 (SPSS, Inc, Chicago, Ill) and Amos (Version 23.0) [Computer Program]. Chicago: IBM SPSS. The assumptions of normality, linearity, homogeneity, and homoscedasticity were checked for any violations. Reliability and validity analyses of the Arabic-HESI were performed by measuring the internal consistency reliability analysis (Cronbach's α), exploratory factor analysis (EFA), and confirmatory factor analysis (CFA). EFA is the first step in validating a translated instrument that is to be used for the first time on a new population (i.e. Jordanian nursing students in the case of the current study) [37]. EFA was used to explore the underlying factor structure of the Arabic-HESI in order to examine the ability of the individual items to reflect stress. Preacher and MacCallum's guidelines [38] were used to conduct the EFA analyses. The CFA was performed using maximum likelihood estimation to confirm the EFA structure and investigate the goodness-of-fit indices of the yielded model. In order to examine the model's goodness-of-fit, a number of statistics were used: overall χ^2 , root mean square error of approximation (RMSEA) [39], comparative fit index (CFI), and the Tucker-Lewis index (TLI) [40]. CFA provides a theory-driven approach for establishing construct validity by assigning items to their corresponding factors based on theoretical beliefs [41].

Results

Reliability

The sociodemographic characteristics of the students are displayed in **Table1**.

INSERT TABLE 1 HERE

The HESI has never been translated into Arabic, nor has it been validated among Arab populations such as the Jordanian population. Therefore, the translated version needs to establish its psychometric properties in that new population [37]. Cronbach's alpha was used to examine the internal consistency of the Arabic-HESI. Any value above 0.7 is usually considered an acceptable reliability value of a given scale [42]. The Cronbach's alpha of the total score of the scale, which comprises 33 items, was 0.767. However, the inter-item correlation of these items was very low (0.095) (**Table 2**), raising questions regarding the dimensionality of the scale with these 33 items. As a result, exploratory factor analysis (EFA) was used to determine the number of underlying factors that these 33 items are loading on, and if some of these items are not loading adequately to be well-correlated with their factors or subscales The EFA is discussed in a separate section below. Iterated EFA results suggested the use of a two-factor model to reach the simple structure of the scale.

INSERT TABLE 2 HERE

As shown in Table 3, six items did not adequately load above 0.30. These items were: "My studies control my life and I have little time for other activities", "The pace of the studies is too fast", "The studies have created anonymity and isolation among students", "I feel that the studies have played a role in creating a cold and impersonal attitude among students", "I feel that I am less well treated because of my sex", and "The training is characterized by an atmosphere where weakness and personal shortcomings are not accepted". Thus, these items were removed before re-running the EFA analysis. Then, the number of factors was reduced to two in order to achieve the simple structure of the EFA, which necessitates at least three items loading on the same factors. Then, after the EFA was repeated for the remaining items, 7 items did not load above 0.30. These items were: "I meet many future colleagues that seem dejected or dissatisfied with their profession", "The teachers often give feedback on the students' knowledge and skills", "My fellow students support me", "I worry about the long working hours and responsibilities of my future career", "The studies stimulate my personal development", "The training demands that I join in situations that I find unethical", and "The insight I have gained into my future profession has made me worried about the stressful workload". These items were removed before re-running the EFA analysis, after which one item ("Student union activities promote a sense of community and contribute to a better working environment for students") did not load above 0.30. This item was then removed before re-running the EFA analysis for the remaining items. Lastly, the EFA simple structure of the two-factor model was achieved with 18 items, as shown in Table 3. Factor one had 14 items and was named "challenges", and factor two had 4 items and was named "dissatisfaction".

The two reliability values of factors one and two were 0.758 and 0.717, respectively; as shown in Table 4, these values are considered good. After the removal of 17 items, as suggested by the iterated EFA, the final Arabic version of the HESI comprised 16 items (Table 5). The total scale reliability of the Arabic version of the HESI was 0.75, which is considered good.

INSERT TABLE 4 HERE

INSERT TABLE 5 HERE

However, Table 5 of the item reliability statistics suggested that removing each of the items “There is a competitive attitude among students” and “I feel that the training is preparing me well for my future profession” would increase the Cronbach’s alpha values of their subscales and factors from 0.686 to 0.758, and from 0.659 to 0.717, respectively. The two items were therefore removed, resulting in 13 items under factor one and 3 items under factor two. The total scale Cronbach’s alpha value of the two-factor model of the Arabic version of the HESI was 0.75 (Table 5).

A confirmatory factor analysis (CFA) was conducted using AMOS software based on a two-factor model, as suggested by the EFA (Figure 2). All factor loadings of the latent variables displayed in Fig. 2 were above 0.3. A confirmatory factor analysis of the two-factor model showed a good fit, with RMSEA (0.068) ranging between 0.058 and 0.078. Also, the CFI and

TLI were 0.841 and 0.803, respectively, indicating an acceptable model and accounting for 45% of the total variance (Table 6). CFA incorporates the specification of one or more hypothesized models and each one proposes a group of factors (latent variables) to explain for covariance among a number of observed indicators. The latent factors are enclosed in the circle (dissatisfaction and challenges), the observed indicators (items) are enclosed in the rectangle, and the measurement error is enclosed in ellipses. Referring to figure 2, the model is determined by two interrelated constructs, challenges and dissatisfaction, which are connected with double headed arrow indicating the correlation ($r=0.15$). The one-headed arrow passing from the factor to the item is the regression path, which is the link between the factor and its related items. This coefficient is the factor loading. The one-headed arrow from the ellipses to the rectangle is the measurement error.

INSERT FIGURE 2 HERE

INSERT TABLE 6 HERE

Discussion

The stress experienced by nursing students in Jordan and in other Arab countries has been examined in many studies. However, to our knowledge, all studies that have been conducted in the Arab world have used a single instrument evaluating only clinical-related stress among nursing students. Although English is the language of instruction in Jordan, there are limitations in using non-Arabic psychometrically evaluated instruments, due to language and cultural variations among students. Therefore, this study aimed to assess the psychometric properties of the Arabic version of the HESI. The translation of the HESI from English into Arabic has proved successful. This result is supported by the excellent CVI and the panel of experts’ agreement that the items of the Arabic-HESI adequately measured the sources of stress among nursing students [44].

The EFA yielded a two-factor model with 16 items reflecting different stressors perceived by nursing students in Jordan. A total of 45% of the variance was explained by the model, compared to the 24-item and 22-item seven-factor models of the original and Korean versions, which explained 48.7% and 45.8% of the variance, respectively. The original HESI and the Korean HESI yielded seven factors, with variations in the items under the factors and in the significance of the factors to the construct of higher education [31, 35]. As for the Arabic-HESI, the items were grouped under two factors, namely “challenges and “dissatisfaction”. The overall internal consistency of the Arabic-HESI was 0.75, compared to 0.85 for the original HESI and 0.78 for the Korean HESI. The Cronbach’s alpha values for the subscales of the Arabic-HESI were higher in comparison to the factors of the original HESI, whilst they were close to the Cronbach’s alpha values of most of the factors of the Korean HESI [31, 35]. This may be related to the variations in the number of items under each factor in the three versions.

According to the Cronbach’s alpha results, the 13-item “challenges” factor was stronger than the 3-item “dissatisfaction” factor. The “challenges” factor’s items were grouped from 6 out of 7 factors of the original HESI, in addition to two other factors that were not loaded in any of the 7 factors. This may be an indication of the comprehensiveness of the “challenges” factor. Although the “financial concerns” factor in the original HESI was the weakest, the items of this factor were grouped under the “challenges” factor in the Arabic-HESI. These items were more important in the Arabic-HESI due to the financial hardship experienced by many families in Jordan, as Jordan is a developing country [14, 45, 46]. In Jordan, about 84.9% of the population live below the poverty line [46].

The “dissatisfaction” factor included the items of the “low commitment” factor from the original HESI and 50% of the items of the “low commitment” factor from the Korean HESI. The presence of these items emphasizes the importance of improving the educational environment in order to improve the experience and satisfaction levels of students, therefore reducing students’ stress levels [10]. Aslan & Akturk [18] and Hamaideh et al. [25] found that nursing students who choose nursing willingly and/or come to like it during their time in education experience lower stress levels than students who do not. Further, the items under the “dissatisfaction” factor highlighted the stereotypes about nursing held by some Jordanians. Despite the evolution of Jordanian society’s view of nursing and nursing education over the past 70 years, some people in Jordan still do not consider nursing to be a prestigious major [47]. To the best of our knowledge, many students in Jordan do not choose to study nursing willingly; rather, for many students, nursing is assigned to them by the unified admission program based on their grades in the General Secondary Education Certification Examination (Tawjihi)[48, 49].

Items which present peer relationships as being a stressor, such as “The studies have created anonymity and isolation among students”, “I feel that the studies have played a role in creating a cold and impersonal attitude among students”, “My fellow students support me” (reversed item), and “There is a competitive attitude among students”, were removed during analysis. Social support from peers has been found to decrease students’ perceived stress during education [50], and in the context of Jordanian culture, relationships between students are characterized by strong and positive bonds [30]. Furthermore, items related to clinical training stressors, such as “The training is characterized by an atmosphere where

weakness and personal shortcomings are not accepted”, “The training demands that I join in situations that I find unethical”, and “I feel that the training is preparing me well for my future profession”, were also removed. This may be attributed to the fact that data collection took place during the period of transition to distance learning due to the COVID 19 pandemic, whereby practicum courses were taught that semester (second semester 2019/2020) using videos, computer simulations, and online quizzes and assignments. Students did not have the chance to practice in clinical settings and therefore did not experience the stressors related to actual training in clinical settings. Furthermore, the lack of training in clinical settings may have also reduced the students’ perceived levels of stress regarding the stressors and responsibilities of their future profession. Therefore, the items “I meet many future colleagues that seem dejected or dissatisfied with their profession”, “I worry about the long working hours and responsibilities of my future career”, and “The insight I have gained into my future profession has made me worried about the stressful workload” were removed during analysis.

Limitations

This study is not without limitations. The cross-sectional design of the study does not provide information about causal relationships among variables. Also, the fact that this is a secondary data analysis hindered the researchers from examining the test-retest reliability, stability reliability, criterion-related validity, Known-group validity, and convergent validity. Further, data were collected soon after the sudden and dramatic transition by all universities in Jordan to distance learning due to the COVID 19 pandemic. Despite the HESI being neutral to educational settings and student populations, we believe that the removal of many of the items in the Arabic-HESI during analysis may have been due to this sudden transition.

Conclusion

This study has provided initial evidence for the validity and reliability of the Arabic-HESI. The instrument showed good internal consistency reliability and excellent content validity. Using the reduced version of the HESI to assess stress among nursing students is recommended. In order to boost the results of the exploratory analysis of this study, future studies should use the Arabic-HESI on a larger sample size, during regular education, and using advanced confirmatory analysis. Identifying different aspects of stress and stressors among nursing students using a new instrument will enrich our knowledge and enable universities and nursing faculties in Jordan and the Arab world to use different strategies to create a new support system for students. These strategies will focus on the main sources of stress for this cohort and will be in line with Arab culture.

Abbreviations

HESI
Higher Education Inventory Scale

Declarations

***Ethics approval and consent to participate**

The Institutional Review Boards of Jordan University of Science and Technology (IRB #.20200316) and Consenting participants signed a written consent form.

***Consent for publication**

Not Applicable

***Availability of data and material**

The raw data can be requested from the first author: Dina Masha'al, PhD, MSN, RN

***Competing interests**

All authors have no financial and non-financial competing interests

***Funding**

This work was funded by the Jordan University of Science and Technology. [Grant number 20200316].

***Authors' contributions**

We hereby confirm that all listed authors meet the authorship criteria and that all authors are in agreement with the content of the manuscript.

Study conception & design: DM; data collection and analysis: DM, AH; data interpretation: DM, AH; and manuscript preparation: DM, AH, LT; final approval of the manuscript version to be published: DM.

***Acknowledgements**

Thanks for Jordan University of Science and Technology.

References

1. American Institute. Stress Effects. Available from <https://www.stress.org/stress-effects/> [Accessed 30 July 2020].
2. Lazarus RS, Folkman S. Stress, Appraisal, and Coping. New York: Springer; 1984.
3. Epel ES, Crosswell AD, Mayer SE, Prather AA, Slavich GM, Puterman E, Mendes WB. More than a feeling: A unified view of stress measurement for population science. *Front Neuroendocrin.* 2018;49:146–69. <https://doi.org/10.1016/j.yfrne.2018.03.001>.
4. Alzayyat 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. <https://doi.org/10.1111/inr.12114>.

5. Labrague LJ, McEnroe-Petitte DM, Gloe D, Thomas L, Papathanasiou IV, Tsaras K. A literature review on stress and coping strategies in nursing students. *J Ment Heal*. 2017;26(5):471–80. <https://doi.org/10.1080/09638237.2016.1244721>.
6. Liu M, Gu K, Wong TKS, Luo MZ, Chan MY. Perceived stress among Macao nursing students in the clinical learning environment. *Int J Nurs Sci [Internet]*. 2015;2(2):128–33. <http://dx.doi.org/10.1016/j.ijnss.2015.04.013>.
7. 10.1590/1518-8345.3036.3209
Ribeiro FMSES, Mussi FC, Pires CG, da S, Silva, RM da, Macedo, TTS de, Santos CA de ST. Stress level among undergraduate nursing students related to the training phase and sociodemographic factors. *Rev Lat Am Enfermagem*. 2020;28:e3209. <https://doi.org/10.1590/1518-8345.3036.3209>.
8. Gibbons C. Stress, coping and burn-out in nursing students. *International journal of nursing studies*. 2010;47(10):1299–309. <https://doi.org/10.1016/j.ijnurstu.2010.02.015>.
9. Labrague LJ. Stress, Stressors, and Stress Responses of Student Nurses in a Government Nursing School. *Heal Sci J [Internet]*. 2013;7(4):424–35. <http://www.hsj.gr/medicine/stress-stressors-and-stress-responses-of-student-nurses-in-a-government-nursing-school.pdf>.
10. 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 [Internet]*. 2018;68:86–92. <https://doi.org/10.1016/j.nedt.2018.05.027>.
11. Şentürk S, Doğan N. Determination of the stress experienced by nursing students' during nursing education. *Int J Caring Sci [Internet]*. 2018;11(2):896–904.
12. 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(1):15–25. <https://doi.org/10.1111/j.1466-7657.2011.00939.x>.
13. Alghamdi S, Aljabri S, Jafari G, Alzebali R, Alkunaidiri N, Kalantan N. Sources of Stress Among Undergraduate Nursing Students. *Glob J Health Sci*. 2019;11(9):116. <https://doi.org/10.5539/gjhs.v11n9p116>.
14. Amany SB, Nakitende J, Ngabirano TD. A cross-sectional study of stress and its sources among health professional students at Makerere University, Uganda. *Nurs Open*. 2018;5(1):70–6. <https://doi.org/10.1002/nop2.113>.
15. Parveen A, Inayat S. Evaluation of factors of stress among Nursing Students. *Adv Pract Nurs*. 2017;02(02):2–5. <https://doi.org/10.4172/2573-0347.1000136>.
16. Madian AAM, Abdelaziz MA, Ahmed HA. Level of Stress and Coping Strategies among Nursing Students at Damanhour University, Egypt. *Am J Nurs Res*. 2019;7(5):684–96. <https://doi.org/10.1269/ajnr-7-5-3>.
17. Sowan AK, Jenkins LS. Designing, delivering and evaluating a distance learning nursing course responsive to students needs. *Int J Med Inform*. 2013;82(6):553–64. <https://doi.org/10.1016/j.ijmedinf.2013.02.004>.

18. Aslan H, Akturk U. Nursing education stress levels of nursing students and the associated factors. *Ann Med Res*. 2018;25(4):660. <https://doi.org/10.5455/annalsmedres.2018.06.108>.
19. Aedh AI, Elfaki NK, Mohamed IA. Factors associated with stress among nursing students (Najran University - Saudi Arabia). *IOSR-JNHS*. 2015;4(6):33–8. <https://doi.org/10.9790/1959-04663338>.
20. Al-Gamal E, Alhosain A, Alsunaye K. Stress and coping strategies among Saudi nursing students during clinical education. *Perspectives in psychiatric care*. 2018;54(2):198–205. <https://doi.org/10.1111/ppc.12223>.
21. 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 [Internet]*. 2012;12(4):204–9. <http://dx.doi.org/10.1016/j.nepr.2012.01.005>.
22. Khater WA, Akhu-zaheya LM, Shaban IA. Sources of stress and coping behaviours in clinical practice among baccalaureate nursing students. *Int J Humanit Soc Sci*. 2014;4(6):194–202.
23. Akhu-Zaheya L, Shaban I, Khater W. Nursing students' perceived stress and influences in clinical performance. *Int J Adv Nurs Stud*. 2015;4(2):44. <https://doi.org/10.14419/ijans.v4i2.4311>.
24. Al-Zayyat AS, Al-Gamal E. Perceived stress and coping strategies among Jordanian nursing students during clinical practice in psychiatric/mental health courses. *Int J Ment Health Nurs*. 2014;23(4):326–35. <https://doi.org/10.1111/inm.12054>.
25. Hamaideh SH, Al-Omari H, Al-Modallal H. Nursing students' perceived stress and coping behaviors in clinical training in Saudi Arabia. *J Ment Heal*. 2017;26(3):197–203. <https://doi.org/10.3109/09638237.2016.1139067>.
26. Alzayyat A, Al-Gamal E. Correlates of Stress and Coping among Jordanian Nursing Students during Clinical Practice in Psychiatric/Mental Health Course. *Stress Heal*. 2016;32(4):304–12. <https://doi.org/10.1002/smi.2606>.
27. Mohamed BM, Ahmed ES. Perception of nursing students towards clinical stressors in the faculty of applied medical sciences-Al Jouf University-Saudia Arabia. *The Journal of American Science*. 2012;8(12):608–17.
28. Alsaqri SH. Stressors and coping strategies of the Saudi nursing students in the clinical training: a cross-sectional study. *Educ Res Int*. 2017;2017:4018470. <http://doi.org/10.1155/2017/4018470>.
29. Ismaile S. Perceived clinical stressors among Saudi nursing students. *Open J Nurs*. 2017;7(04):463. <https://doi.org/10.4236/ojn.2017.74036>.
30. Algaralleh A, Altwalbeh D, Alzayyat A. Preliminary psychometric properties of the arabic version of sheu and colleagues perceived stress scale among nursing students at Jordanian universities. *J Multidiscip Healthc*. 2019;12:777–87. <https://doi.org/10.2147/JMDH.S214456>.
31. Dahlin M, Joneborg N, Runeson B. Stress and depression among medical students: A cross-sectional study. *Med Educ*. 2005;39(6):594–604. <https://doi.org/10.1111/j.1365-2929.2005.02176.x>.
32. Dagistani A, Al Hejaili F, Binsalih S, Al Jahdali H, Al Sayyari A. Stress in Medical Students in a Problem-Based Learning Curriculum. *Int J High Educ*. 2016;5(3):12–7. <https://doi:10.5430/ijhe.v5n3p12>.

33. Hoang S. Stress among undergraduate distance learners: a cross-sectional study. PhD [Dissertation]. Minneapolis (MN): Walden University; 2016. Available from <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=psyc13&NEWS=N&AN=2016-17133-056>.
34. Berman A, Snyder S. Kozier & Erb's Fundamental of nursing concept process and practice. New Jersey: Pearson Prentice Hall; 2012.
35. 10.1186/s12909-016-0824-9
Shim EJ, Jeon HJ, Kim H, Lee KM, Jung D, Noh HL, et al. Measuring stress in medical education: validation of the Korean version of the higher education stress inventory with medical students. *BMC Med Educ* [Internet]. 2016;16(1):1–8. Available from: <http://dx.doi.org/10.1186/s12909-016-0824-9>.
36. 10.1097/00005053-198412000-00006
Vitaliano PP, Russo J, Carr JE, Heerwagen JH. (1984). Medical school pressures and their relationship to anxiety. *The Journal of nervous and mental disease*. 1984; 172(12):730–736. <https://doi.org/10.1097/00005053-198412000-00006>.
37. Hayajneh AA. The psychometric properties of the Arabic version of the Tilburg frailty indicator. *Global J Health Sci*. 2019;11(9):123–33. <https://doi.org/10.5539/gjhs.v11n9p123>.
38. Preacher & MacCallum. Repairing Tom Swift's Electric Factor Analysis Machine. *Understanding Statistics* [Internet]. 2003;2(1):13. Available from: <http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=9228740&site=ehost-live>. [Accessed Jul 30 2020].
39. Hooper D, Coughlan J, Mullen M. Structural equation modelling: guidelines for determining model fit. *Electron J Bus Res Methods*. 2008;6:53–60.
40. Bentler PM. Comparative fit indexes in structural models. *Psychol Bull*. 1990;107:238–46. <https://doi.org/10.1037/0033-2909.107.2.238>.
41. Strauss ME, Smith GT. Construct validity: Advances in theory and methodology. *Annu Rev Clin Psychol*. 2009;5:1–25. <https://doi.org/10.1146/annurev.clinpsy.032408.153639>.
42. Kline P. A handbook of psychological testing. 2nd ed. London: Routledge; 1999.
43. Al-Zaru IM, Hayajneh AA, Al-Dwaikat T. Psychometric properties of the Arabic version of the cardiac depression scale tested on Jordanian patients with cardiovascular diseases. *BMC Psychiatry*. 2020;20(1):246. <https://doi.org/10.1186/s12888-020-02651-8>.
44. Polit DF, Beck CT. *Nursing Research: Generating and Assessing Evidence for Nursing Practice*. New York: Lippincott Williams & Wilkins; 2012.
45. Ali N, Jamil B, Sethi A, Ali S. Attitude of Nursing Students Towards E-Learning. *Adv Heal Prof Educ*. 2016;2(1):24–9.
46. National council of family affairs (NCFA). *Jordanian Family Report*. Jordan: NCFA; 2017. Available from <http://ncfa.org.jo:85/NCFA/sites/default/files/Publications/family-report.pdf>.
47. Zahran Z. Nurse education in Jordan: History and development. *Int Nurs Rev*. 2012;59(3):380–6. <https://doi.org/10.1111/j.1466-7657.2011.00947.x>.

48. Ahmad MM, Safadi RR. Entry criteria and nursing students' success. *Jordan Med J.* 2009;43(3):189–96.
49. Safadi RR, Saleh MYN, Nassar OS, Amre HM, Froelicher ES. Nursing students' perceptions of nursing: A descriptive study of four cohorts. *Int Nurs Rev.* 2011;58(4):420–7. <https://doi.org/10.1111/j.1466-7657.2011.00897.x>.
50. Hamdan-Mansour AM, Dawani HA. Social support and stress among university students in Jordan. *Int J Ment Health Addict.* 2008;6(3):442–50. <https://doi.org/10.1007/s11469-007-9112-6>.

Tables

Table1. Nursing students' sociodemographic characteristics (N=355)		
	N	%
Age	(M=20.02, SD=1.12)	
Gender		
Male	97	27.32
Female	258	72.68
Monthly Income		
Very low income	222	62.54
Low income	115	32.39
Medium to high income	18	05.07
Academic year		
First year	60	16.90
Second year	222	62.54
Third year	41	11.55
Fourth year	32	09.01

Table 2. Scale Reliability Statistics				
	mean	sd	Cronbach's α	Inter-Item correlation
scale	2.568	0.590	0.767	0.095
<i>Note.</i> Of the observations, 355 were used, 0 were excluded listwise, and 355 were provided.				

Table 3. Exploratory factor analysis of the Arabic version of HESI, three-factor model, 33 items (N=355) Thirty-three items loadings of the Arabic version of HESI

	Factor 1	Factor 2	Factor 3	Uniqueness
Student union activities promote a sense of community and contribute to a better working environment for students	.	0.464	.	0.763
Studies control my life and I have little time for other activities	.	.	.	0.958
The pace of studies is too high	.	.	.	0.956
I am worried about accommodation	0.460	.	.	0.777
There is a competitive attitude among students	.	0.537	.	0.701
The studies have created anonymity and isolation among students	.	.	.	0.827
I feel that the studies have played a role in creating a cold and impersonal attitude among students	.	.	.	0.895
I meet many future colleagues that seem dejected or dissatisfied in their profession	0.335	.	.	0.849
The teachers give encouragement and personal attention	.	0.517	.	0.667
I feel that I am less well treated because of my ethnic background	0.365	.	.	0.829
The teachers often fail to clarify the aims of the studies	0.380	0.400	.	0.612
The teachers often give feedback on the students' knowledge and skills	.	0.415	.	0.797
My fellow students support me	.	0.367	.	0.836
As a student, my financial situation is a worry	0.431	.	.	0.784
I am worried about my future economy and my ability to repay student loans	0.499	.	.	0.742
I am able to influence the studies	.	.	0.313	0.824
I feel that I am less well treated because of my sex	.	.	.	0.926

Table 3. Exploratory factor analysis of the Arabic version of HESI, three-factor model, 33 items (N=355) Thirty-three items loadings of the Arabic version of HESI

	Factor 1	Factor 2	Factor 3	Uniqueness
The literature is too difficult and extensive	0.424	.	.	0.796
I worry about long working hours and responsibilities in my future career	0.349	.	.	0.797
I am satisfied with my choice of career	0.327	.	.	0.810
I am worried that I will not acquire all the knowledge needed for my future profession	0.422	.	.	0.750
The studies stimulate my personal development	.	0.426	.	0.810
The professional role presented in the training conflicts with my personal views	.	0.366	.	0.764
I am proud of my future profession	.	.	0.787	0.348
As a student you are often expected to participate in situations where your role and function is unclear	0.355	.	.	0.829
I am satisfied with my choice of career	.	.	0.825	0.311
There is too much focus on passive learning of facts and too little on active seeking of knowledge and time for reflection	0.357	.	.	0.836
I feel that my teachers treat me with respect	.	0.416	.	0.699
The training demands that I join in situations that I find unethical	0.339	.	.	0.882
I feel that the training is preparing me well for my future profession	.	.	0.313	0.813
The training is characterized by an atmosphere where weakness and personal shortcomings are not accepted	.	.	.	0.914
The education is highly characterized by group activities with unclear goals and with too much responsibility placed on the student	0.453	.	.	0.813

Table 3. Exploratory factor analysis of the Arabic version of HESI, three-factor model, 33 items (N=355) Thirty-three items loadings of the Arabic version of HESI

	Factor 1	Factor 2	Factor 3	Uniqueness
The insight I have had into my future profession has made me worried about the stressful workload	0.507	.	0.326	0.640

Table 4. The two factors model of the Arabic version of HESI			
	Challenges	Dissatisfaction	Uniqueness
I am worried about accommodation	0.484	.	0.783
There is a competitive attitude among students	0.377	.	0.851
The teachers give encouragement and personal attention	0.416	.	0.755
I feel that I am less well treated because of my ethnic background	0.411	.	0.841
The teachers often fail to clarify the aims of the studies	0.574	.	0.654
As a student, my financial situation is a worry	0.503	.	0.764
I am worried about my future economy and my ability to repay student loans	0.530	.	0.738
I am able to influence the studies	.	0.358	0.849
The literature is too difficult and extensive	0.397	.	0.830
I am worried that I will not acquire all the knowledge needed for my future profession	0.488	.	0.780
The professional role presented in the training conflicts with my personal views	0.446	.	0.790
I am proud of my future profession	.	0.940	0.184
As a student you are often expected to participate in situations where your role and function is unclear	0.370	.	0.856
I am satisfied with my choice of career	.	0.859	0.320
There is too much focus on passive learning of facts and too little on active seeking of knowledge and time for reflection	0.315	.	0.869
I feel that my teachers treat me with respect	0.460	.	0.724
I feel that the training is preparing me well for my future profession	.	0.301	0.904
The education is highly characterized by group activities with unclear goals and with too much responsibility placed on the student	0.337	.	0.895

Table 5. Two factors model: Item Reliability Statistics

Factor 1: Challenges				
	M	SD	item-total correlation	If item dropped Cronbach's α
C1: I am worried about accommodation	2.172	1.128	0.399	0.654
Removed: There is a competitive attitude among students	2.687	1.031	0.324	0.758
C2: The teachers give encouragement and personal attention	2.546	0.911	0.319	0.667
C3: I feel that I am less well treated because of my ethnic background	1.465	0.807	0.339	0.665
C4: The teachers often fail to clarify the aims of the studies	3.028	0.809	0.452	0.651
C5: As a student, my financial situation is a worry	3.127	0.929	0.412	0.654
C6: I am worried about my future economy and my ability to repay student loans	2.501	1.103	0.442	0.647
C7: The literature is too difficult and extensive	3.420	0.726	0.361	0.664
C8: I am worried that I will not acquire all the knowledge needed for my future profession	3.569	0.699	0.373	0.663
C9: The professional role presented in the training conflicts with my personal views	2.701	0.924	0.306	0.669
C10: As a student you are often expected to participate in situations where your role and function is unclear	2.932	0.729	0.323	0.668
C11: There is too much focus on passive learning of facts and too little on active seeking of knowledge and time for reflection	3.093	0.795	0.330	0.667
C12: I feel that my teachers treat me with respect	1.775	0.802	0.423	0.655

Table 5. Two factors model: Item Reliability Statistics				
Factor 1: Challenges				
	M	SD	item-total correlation	If item dropped Cronbach's α
C13: The education is highly characterized by group activities with unclear goals and with too much responsibility placed on the student	2.969	0.878	0.304	0.670
Factor 1 (Cronbach's α after removal=0.758)	2.713	0.593		
Factor 2: Dissatisfaction				
S1: I am able to influence the studies	1.901	0.826	0.314	0.673
S2: I am proud of my future profession	1.420	0.760	0.651	0.454
S3: I am satisfied with my choice of career	1.625	0.869	0.601	0.470
Removed: I feel that the training is preparing me well for my future profession	1.828	0.864	0.252	0.717
Factor 2 (Cronbach's α after removal=0.717)	1.694	0.217		
Total scale (Cronbach's α after removal= 0.75)				

Table6. Goodness-of-fit statistics for two-factors model	
Fit Statistics	Two-factors model
RMSEA (CI 90%)	0.068 (0.058, 0.078)
TLI	0.803
CFI	0.841

Note: RMSEA: Root mean square error, CFI: Comparative fit index, TLI: Tucker-

Figures

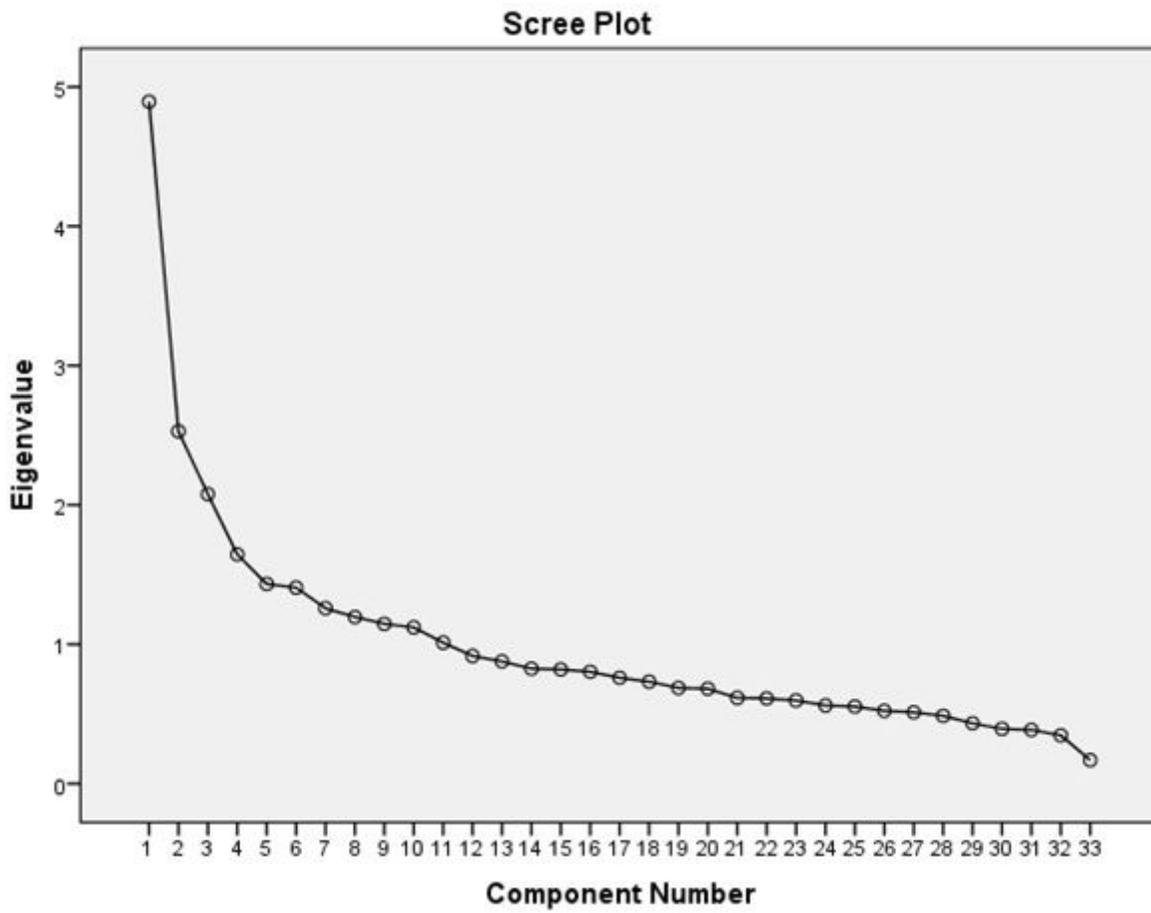


Figure 1

Scree plot

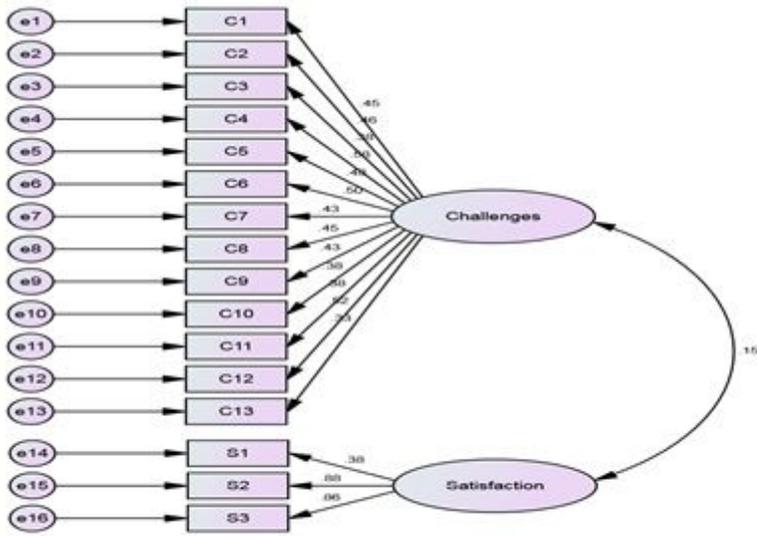


Figure 2

The confirmatory factor analysis of the two factors model