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Original Article

Relationship between exam anxiety, computer experience, and obstacles for nursing students who had undertaken electronic exams

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ABSTRACT

Background: Implementing electronic exams for the first time among fourth-year nursing students increases the anxiety related to the exams. So, this study aims to assess the relationship between exam anxiety, computer experience, and obstacles for nursing students who had undertaken electronic exams. **Subjects and methods**: the study followed a correlational descriptive design. It included all fourth-year nursing students at the Faculty of Nursing, South Valley University (171). Three tools were used to collect the data. The tool I (a Westside Test Anxiety Scale). Tool II (a structured computer experience scale), tool III (structured obstacles related to exam scale), and. **Results**: Only (15.0%) of participants reported comfortably low test anxiety levels. 63.4% of the participants have a moderate computer experience level. More than one-half of the participants reported that personal obstacles and teaching obstacles present to some extent (50.3%, and 52.9% respectively). Less than fifty percent (45.1%) of the participants mentioned that technical obstacles present to some extent. There are no statistically significant differences between different electronic exam anxiety levels and age, sex, and experience level (p-value > 0.05) while there is a highly statistically significant difference between different electronic exam anxiety levels and the presence of obstacles (p-value = 0.001). **Conclusion and recommendations**: Computer experience level did not statistically associate with exam anxiety levels while different types of obstacles can increase exam anxiety levels. So, adequate orientation and training programs for the students who had undertaken electronic exams are recommended.

Keywords: Exam anxiety, computer experience, obstacles, electronic exam, nursing students

Introduction

Test anxiety is more common in medical students ranging from moderate to severe levels which can affect their academic performance. It includes low confidence level, fear of failure, stress, and worry (Roos, 2020 & Mastour, et al. 2022). Nursing students experience higher levels of test anxiety than others, especially because of the struggle to balance multiple works, career adjustment, and family responsibilities with the long study hours that are required for success. Over time these stressors may put the student under chronic stress. Test anxiety affects about one-third of all nursing students (Dawood, et al., 2016).

Despite all the previous advantages of electronic exams, it is associated with a high level of anxiety. Compared with the paper exam, applying electronic exam for the first time was rejected by most students because of the mechanism of using the program and computer (Ismail, et al., 2020).

The electronic exam is a new one of evaluation method which has its advantages such as reducing the time for writing questions, correcting papers, and printing the results (Huseyin, & Ozturan, 2018, Galvis, 2018). It is considered an effective mode of assessment with particular importance to provide immediate exam feedback (Elsalem, et al., 2020). Nearly all of the world's top universities use general-purpose/customized software to administer e-exam. The success of the electronic examinations can be measured based on student satisfaction (Qureshi & Rizwan, 2015; Qalawa, et al., 2021).

E-exam plays an important role in reducing cost and maintaining the privacy of the exam (Elbasri, et al., 2018). Exam privacy can be maintained through E-exams be taken by accessing the computer networks in labs, each nursing student gets an account, including a username and password that are only valid for the specified exam, finally, at the end of the exam, the results are submitted directly to the database to be processed and saved (Ismail, et al., 2020). Electronic exams allow teachers to accurately measure the educational content over time (Fluck, et al., 2009). These exams can contribute to increasing the motivation of the learner through tests of appropriate items, in which the low-achieving students tend to prefer the structural test over electronic exams (Bashitialshaaer, et al., 2021). The use of advanced devices makes the electronic link process easy and fast, with adequate protection programs to avoid the leakage of questions (Ranne, et al., 2008).

Studies reported that computer experience has a great role in controlling electronic exam anxiety. These studies recommended that the electronic exam should be applied gradually to increase students' experience (Ismail, et al., 2020, Amate-Romera, 2021, & Bashitialshaaer, et al., 2021). Obstacles identified by students towards electronic exams were related to internet speed and security systems, the exam system, and technical problems associated with it (James, 2016). Obstacles are divided into three types (personal, teaching, and technical obstacles) personal obstacles electronic exams will not show

the students' real level and will not distinguish between students teaching obstacles lack of sufficient experience in preparing and applying electronic exams technical obstacles the security and confidentiality of data and information, and everything related to the protection from privacy on the internet, which affects the online courses and exams (Paredes, et al., 2021).

Significance of the study

It is observed that some students feel anxious about electronic exams. The electronic exam is a new experience for nursing fourth-year students at the Faculty of Nursing, South Valley University, thus was the driving factor to study to which extent exams anxiety, computer experience, and obstacles for nursing students who undertake electronic exams.

Aim of the study

This study aims to assess the relationship between exam anxiety, computer experience, and obstacles for nursing students who undertaken electronic exams.

Research questions

Do students who undertake electronic exams that have computer experience have less exam anxiety?

Do students who undertake electronic exams that have fewer obstacles during exams have less exam anxiety?

Subjects and methods

Research design:

A descriptive correlational research design was utilized to fulfill the aim of this study.

Setting:

The study was conducted at the Faculty of Nursing South Valley University, Qena Governorate. In the faculty students' numbers from 1st to 4th year are (429, 502, 256, and 171) respectively. E-exams are applied only to fourth-year students.

Sample:

The sample of the current study targeted all fourth-year students at the Faculty of Nursing, South Valley University. The response rate was 153 students (89.5 %) from the total 171 fourth-year students who respond to study tools.

Study tools

Three tools were used to collect the necessary data.

The tool I: A Westside Test Anxiety Scale was adopted from Driscoll, (2022). It consists of 10 statements. The responses followed five points Likert scale ranging from extremely or always true (5 degrees), highly or usually true (4 degrees), moderately or sometimes true (3 degrees), slightly or seldom true (2 degrees), and not at all or never true (1 degree).

Westside Test anxiety total scores were divided as follows:

- 1.0: 1.9 Comfortably low test anxiety

- 2.0: 2.5 Normal or average test anxiety
- 2.5: 2.9 High normal test anxiety
- 3.0: 3.4 Moderately high
- 3.5: 3.9 High test anxiety
- 4.0: 5.0 Extremely high anxiety

Tool II: A structured computer experience scale composed of two parts; the first part (personal data) included age and sex and the second part assessed computer experience which was prepared by the researchers through reviewing literature (Deltsidou, et al., (2010); Al-Othman, et al., (2021) & Boot, et al., (2015)). It consisted of 13 statements. The responses followed five points Likert scale ranging from strongly agree (five degrees), to strongly disagree (one degree). A Structured computer experience scale total scores were divided as follows:

- 0.0: 2.4 Low
- 2.5: 3.9 Moderate
- 4: 5 High

Tool III: A structured obstacle related to the exam scale was prepared by the researchers through reviewing literature Elsalem, et al., (2020); Bashitialshaaer, et al., (2021); Ismail, et al., (2020); Farrag, et al., (2020). It consisted of 24 statements. The responses followed three points Likert scale ranging from always present (three degrees) to not present (one degree). A Structured obstacle related to exam scale scores was divided as follows:

- 0.0: 1 not present
- 1.1: 2 present to some extent
- 2.1 : 3 always present

Methods

The study was conducted throughout two phases:

I- Preparatory phase:

1. Started on December 2021 in which extensive review of the literature was done.
2. Study proposal preparation.
3. Data collection tools translated into Arabic.
4. Official permission to conduct the study was obtained.
5. Face validity: the tools reviewed by a jury committee to assess the clarity, feasibility, and applicability of the tools. The committee consisted of 5 experts from Qena, Sohag, and Cairo Faculties of Nursing (2, 2, and 1) respectively. There were minor modifications to the tools all of them have been done.
6. A pilot study was conducted on 20 student of participants to test the applicability of the tools, and the time needed for data collection. A pilot study sample was included in the actual study as there is no modifications were needed.
7. Reliability measured using Cronbach's alpha test, structured computer experience scale reliability 0.918, structured obstacles scale reliability 0.939, and Test anxiety scale reliability 0.933.

8. Google form was utilized to design three study tools with the explanation of ethical considerations and anonymity is considered.

II- Implementation phase:

1. During this phase data collection started on the last day of exams 26 June 2022 and ended after two weeks.
2. The researcher sent the google form link of the study tools to the target participants via WhatsApp application. There is no incomplete response because all questions were required for submission.
3. Frequent remembering messages sent randomly to stimulate participants to respond.

Ethical considerations: Permission obtained from responsible authorities of the Faculty of Nursing. The study proposal has been accepted by the ethical committee at the Faculty of Nursing, South Valley University under the rule number (SVU-NUR-ADM-1-18-7-2022). The confidentiality and anonymity of the participant are assured. Participants who submit completed responses are considered acceptable to participate in the study.

Statistical Design

Collected data has been exported from Google Forms to an excel sheet. Data analysis had done using the statistical package for social sciences (SPSS) version 26 for windows. A normality test was explored that revealed nonparametric data. The collected data is presented in tables and figures using frequencies and percentages. The correlation was measured using the Spearman correlation coefficient test. The Kruskal-Wallis H test was used to show the difference between variables. Test of significance considered: insignificant $P > 0.05$; significant $P = 0.05$ and highly significant $P = 0.01$.

Results

Table (1): Personal data of the participants this table shows that about two-thirds (66.0%) of participants aged 22 years and (62.1%) are females.

Figure (1): Anxiety level of the participants this figure reflects that only (15.0%) of participants reported comfortably low test anxiety levels while nearly one quarter (24.8%) reported moderately high anxiety levels and more than one quarter (26.1%) reported normal average anxiety levels.

Figure (2): Computer experience level of the participants this figure illustrates that (63.4%) of the participants have a moderate computer experience level while (22.2%) have a high computer experience level and only (14.4%) have a low computer experience level.

Table (2): Different three types of obstacles this table shows that for personal obstacles, more than half of participants reported that they “failure to attend the full theoretical lectures, The feeling that electronic exams will not show the exact level of students, Inability to organize time during the exam, and difficulty using the exam platform’

obstacles are not present (56.2%, 60.8%, 59.5%, and 62.1% respectively). While more than one-third of them reported that 'Not studying the whole entire exam's material, lack of computer experience and Inability to focus while reading on the screen' obstacles are always present (34.6%, 35.3%, and 34.0% respectively).

Concerning teaching obstacles, 40.5% of the participants confirmed that "the choices are very similar" while more than one-quarter of them reported that "Difficulty of the questions, Poor communication between students and lecturers, Faculty members do not prepare students effectively for the exam, The final exam score is not expected by the student" obstacles are always present (30.4%, 27.5%, 26.1%, and 28.8% respectively). Regarding technical obstacles, 46.4 of the participants reported that "technical e-learning platform problems" present to some extent. 36.6 % of them reported that "No enough space between computer devices" is always present. While the majority (83.0 %) of them reported that "power failure during the exam" doesn't present.

In addition, there is no correlation between electronic exam anxiety level with age, sex, and experience level (p-value > 0.05) while there is a strong positive correlation between electronic exam anxiety level with Personal obstacles, Teaching obstacles, Technical obstacles, and obstacles as a total.

Figure (3): Different types of obstacles this figure indicates that more than one-half (50.3%) of the participants reported that personal obstacles are present to some extent and (30.1%) of them always face these personal obstacles. Concerning teaching obstacles, it is mentioned by more than one-half (52.9%) of the participants as present to some extent, and (24.8%) of them confirmed that teaching obstacles are always present. Regarding technical obstacles, the highest percentage (45.1%) of the participants mentioned that it is present to some extent, and (27.5%) of them confirmed that it is always present.

Table (3): Spearman correlation between anxiety level with age, sex, experience level, and obstacles

this table shows that there is no correlation between electronic exam anxiety level with age, sex, and experience level (p-value > 0.05) while there is a strong positive correlation between electronic exam anxiety level with personal obstacles, teaching obstacles, technical obstacles, and obstacles as a total.

Table (4): Comparing participants' anxiety level between participants' personal data, experience level, and obstacles this table reflects that there is no statistically significant differences between different electronic exam anxiety levels and age, sex, experience level (p-value > 0.05) while there is a highly statistically significant difference between different electronic exam anxiety levels and the presence of obstacles (p-value = 0.001).

Table (1): Personal data of the participants

Variables	n. = 153	%
Sex		
Male	58	37.9
Female	95	62.1
Age		
21	8	5.2
22	101	66.0
23	38	24.8
24	6	3.9

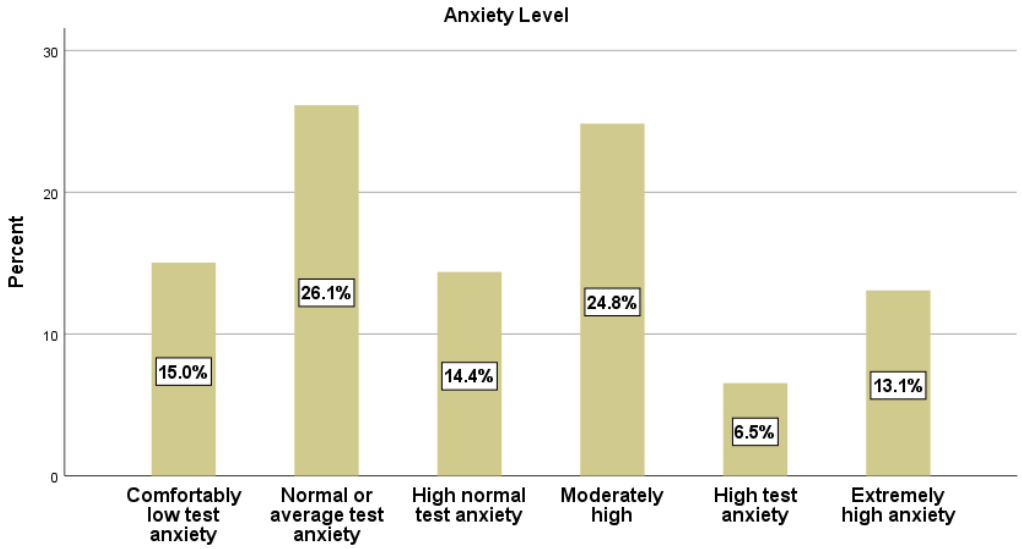

Figure (1): Anxiety level of the participants.

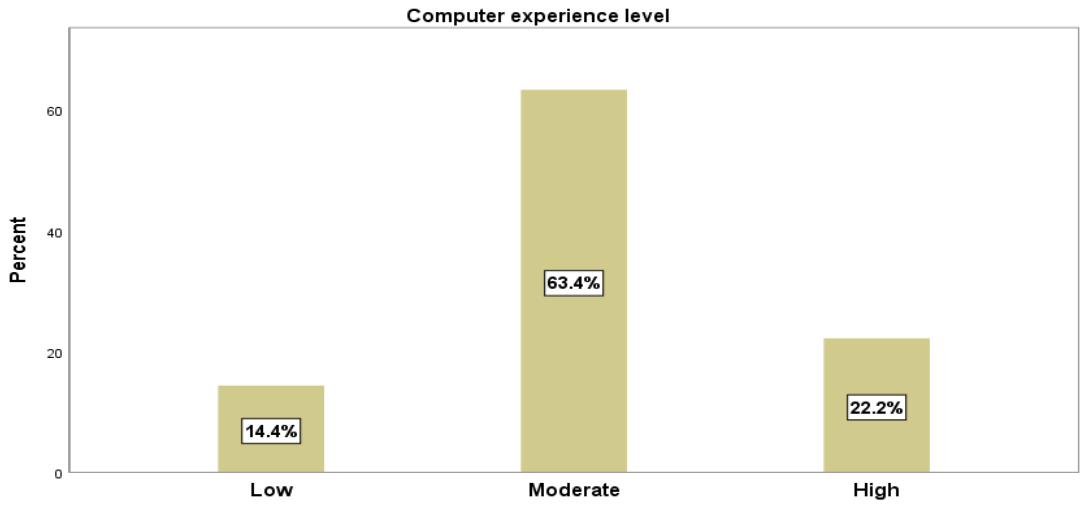

Figure (2): Computer experience level of the participants

Table (2): Different three types of obstacles

Variables	Not present		Present to some extent		Always present	
	n.	%	n.	%	n.	%
Personal obstacles						
Not studying the whole entire exam's material	64	41.8	36	23.5	53	34.6
Failure to attend the full theoretical lectures	86	56.2	34	22.2	33	21.6
lack of computer experience	52	34.0	47	30.7	54	35.3
The feeling that electronic exams will not show the exact level of students.	93	60.8	28	18.3	32	20.9
Inability to organize time during the exam	91	59.5	28	18.3	34	22.2
Inability to focus while reading on the screen	65	42.5	36	23.5	52	34.0
The difficulty using the exam platform	95	62.1	28	18.3	30	19.6
I fear of electronic exams more than paper	71	46.4	36	23.5	46	30.1
Teaching obstacles						
The choices are very similar	56	36.6	35	22.9	62	40.5
Difficulty of the questions	40	26.1	65	42.5	48	31.4
The exam is difficult because of many exam models.	78	51.0	41	26.8	34	22.2
Teaching methods did not cover the curriculums sufficiently.	75	49.0	48	31.4	30	19.6
Poor communication between students and lecturers.	78	51.0	33	21.6	42	27.5
The faculty member of the subject is not present during the exam for any explanation.	124	81.0	13	8.5	16	10.5
Faculty members did not prepare students effectively for the exam.	74	48.4	39	25.5	40	26.1
The exams did not take into account the high quality of the design and preparation of the questions.	78	51.0	47	30.7	28	18.3
The final exam score is not expected by the student.	72	47.1	37	24.2	44	28.8
Technical obstacles						
Technical e-learning platform problems.	54	35.3	71	46.4	28	18.3
Unavailability of the Internet.	84	54.9	27	17.6	42	27.5
Poor internet quality.	88	57.5	21	13.7	44	28.8
Not enough space between computer devices	63	41.2	34	22.2	56	36.6
Short exam duration which doesn't commensurate with the length of the exam.	105	68.6	22	14.4	26	17.0
Failure to monitor cheating.	92	60.1	38	24.8	23	15.0
Power failure during the exam	127	83.0	14	9.2	12	7.8

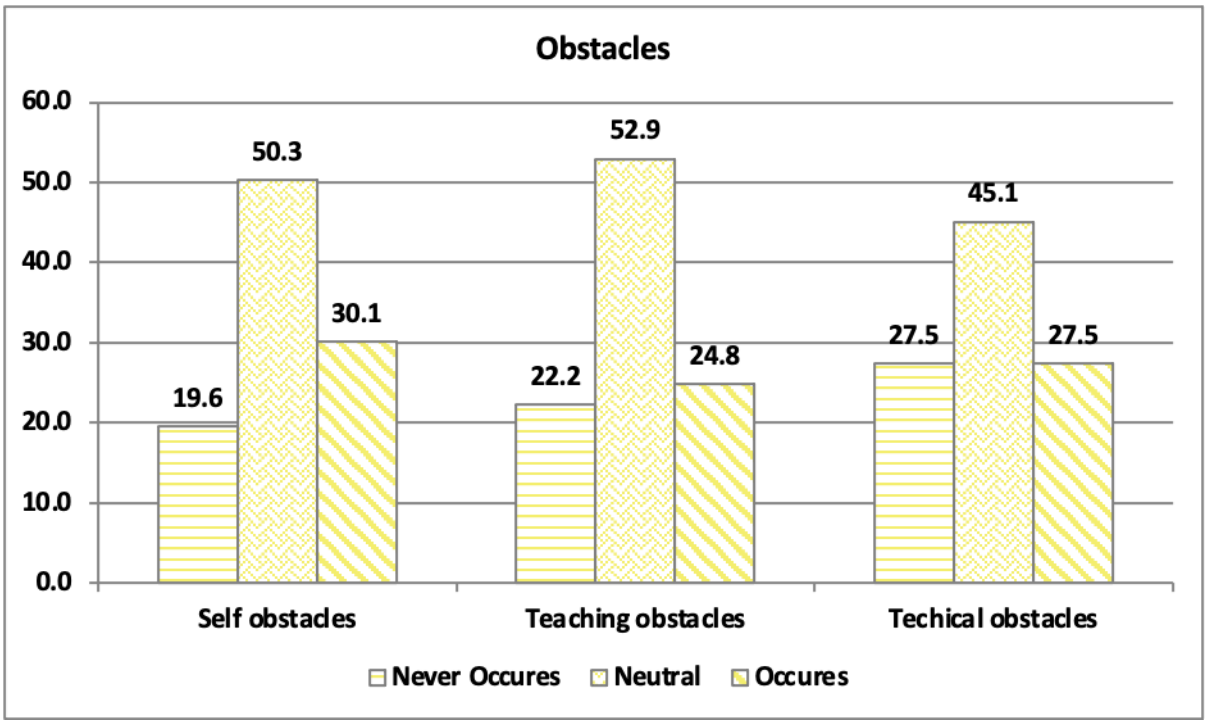

Figure (3) Different types of obstacles

Table (3): Spearman correlation between anxiety, experience, and obstacles among nursing students and their age and sex

Variables		**Age**	**Sex**	**Anxiety Level**
Anxiety Level	r.	- 0.056	0.001	
	P value.	0.492	0.991	
Experience level	r.	0.047	**-0.216****	-0.128
	P value.	0.564	**0.007**	0.114
Personal obstacles	r.	0.011	0	**0.578****
	P value.	0.895	0.997	**0.001**
Teaching obstacles	r	-0.106	-0.009	**.388****
	P value.	0.19	0.911	**0.001**
Technical obstacles	r.	-0.126	0	**0.375****
	P value.	0.121	1	**0.001**
Total obstacles	r	**-.161***	-0.076	**0.457****
	P value.	**0.047**	0.353	**0.001**

*. Correlation is significant at the 0.05 level.

**. Correlation is highly significant at the 0.01 level.

Table (4): Comparing participants' anxiety levels between personal data to personal characteristics, Experience level, and Obstacles.

Variables	Comfortably low test anxiety		Normal or average test anxiety		High normal test anxiety		Moderately high		High test anxiety		Extremely high anxiety		Kruskal-Wallis H	P-value
	n.	%	n.	%	n.	%	n.	%	n.	%	n.	%		
Age														
21	0	0.0	4	2.6	0	0.0	2	1.3	0	0.0	2	1.3		
22	11	7.2	30	19.6	16	10.5	22	14.4	10	6.5	12	7.8	14.041	0.015*
23	12	7.8	6	3.9	4	2.6	12	7.8	0	0.0	4	2.6		
24	0	0.0	0	0.0	2	1.3	2	1.3	0	0.0	2	1.3		
Sex														
Male	8	5.2	18	11.8	4	2.6	18	11.8	2	1.3	8	5.2	7.383	0.194
Female	15	9.8	22	14.4	18	11.8	20	13.1	8	5.2	12	7.8		
Experience level														
Low	0	0.0	6	3.9	2	1.3	8	5.2	0	0.0	6	3.9		
Moderate	17	11.1	26	17.0	14	9.2	22	14.4	6	3.9	12	7.8	10.305	0.067
High	6	3.9	8	5.2	6	3.9	8	5.2	4	2.6	2	1.3		
Obstacles														
Not present	14	9.2	6	3.9	0	0.0	0	0.0	2	1.3	2	1.3		
Present to some extent	9	5.9	28	18.3	16	10.5	30	19.6	4	2.6	6	3.9	41.004	0.001**
Always present	0	0.0	6	3.9	6	3.9	8	5.2	4	2.6	12	7.8		

* Correlation is significant at the 0.05 level.

** Correlation is highly significant at the 0.01 level.

Discussion

This study assessed the relationship between exam anxiety, computer experience, and obstacles (personal, teaching, technical) for nursing students who had under taken electronic exams. Previous studies' findings support that the area of electronic exams or computer-based test still needs further exploration to expand the understanding of student anxiety related to electronic exams and associated factors, especially after the adoption of e-learning and electronic evaluation of the student's performance (Hassan٢٠٢٢ و, Woldeab, & Brothen, 2019). So, this study aims to assess the relationship between electronic exam anxiety, computer experience, and obstacles for nursing students who had under taken electronic exams.

The study included 153 fourth-year nursing students at the Faculty of Nursing, South Valley University at Qena governorate, Egypt. This is the 1st academic year for them to do electronic exams. They aged from 21 to 24 years, 95 students out of 153 were females and the rest (58) were males. Only one-fifth of participants reported comfortably low test anxiety levels and the rest confirmed that they had different levels starting from normal or average test anxiety to extremely high anxiety.

The current findings are consistence with the findings of the study done in Jordan and indicated that remote E-exams appeared as more stressful in almost one-third of all medical students, while in-campus exams were reported as being more stressful by around one-quarter of students (Elsalem, et al. 2020). Also, our findings are in the same line with the findings of the quasi-experimental study at Golestan University of Medical Sciences, Iran which confirmed that nursing students' test anxiety score was higher in the computer-based test group than paper-based test group (Kolagari, et al. 2018). Another study in Texas done by Washburn S.E. revealed that 85% of the students stated that they experienced additional anxiety related to the electronic exam and believed that they would continue to experience that anxiety with subsequent electronic exams (Washburn, et al, 2017).

Fortunately, the majority of the participants had moderate to high computer experience so they are familiar with using the computer during exams. This finding may explain the absence of the correlation between electronic exam anxiety levels and the computer experience level of the participants "answers the 1st study question".

Almost one-third of all participants mentioned that the obstacles faced them during electronic exams included: "not studying the whole entire test material, lack of computer experience, Inability to focus while reading on the screen, I fear electronic exams more than paper, the choices are very similar, the difficulty of the questions, and no enough space between computer devices" are always present obstacles. Furthermore, dividing the obstacles into three types (personal, teaching, and technical obstacles) gives more clear insight that more than one-half of the participants suffered

from the presence of personal, and teaching obstacles. These different three types of obstacles correlated positively with the electronic exam anxiety levels. In addition, there was a positive correlation between the total score of all obstacles and the electronic exam anxiety levels "this answers the 2nd study question". This means that increasing the presence of obstacles increases the anxiety level among students.

These results are in agreement with a previous study conducted by Elsalem, et al. (2020) who reported that a significant association was observed between students' experience of stress during exams and all studied factors, except not studying the whole exam material and whether the exam is more than one form. Among these factors, technical problems related to the E-exam platform or internet connections were both reported as factors contributing to stress in approximately two-thirds of students who considered remote E-exams more stressful, compared with around 40% of students who considered in-campus exams as being more stressful. In addition, the previous study by Washburn, et al (2017) confirmed that most of the electronic exam anxiety appeared to result from technical concerns.

The findings indicated that the electronic exam anxiety levels didn't affect by sex and these findings are supported by Sreedevi's (2016) study which reflected that there is no statistically significant difference between females and males in exam stress levels while Babar's (2015) study confirmed that female students had higher stress scores than males concerning personal issues, academic performance, educational environment and learning of clinical skills.

Finally, our results indicated that the electronic exam anxiety levels do not correlate with age. This can be explained by the closeness of participants' age which ranged from 21 to 24 years, while contradicts Sreedevi's (2016) study reported different findings which showed that stress levels were more common in the students aged ≤18 years when compared with those aged older than 18 years.

Conclusion: Based on our results, it can be concluded that computer experience level did not statistically associate with exam anxiety levels while personal, teaching, and technical obstacles can increase exam anxiety levels.

Recommendations:

1. Pre-electronic exams adequate orientation should be done for nursing students who are first-time apply electronic exams.
2. Faculty of Nursing should organize training programs for students on how to overcome electronic exams personal obstacles.
3. All considerations should be given during subject teaching with an effective application for adopted teaching strategy to avoid electronic exams teaching obstacles.
4. Adequate check for internet, exam platform, software, hardware, and other causes related to technical obstacles.

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