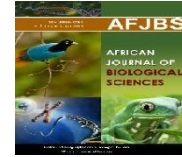




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Attitude of Nursing School Students Regarding Telenursing in Sharkia Governorate

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Abstract: Tele-nursing is considered one of the most important technological events of the late (twentieth) century as the gateway to modern nursing care. The aim of tele-nursing is to improve client safety, quality of care, and is considered a quick access to nursing care by overcoming the geographical barriers. The study aimed to assess the attitude of nursing school students regarding telenursing. A descriptive, cross-sectional research design was utilized. The study was conducted at Sherief Omar, Fakous, Abu Kaber, Al-Husseiniyah, and Kafer Saker School. A simple random sample of 400 students from these settings was used. Two tools were used in this study to collect the data. Tool I: A structured interviewing questionnaire which consisted of nursing students' demographic characteristics and Technology Usage of the Nursing School Students. Tool II: questionnaire to measure attitude of nursing students regarding telenursing. The study revealed that 95.75% of students used the internet for communication through their smartphones. Furthermore, 44.25% had a positive attitude regarding telenursing and demonstrates a highly statistically significant association between the total attitudes toward telenursing among nursing students and their age, educational level ($p=0.004$) and social level ($p=0.001$). The study concluded that over two-fifths of the nursing students had a positive attitude toward telenursing. The study recommended holding educational programs for nursing school students to improve their attitudes regarding telenursing.

Keywords: Attitude, Nursing students, Telenursing

Introduction

The evolution of Information Communication Technologies (ICTs) has significantly contributed to the global expansion of nursing care service delivery, revolutionizing client care through

innovative methods (Nejadshafiee et al., 2020). In healthcare, the integration of computer use, electronic communication, information technology and telenursing has brought about fundamental changes in healthcare processes which enabling

nurses to upgrade their nursing services and reach the client welfare **(Hareiman& Mtshali, 2019)**.

Telenursing is a long-distance health service conducted using information technology which includes the delivery, management and coordination of care, and services provided through information and telecommunication technologies **(Oladeji et al., 2022)**. Applications of telenursing represents an important way for reaching modern nursing care and overcoming geographical barriers especially in case of a disaster or a public health emergency through Information and Communication Technology systems (ICT) as telephones, fax, internet, soft applications as Facebook, WhatsApp, audio and video conferencing, and computer system **(Alipour & Haghghi, 2021)**. Moreover, telenursing encompasses a range of actions, from the exchange of medical notes and phone calls to the transmission of images through cameras and computers **(Ganapathy, 2023)**.

Nursing students are an intrinsic part of healthcare system who should be prepared for the use of technology from the start of education to be prepared for "high-touch, high technology" patient care **(Terkes et al., 2019)**. Recognizing the undergraduate nursing students' perspectives and receptiveness toward telenursing can significantly influence its integration in the upcoming shift to a telehealth era **(Malhotra et al., 2020)**.

Furthermore, understanding student attitudes towards technology is paramount, as these attitudes significantly influence course engagement, subsequently impacting learning outcomes. Recent studies focusing on the attitudes of nursing students regarding technology use have highlighted an overall positive towards technology **(Leonardsen et al., 2023)**.

Telenursing today allow community health nurses (CHN) to reach and interact with clients to address the need of rural and urban population who live in distance, inaccessible and remote areas. Through telenursing care, community health nurses play critical roles in regulating the quality of nursing care and improving healthcare outcomes **(Butta et al., 2023)**.

Community health nurses engaged in telenursing persist in utilizing the established steps of the nursing process assessing, planning, implementing,

evaluating, and documenting nursing care. In addition to providing information, referrals, education, and support **(Ghorbanzadeh et al., 2017)**.

Significance of the study:

Telenursing represents a significant advancement in modern nursing care, symbolizing a crucial technological leap in late twentieth-century healthcare. By overcoming geographical barriers, telenursing enhances access to nursing services, thereby improving client safety and healthcare quality **(Weheida et al., 2022)**. Despite increasing support, the effective adoption of telenursing faces challenges in regions like Egypt, including limited experience, resistance to change, and equipment availability issues **(El Sayed, 2017)**. On the other hand, Nursing school students, integral to the healthcare system, should be aware of using information and communication technology in the nursing practice and be equipped with the technological skills **(Koltsida and Jonasson, 2021)**. Moreover, the effective implementation of telenursing influenced by various factors such as nursing students' perspectives and attitudes toward technology **(Esthita et al., 2017)**. Consequently, an appropriate telenursing education is required to provide the dynamic development of nursing **(Poreddi et al., 2021)**. Additionally, providing comprehensive education on telenursing also helps to address any nursing students' misconceptions or negative opinions regarding telenursing **(Ghorbanzadeh et al., 2017)**. Therefore, assessing nursing students' attitudes and perceptions are imperative for the stable integration of innovative nursing health care technologies **(Mun et al., 2024)**.

Aim of the study:

This study aimed to assess attitude of nursing school students regarding telenursing.

Research questions:

1. What is the nursing school students' attitude regarding telenursing?
2. Is there a relation between nursing students' attitude toward telenursing and their characteristics?

Subjects and methods:

Research design:

A cross sectional descriptive design was used.

Study setting:

The current study was conducted in five secondary nursing schools. These schools were Sherief Omar, Fakous, Abu Kaber, Al-Husseiniyah, and Kafer Saker, which randomly selected from nursing schools in Sharkia Governorate.

Study subjects:

The study sample composed of 400 female students from the above mentioned nursing schools.

Tools for data collection:

Two tools were used in this study to collect the data:

Tool I: Self-administered Questionnaire: Based on literature review, researchers developed the questionnaire and wrote it in a simple clear arabic language; it composed of two parts to assess the following:

➤ **Part I: Socio-demographic Characteristics of the Nursing School Students** which included 16 questions concerning the socio-demographic characteristics of the nursing school students, adapted from **El-Gilany et al. (2012)**. It included questions on age, gender, residence, educational level, parents' educational levels and jobs, family income, and house type. Additionally, this section include number of family members, number of rooms in the house, home condition, family property, family healthcare places, and socio-economic level.

➤ **Part II: Technology Usage of the Nursing School Students:** This section concerned the nursing students' use of technology and included eight questions on topics such as owning a mobile phone, type of mobile phone, computer access, internet access, daily internet usage, internet connection methods, training courses on telenursing, and names of courses on telenursing.

Tool II: Self-administered Student Attitude Questionnaire Regarding Telenursing : It was concerned with scale to measure the attitude of nursing students about telenursing adapted from **(Glinkowski et al.,**

2013) and modified by the researchers which included 12 items covering various aspects of telenursing.

Scoring system for nursing students' attitude:

A 3-point Likert scale was employed, with responses of "Agree", "Uncertain", and "Disagree" scored as 2, 1, and 0, respectively, for attitude scoring. The scoring was reversed for negative statements. The scores of the items were summed, and the total was divided by the number of items, yielding a score. These scores were then converted into a percentage score with attitudes classified as follows: Positive: >70%, and Negative: ≤70%.

Validity & Reliability:

A panel of three experts assessed the validity: two professors of nursing staff from the community health nursing, and a professor from the Medical and Surgical department, They evaluated the tools for face and content validity, focusing on clarity, relevance, comprehensiveness, and understandability. The tools were then modified according to their feedback and suggestions.

The reliability of the proposed tools was assessed using Cronbach's Alpha test, yielding a score of 0.819 for the attitude questionnaire.

Field work:

Once all official permissions were granted to proceed with the study, the researcher visited the study settings and met with students individually to explain the study's aim, process and data collection forms. Verbal approval consent was obtained from students to participate in the study. After that, the researcher asked students to fill in the questionnaire. Each student took between 35 and 40 minutes to complete the questionnaire which covered socio-demographic characteristics, technology use, and attitudes regarding telenursing. The actual field work was carried out from October 2023 and continued through March 2024. The researcher conducted fieldwork two days per week, on Sundays and Wednesdays from 9:00 a.m. to 3:00 p.m.

Pilot study :

The pilot study was carried out on a sample of 40 students, representing 10% of the study sample, to test the applicability of the constructed tools and the clarity and comprehensiveness of the questions related to students' attitudes regarding telenursing.

The necessary modifications were done according to the results of pilot study. The nursing school students who involved in the pilot study were excluded from the main study sample.

Administrative and Ethical consideration:

Formal approval to carry out the study was granted by submission of official letters from the Faculty of Nursing, Zagazig University, to the directors of the selected nursing schools, explaining the aim of the study to obtain their permission and cooperation.

The research was approved by the Ethics Committee at the Faculty of Nursing, Zagazig University. All necessary official permissions to conduct the study were secured. The researcher provided each student with a simple explanation of the study's aim to obtain their oral consent to participate. Students were given the opportunity to refuse the participation and they were notified that they could withdraw at any without needing to justify their decision, and any questions raised would be answered. Moreover, they were assured that the information would remain confidential and used solely for research purposes, with no harmful effects expected.

Statistical analysis:

All data were revised, coded, and statistically analyzed were performed using the Statistical Package for Social Sciences (SPSS) version 22. Data were presented using descriptive statistics, including mean \pm SD for continuous data and categorical data were expressed in frequencies and percentages. The Chi-square (χ^2) test was employed to determine the relationship between categorical variables.

Statistical Significance of the results:

- Highly significant at p-value < 0.01.
- Statistically significant at p-value < 0.05.
- Non-significant at p-value \geq 0.05.

Results

Table (1) describes the personal characteristics of the nursing school students. 65% of the students were female and 46.5% of them aged 16 years to less than 17 years old with a mean age of 16.06 \pm

1.25 years. Furthermore, the rural residence dominated the study (54.25%) and 46.5% were in the second educational level of nursing school.

Figure (1) displays that 51.25% of the studied nursing school students reported having a low socio-economic class, while only 15.5% of them had a high socio-economic class.

Table(2) illustrates the distribution of the studied nursing school students based on their utilization of technology and their attendance of telenursing courses. Notably, 100% of the participants possessed smartphones, exclusively of the smart type, while only 26.25% of them had computers. Furthermore, 100% of the participants had access to the internet, and 78.75% of them spent more than 4 hours daily using the internet. Moreover, 95.75% of them used the internet for communication through their smartphones. Surprisingly, all participants reported not having training courses related to telenursing.

Table (3) shows that the attitudes of nursing school students towards telenursing are diverse. A notable 46.25% express agreement that telenursing could enhance client care development in the future, while 48.25% believe it could lead to cost savings in healthcare services, and a significant 72.5% agree that it reduces nursing service time. However, there's a neutral stance (46.25%) regarding the integration of telenursing into nursing school curricula. Conversely, skepticism arises as 64.25% doubt the availability of necessary facilities for telenursing services, 65.75% are skeptical about client trust in telenursing-delivered health information, and 61.25% question its efficacy in facilitating healthcare team-client communication. The same table revealed that 55.75% of nursing school students had a total negative attitude toward telenursing, while 44.25% demonstrated a total positive attitude.

Table(4) demonstrates a highly statistically significant association between the total attitudes toward telenursing among nursing students and their age, educational level (p=.004) and social level (p=.001).

Table 1: Personal characteristics of the nursing school students (n=400)

Personal Characteristics	N	%
Age		
15- < 16 Y	94	23.5
16- < 17 Y	186	46.5
17+	120	30.0
Mean±SD	16.06±1.25	
Gender		
Male	140	35.0
Female	260	65.0
Residence		
Urban	183	45.75
Rural	217	54.25
Educational Level in the Nursing School		
First Level	94	23.5
Second Level	186	46.5
Third Level	120	30.0

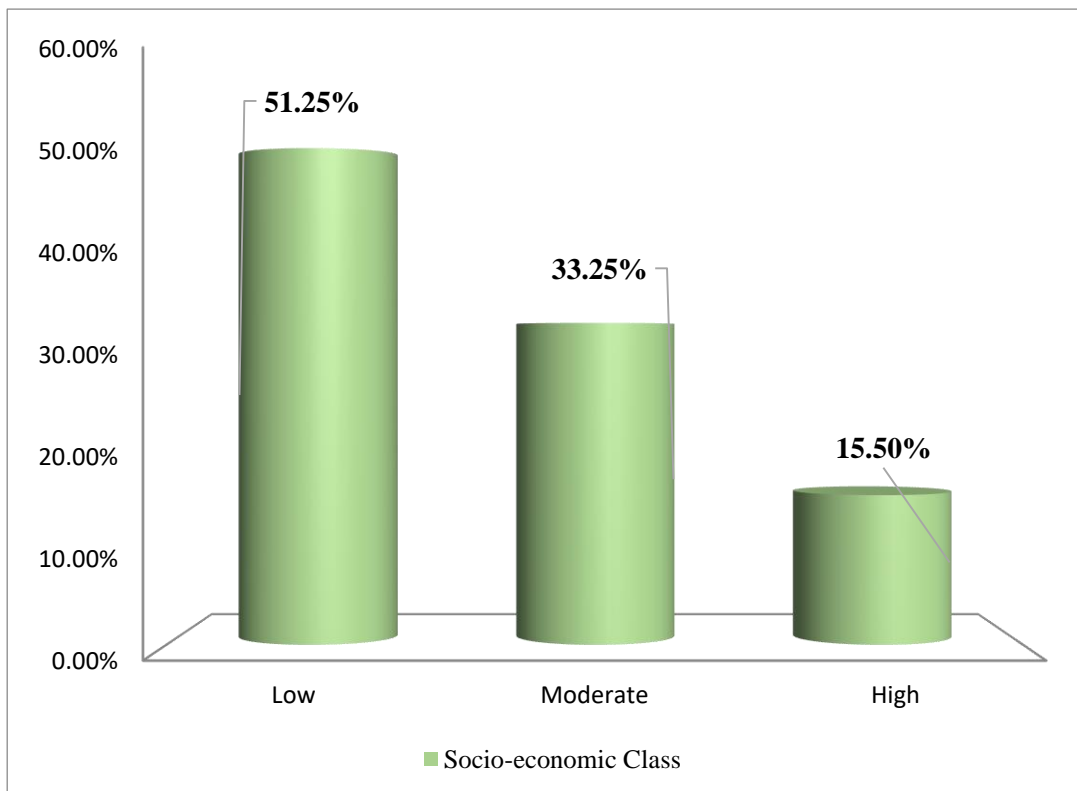


Figure 1: Socio-economic Level of Nursing School Students in the Study Sample (n=400).

Table 2: Distribution of the studied nursing school students according to their use of technology and their telenursing courses (n=400)

Items	N	%
Have a mobile phone		
Yes	400	100.0
No	0	0
Type of mobile phone		
Smartphone (Equipped with internet browsing and applications)	400	100.0
Usual mobile phone	0	0
Have a computer		
Yes	105	26.25
No	295	73.75
Browse the Internet		
Yes	400	100.0
No	0	0
Number of hours do you spend online on the internet daily		
Two hours daily	10	2.5
Four hours daily	18	4.5
More than four hours daily	315	78.75
Do not use the internet daily	57	14.25
Communicate online through		
Through the computer	7	1.75
Through the smartphone	383	95.75
Both	10	2.5
Having Training Courses about Telenursing		
Yes	0	0
No	400	100.0

Table 3: Distribution of the nursing school students according to their attitudes toward telenursing (n=400)

No	Items	Agree		Neutral		Disagree	
		No	%	No	%	No	%
1	" I Believe that telenursing should be added to nursing school curricula."	92	23.0	185	46.25	123	30.75
2	" I Desire to provide telenursing services in the field of nursing care."	154	38.5	167	41.75	79	19.75
3	"I believe that the necessary facilities for providing telenursing services are available in the country"	60	15.0	83	20.75	257	64.25
4	"I believe that nurses using telenursing technology have a positive impact on client care"	49	12.25	166	41.5	185	46.52
5	"I think telenursing could be used as additional development for client care in the future"	185	46.25	122	30.5	93	23.25
6	"I believe that telenursing can be used as a precise means to monitor the quality of nursing care provided to clients."	133	33.25	203	50.75	64	16.0
7	"I believe that clients will trust health information and nursing services provided through telenursing technology"	35	8.75	102	25.5	263	65.75
8	"I believe that the use of telenursing will increase the efficiency of the healthcare team"	78	19.5	121	30.25	201	50.25
Total Attitude Levels Regarding Telenursing		Positive Attitude 44.25%		Negative Attitude 55.75%			

Table 4: Relationship between the nursing school students' socio-demographic characteristics and their total attitudes regarding telenursing (n=400)

Socio-demographic Characteristics	Total Attitude				X ²	P-Value
	Positive N=177		Negative N=223			
	N	%	N	%		
Age 15- < 16 Y 16- < 17 Y 17+	24	13.6	70	31.4	4.980	.004**
	40	22.6	146	65.5		
	113	63.8	7	3.1		
Gender Male Female	82	46.3	58	26.0	1.213	.059
	95	53.7	165	74.0		
Residence Urban Rural	76	42.9	107	48.0	.968	.534
	101	57.1	116	52.0		
Educational level First Level Second Level Third Level	24	13.6	70	31.4	4.980	.004**
	40	22.6	146	65.5		
	113	63.8	7	3.1		
Social level Low Moderate High	33	18.6	172	77.1	7.023	.001**
	87	49.2	46	20.6		
	57	32.2	5	2.4		
Fathers' educational level Illiterate Basic education Secondary education Two-year institute University education Postgraduate studies	5	2.8	8	3.6	1.022	0.067
	18	10.2	28	12.6		
	35	19.8	74	33.2		
	39	22.1	52	23.3		
	78	44.1	59	26.4		
	2	1	2	0.9		
Mothers' educational level Illiterate Basic education Secondary education Two-year institute University education Postgraduate studies	10	5.6	17	7.6	0.927	0.184
	18	10.2	38	17.1		
	44	24.9	59	26.5		
	52	29.4	40	17.9		
	50	28.2	65	29.1		
	3	1.7	4	1.8		
Family monthly income Insufficient Sufficient for daily expenses only Sufficient for daily expenses and emergencies Sufficient and saved	100	56.5	92	41.3	1.567	0.098
	20	11.3	37	16.6		
	17	9.6	34	15.2		
	40	22.6	60	26.9		

*Significant at p < 0.05. **Highly significant at p < 0.01. Not significant at p>0.05

Discussion:

The entire world is increasing potential to use information and communication technology at all fields and also nursing, to improve the quality of nursing services. Information and communication technology (ICT) advancements have given nurses new resources and platforms to connect with clients remotely, evaluate their health, impart knowledge, and offer assistance (Khraisat et al., 2023).

Applications of telenursing represents an important way for reaching modern nursing care and overcoming geographical barriers especially in case of a disaster or a public health emergency (Alipour & Haghghi, 2021).

In order to creatively prepare for this rapidly growing field, it is crucial to understand how nursing students view telenursing in this hyperconnected world. Understanding undergraduate nursing students' perspectives and receptiveness toward telenursing can significantly influence its integration in the upcoming shift to a telehealth era (Riley et al., 2021). Thus, this study aims to assess attitude of nursing school students regarding telenursing in Sharkia Governorate.

Based on the findings of the current study, 400 nursing school students with a mean age of 16.06 ± 1.25 years were included. More than half of the nursing students lived in rural areas. This result can be attributed to the fact that 77% of Sharkia's population resides in rural areas (Ministry of Communications and Information Technology, 2024). Conversely, Malhotra et al. (2020) studied telemedicine among medical and allied healthcare students in a private institution in Iran and revealed that most of the students lived in urban areas. This difference may be due to variations in geography and population characteristics. From the investigator's perspective, nursing students in urban areas have greater opportunities to acquire experience and attitude about nursing because of the higher number of hospitals and clinics, as well as the availability of job opportunities in cities.

Regarding the socio-economic level of the nursing school students in the study sample, the present study clarified that more than half of the students belonged to a low socio-economic class, reflecting the overall low socio-economic status of the country. This finding contrasts with Ali (2023), who studied the awareness and attitudes of pediatric nursing students, nurses, and adolescents regarding advanced devices and virtual nursing in Benha City, Egypt, and found that 44% of the studied sample had a good economic status. This difference may be attributed to discrepancies in study design and sample size.

Regarding technology use, the current study showed that all of the nursing students had smartphones. This result can be attributed to the rapid global spread of mobile technology, making it an integral part of daily life. Additionally, it reflects the current generation of nursing students' ability to use new communication technologies. This finding aligns with El-Ramedy (2020), who conducted a study titled "Nursing Students' Perception Regarding Use of Social Networking in Nursing Education and Its Effect on Their Engagement, Egypt," and found that most of the studied nursing students had smartphones. Similarly, Fathizadeh et al. (2020), in their study "Telenursing Strategies in Iran: A Narrative Literature Review," reported that 74% of the studied sample indicated that the telephone was the most common method for telenursing.

Regarding computer access, the current study highlighted that about three-quarters of the nursing students did not have computer access. This might be attributable to the students' low socio-economic status and limited proficiency in using computers. In contrast, Abd-Aleem (2019) at Port Said University observed that 54.4% of the nursing students had computer access. Similarly, Elewa and Guindy (2017), in their study on nursing students' perceptions and educational needs regarding nursing informatics at the Faculty of Nursing, Beni Suef University, found that the majority of the sample had computer access. This discrepancy might be due to the greater need for computer access among university nursing

students and their higher proficiency in using computers.

Regarding internet access, the current study demonstrated that all of the nursing students had internet access. This result reflects the widespread availability of internet connections in Egypt and the necessity for nursing students to use the internet for their studies and to explore the world. Similarly, **Bdair (2024)** reported that 97.4% of the studied sample in Saudi Arabia had internet access. In line with this, **Poreddi et al. (2021)** in India indicated that 96.7% of their studied sample had internet access. Furthermore, **Barbara and Samaria (2020)** found that the majority of Indonesian nursing students in their study had internet access, even though technology use did not correlate with their perception of telenursing competence.

Regarding the number of hours spent using the internet per day, the findings of the current study showed that more than three-quarters of the nursing students spent more than four hours per day online. This reflects their need for the internet for various purposes such as studying, social media, online communication, and entertainment. Similarly, **Hussain et al. (2023)** in Saudi Arabia found that 62.1% of the studied nursing students used the internet for more than three hours per day. **Poreddi et al. (2021)** in India reported that 73.3% of the nursing students used the internet for more than three hours per day. Likewise, **Abd-Aleem (2019)** at Port Said University demonstrated that more than half of the studied nursing students used the internet for more than three hours per day.

Regarding the way of connecting to the internet, the results of the present study clarified that most of the nursing students connected to the internet through their mobile phones. This is likely due to the students' low socio-economic status, which may limit their ability to afford computers with internet access. Additionally, mobile phones are preferred due to their convenience, as they are smaller and easier to carry than computers. This result is similar to the findings of **Terkas et al. (2019)**, who studied "Determination of Nursing Students' Attitude Towards the Use of Technology" in Turkey and emphasized that 87.2% of the

studied sample connected to the internet through mobile phones.

Regarding training courses on telenursing, the present study found that none of the nursing students had received such training. This lack of training may be attributed to the limited availability of telenursing courses, as the adoption of telenursing is still in its early stages in the country. In contrast, **Mohamed et al. (2023)**, in a study at university isolation hospitals in Mansoura and Kafr El-Sheikh, reported that 42.5% of nurses had attended training courses on telenursing. This higher percentage could be due to mandatory institutional regulations regarding telenursing training courses, which are particularly critical for isolation hospitals.

In addressing the research objective of determining the attitudes of nursing school students towards telenursing, particularly regarding its inclusion in nursing school curricula, the findings of this study revealed that more than two-fifths of the nursing school students surveyed held a neutral attitude towards integrating telenursing into the nursing curriculum. This neutrality in attitude could potentially be attributed to variations in the readiness of nursing students to embrace new technologies and methodologies in nursing education. This finding is consistent with the results of a study conducted by **Ranjbar et al. (2021)** in Iran, which explored the attitudes of nurses and midwives towards telenursing. In that study, 44.9% of the participants expressed neutrality regarding the necessity of incorporating telenursing into nursing education. Also, a study conducted by **Dangyang (2017)** in Nigeria on the knowledge and practice of telenursing among nurses highlighted that the majority of participants expressed a need for telenursing to be incorporated into nursing practice in the study area.

Regarding the attitude towards using telenursing services in the field of nursing care, the findings of the current study revealed that more than two-fifths of the nursing school students held a neutral attitude towards the utilization of telenursing in nursing care. These results suggest a potential influence of the nursing students' limited knowledge about information and communication

technology (ICT) and the benefits of telenursing on their attitudes. Additionally, a minority of students may harbor fears related to job displacement due to advancements in ICT or exhibit resistance towards accepting change, which could contribute to their neutral stance on utilizing telenursing services. This indicates that the readiness to embrace telenursing among some nursing students is still evolving. This finding is in agreement to a study done by a **Elsayed and Ebrahim (2018) at Benha University Hospital**, who implemented an educational program on telenursing for nursing interns and found that approximately 58.2% of participants expressed a mixed attitude ("sometimes") towards using telenursing services in the field of nursing care. In contrast, a study by **Dangyang (2017)** among nurses in Nigeria demonstrated a much higher acceptance of telenursing, with 84.4% of participants expressing a desire for its implementation in nursing practice, and 87.8% indicating belief in the positive impact of implementing telenursing. This disparity may be attributed to differences in participants' levels of knowledge about telenursing and their eagerness to embrace new trends in clinical practice.

In the context of the current study, it was found that more than three-fifths of the nursing students surveyed disagreed with the facilities required for providing telenursing are readily available in the country. This trend may be attributed to several factors, including limited access to appropriate technology and the absence of widespread adoption of telenursing applications in Egyptian hospitals. Contributing to this situation are various factors such as insufficient funding, lack of supportive policies, economic challenges, and inadequate power supply. These findings are supported by **Raj (2019)**, who conducted a study titled "Nurses' knowledge and attitude toward using mobile health applications: a study in **Finland and Lithuania**." The study revealed that 48% of the participants strongly agreed that there was a lack of infrastructure and insufficient access to Wi-Fi. Additionally, 59% of the participants expressed concerns about the reliability of software, and 58% found mobile apps or devices to be complicated to use.

Concerning the attitude that telenursing technology have a positive impact on client care, the existing study results showed that more than two fifth of the studied nursing students disagreed that telenursing technology have a positive impact on client care. The reason behind may be due to nursing school student's unknowledgeable about telenursing and their less exposure to telenursing applications. In this respect, **Raj (2019)** who carried out a study among nurses in **Finland and Lithuania** confirmed that 47% of the participants agreed that mobile health applications do not have any added value in nursing care. On the contrary, **Abd Ellatif et al. (2023)** conducted a study on knowledge and attitude of faculty of nursing students regarding telenursing at **Benha University in Egypt** and concluded that 49.5% of the studied nursing students agreed that telenursing technology have a positive impact on client care.

Additionally, **Alqurashi et al. (2023)** carried out a study among health care practitioners regarding telemedicine during COVID-19 in **Saudi Arabia** and stated that 44% of the participants disagreed that telemedicine technology reduces the effectiveness of client care. The main reason for this could be attributed to the fact that faculty nursing students and health care practitioners are more knowledgeable about telenursing than nursing school students.

With reference to the attitude that telenursing can be used as an additional development for client care in the future, the concurrent study revealed that about half of the studied nursing school students agreed that telenursing can be used as an additional development for client care in the future. Possible explanation of such result is that studied nursing students are seeking to use modern technology in providing healthcare to cope with global change in healthcare system. In congruence with this, **Khraisat et al. (2023)** conducted a study among nursing students in **Jordan** and denoted that 53.3% of the studied sample agreed that the use of telenursing could be used as an additional form of client care in the future.

On the other extreme, **Dangyang (2017)** carried out a study among nurses in **Nigeria** and

indicated that 68.2% of the participants disagreed that telenursing may not bring any extra value to existing nursing practice before its implementation which signified that more value will be achieved in nursing practice with telenursing. This difference might be credited to many factors such as the discrepancies in cultures between countries or the variations in the study setting, the sample size as well as the age groups and the practical experience of the studied sample.

The results of the current study illustrated that half of the nursing school students surveyed had a neutral response regarding the use of telenursing as an effective means to monitor the quality of nursing care provided to clients. This is most likely due to the students' average knowledge levels about telenursing or their resistance to accepting change. Consistent with this, **Elsayed and Ebrahim (2018) at Benha University Hospital** implemented an educational program about telenursing for nursing interns and found that 47.3% of the participants had a sometimes positive attitude towards using telenursing as a precise tool for quality control during the preprogram phase. These findings contradicted **Alqurashi et al. (2023)**, who conducted a study on the perception of healthcare practitioners regarding telemedicine during COVID-19 in Saudi Arabia and found that 62% of the sample agreed that telenursing is an effective technology for monitoring client care. Similarly, **Raj (2019)** conducted a study among nurses in Finland and Lithuania and reported that 73% of the sample agreed that using mobile health applications improves the quality of nursing care. Moreover, **Dall (2014)** studied "Factors Influencing Nurses' Attitudes towards Information Technology in Nursing Practice in Western Australia" and observed that 45.5% of the participants agreed that the use of Information Technology in healthcare improves the quality of client care. This difference might be related to the positive previous experiences with telenursing and the accessibility of resources and infrastructure in these countries, which facilitate the effective implementation of telenursing.

Based on the current study results, about two-thirds of the nursing students disagreed that clients will trust health information and nursing

services provided through telenursing technology. This perception may stem from the students' feelings of uncertainty. Similarly, **Dangyang (2017)** conducted a study among nurses in **Nigeria** and found that 64.8% of the participants believed that telenursing may not be very important due to its limitations. In contrast, **Elsayed and Ebrahim (2018) at Benha University Hospital** implemented an educational program about telenursing for nursing interns and concluded that 45.5% of the participants in the preprogram phase sometimes had a positive attitude, believing that clients would trust advice or information from medically related telenursing applications. The discrepancy between these results might be due to differences in study design and sample size.

According to the results of the current study, half of the nursing students disagreed that the use of telenursing will increase the efficiency of the healthcare team. This might be explained by the students' fear that telenursing technology could control the field of nursing, thereby decreasing the need for nursing manpower. This result contrasts with **Martich (2016)**, who wrote about telehealth nursing tools and strategies for optimal client care in **New York** and stated that telenursing would increase the efficiency and performance of the healthcare system. Similarly, **Dangyang (2017)** conducted a study among nurses in **Nigeria** and highlighted that 71.9% agreed that confidence, competence, and skills are acquired with telenursing.

Additionally, Raj (2019) carried out a study among nurses in **Finland** and Lithuania and found that 38% and 39% of the participants, respectively, agreed that using mobile health applications improves job performance and effectiveness. This difference might be attributable to cultural differences between Egypt and other countries. Additionally, unlike nursing school students, nurses in these countries have the willingness to change and an attitude geared towards ensuring efficiency.

Considering the attitude that telenursing can facilitate communication between the healthcare team and clients, the findings of the present study showed that three-fifths of the

nursing students disagreed with this notion. This is most likely due to inadequate knowledge of ICT, unawareness of telenursing, or previous negative experiences regarding collaboration within the healthcare team. This finding contrasts with studies by **Bayomee et al. (2020)** and **Kumar et al. (2022)**, which indicated that 68.4% and 66.5% of their respective samples agreed that telenursing can enhance communication among healthcare providers, contributing to client well-being. The discrepancy between these results might be due to differences in the tools or questionnaires used, the study sample's characteristics, their educational levels, and variations in regulations, training, guidance, and working conditions across institutions. This also underscores the impact of reducing transportation burdens and providing regular condition checks with useful advice or nursing care, which can improve communication and collaboration among nurses and other disciplines, ultimately benefiting client well-being. In light of the existing study results, more than two-fifths of the nursing students agreed that **telenursing can reduce the cost of healthcare services**. This might be due to telenursing reducing financial barriers and increasing efficiency by reaching clients without added costs, saving time and resources, and eliminating the need for travel. This finding aligns with **Esthita et al. (2017)**, who found that 39% of physicians in Bangladesh agreed that ICT in healthcare reduces the financial burden on the government. Similarly, **Ranjbar et al. (2021)** mentioned that 43.2% of nurses and midwives in Iran disagreed that telenursing increases client care costs. A recent study by **Alqurashi et al. (2023)** observed that 48% of healthcare practitioners in Saudi Arabia disagreed that telemedicine raises hospital expenses, and 65% agreed it reduces client care costs. In the same contrast, **Poreddi et al. (2021)** reported that 61.2% of nursing interns in India agreed that telenursing reduces client care costs.

With reference to the attitude that the use of telenursing help reduce the time required for a nurse to perform nursing services, the current study revealed that about three-quarters of the nursing students agreed that telenursing reduces the time needed for nursing services. This reflects

the fact that telenursing allows nurses to work remotely, saving time and resources associated with office space. It offers the flexibility to plan without temporal and spatial constraints, resulting in enhanced nursing care. In this respect, **Kumar et al. (2022)**, in their study titled "Assessment of Knowledge and Attitude of Healthcare Professionals Regarding the Use of Telemedicine: A Cross-Sectional Study from Rural Areas of Sindh, Pakistan," clarified that 86.3% of the sample agreed that telemedicine is time-saving for healthcare professionals. Similarly, **Alqurashi et al. (2023)** conducted a study about telemedicine among healthcare practitioners in Saudi Arabia and illustrated that 72% and 67% of the sample, respectively, agreed that the use of telemedicine saves time and provides faster care.

The findings of the current study emphasized that about half of the nursing students were neutral about **the safety of recording client information through telenursing technology**. This result might be attributed to the nascent stage of telenursing adoption in the country and inadequate information about technology-based infrastructure, which increases fear of using new technology like telenursing. This method of providing healthcare services is not yet popular in Egypt. These results are consistent with **Abd Ellatif et al. (2023)**, who studied the knowledge and attitude of nursing students regarding telenursing at **Benha University in Egypt** and found that 52% of the sample were neutral about the security of client information via telenursing.

Regarding the total attitude levels of the studied nursing school students about telenursing, the current study concluded that more than half of the students had negative overall attitude scores regarding telenursing. Possible explanation of such result is that the full benefits, components and importance of using telenursing application in healthcare system is not yet fully understood by the nursing school students as well as inadequate information about technology-based infrastructure or their fear from nursing job losses within health care organization. This called for adequate training and education for nursing students to acquire full knowledge of telenursing in order to improve attitude toward telenursing.

Similarly, **Mohamed et al. (2023)** found that 72.4% of participants had negative attitudes in the pre-program phase of their educational program on telenursing at isolation hospitals in **Mansoura** and **Kafr El-Sheikh**.

In contrast, **AbdEllatif et al. (2023)** also found that 65.4% of nursing students at **Benha University** had positive attitudes towards telenursing, possibly due to factors like perceived usefulness, social influence, self-efficacy, and innovativeness.

Regarding the relationship between nursing students' attitude toward telenursing and their socio-demographic characteristics, the present study revealed a highly statistically significant association between the students' total attitude levels and their age, with older nursing students exhibiting higher positive attitude levels. This outcome can be attributed to the accumulation of knowledge and experiences with age, which may influence their perspectives and attitudes toward telenursing. Similarly, **Elewa and Guindy (2017)** conducted a study in **Egypt** and found a statistically significant relationship between nursing students' total attitude levels and their age, supporting the notion that age correlates with attitude development in nursing students regarding telenursing.

The current study revealed a highly statistically significant relationship between nursing students' total attitude levels toward telenursing and their educational level, indicating that higher levels of education were associated with more positive attitudes toward telenursing. This relationship is likely due to education enhancing nursing students' familiarity and perceptions regarding informatics and communication technology. This finding aligns with research by **Khraisat et al. (2023)** in **Jordan**, who also found a statistically significant association between students' perceptions of telenursing and their educational level.

Furthermore, **Park et al. (2024)**, in their study on the status of telenursing and future use intentions in home health care in **South Korea** post-COVID-19, illustrated a statistically significant association between students' perceptions of telenursing and their educational level. These studies collectively

suggest that higher education plays a crucial role in shaping nursing students' attitudes and perceptions toward telenursing.

Conclusion :

Based on the findings of the current study and the answers to the research questions, it can be concluded that all nursing students owned smartphones and had access to the internet. Additionally, none of the participants reported having received training courses related to telenursing. Additionally, over two-fifths of nursing students had a positive attitude toward telenursing.

Recommendations:

Based on the study's findings, the following recommendations are advocated:

1. Held educational programs for nursing school students to improve their attitudes regarding telenursing.
2. Organize training courses for nursing students focusing on telenursing and its practical applications.
3. Survey on wide range is recommended to confirm the results

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