






# Digital Health Usage and Awareness among Medical Students: A Survey Study

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## Abstract

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**BACKGROUND:** In the era of increasingly expanding digital ecosystem, health misinformation became highly risky, especially the information sources which are non-evidence based. This problem is magnified due to the vulnerability of most internet users, especially the adolescents information seekers who lack health literacy.

**AIM:** The aim of this study is to explore the pattern of digital health usage among medical university students and their level of awareness towards choosing online health information (OHI).

**METHODS:** A cross-sectional study of 480 medical students from 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> academic years, at the Faculty of Medicine, Helwan University, between October 2019 and October 2020. Students took an online structured questionnaire on google forms.

**RESULTS:** Mobile smartphones were the most widely used technological devices by participants. Almost all participants used Internet daily 98.8%, with the highest preference to social media 72.5% and text messaging 74.8%. Seeking health information was a common practice for personal health-related purpose of using Internet 87.1%, despite the lack in checking the reliability of messages and quality of provider. Knowledge about advantages and disadvantages of digital tools was also deficient among participant medical students.

**CONCLUSION:** Despite the high technology adoption among the university medical students, they lack the needed knowledge and skills for proper search, choosing, and evaluation of OHI.

## Background

We are living nowadays a great technological revolution, which is highly improving all fields and aspects of life. This is very obvious in the healthcare discipline, where we find a great merge between digital technologies and health. This includes many digital care programs, which is defined as “Digital Health”. The main goal behind integrating technologies with healthcare systems is to leverage the efficiency of these systems through enhancing the health service delivery to clients, patients, and population [1], [2], [3]. The world connectivity is increasing progressively due the invasion of networks. Consequently, it is very much easier to use the digital technologies to strengthen the health systems globally [4]. In Egypt, as reported in the “ICT Indicators Annual Report 2014–2018”, percentage of individuals using computers was 53.3% of total individuals, those using cellphones was 95.7%, while 39.2% were using smartphones. Considering the digital usage by age group, 34% of the total internet users were in the age group 15–24 years old. Regarding the gender of the Internet users, percentages of the males was

higher than that of the females, 56.6% and 43.4%, respectively [5].

The abundance of online health information (OHI), regarding the health risks and the health-promoting measures, is an important component affecting the provision of online health practices [6]. The internet allows anyone to disseminate health-related information whether he is medically qualified or not [7]. In the era of the increasingly expanding digital ecosystem, health misinformation became highly risky, especially the information sources which are non-evidence based. The spread of the non-credible information about the different health issues is highly threatening health outcomes [8].

This problem is magnified due to the vulnerability of most Internet users, especially the adolescents information seekers who lack health literacy [9]. They usually do not depend on quality criteria while choosing OHI sources. The choice of some users can sometimes be based on the design and the quality of pictures [10]. In a study aiming to understand the way used by youth to reach health-related online information, it was stated that youth are at risk due to the lack of the knowledge and the skills needed to evaluate the quality of OHI and the ability to choose the correct source [11].

The aim of this study is to explore the pattern of digital health usage among the medical university students, and their level of awareness about choosing OHI and mobile health applications.

## Methods

This was a cross-sectional study conducted over a period of 12 months, starting October 2019 to October 2020. The study was conducted at the Faculty of Medicine, Helwan University, and included a total of 480 medical students from 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> academic years.

The sample size was calculated using Epi-info version v5.5.2 software, with Internet usage among youth 34% [5] and a margin of error/precision (d) no more than 0.05. The total required sample size was calculated to be 350. A percentage of 20% as non-response was added to have a final sample to be 420, but the study was conducted on a sample of 480 medical students. The inclusion criteria for enrolment were being a student in the 1<sup>st</sup>, 2<sup>nd</sup>, or 3<sup>rd</sup> years of Faculty of medicine, in addition to having a digital device and Internet access.

The link for a structured questionnaire on google forms was disseminated to medical students through the Faculty high administrative authority and students' leaders, and a total of 480 eligible responses was received. The questionnaire included two sections. The first section included socio-demographic characteristics gender, age, nationality, and questions about mother's and father's education which were adapted from a validated questionnaire [12]. The second section included questions about digital usage pattern and awareness, which were based on themes identified during literature review and validated through the use of pretested questionnaires and by experts' opinion due to absence of previous validated tools. Reliability was checked by Cronbach's alpha test using Statistical Package for Social Sciences (SPSS) with value of 0.76. Questions that increased alpha if deleted, were checked and reformulated to yield Cronbach's alpha test value of 0.82. Pattern of digital usage included: type of technology used frequently (mobile phones, desktops, or laptops); mobile phone type (smart or feature phone); frequency of Internet usage (daily, weekly or monthly); personal health-related purpose of Internet usage (seeking health information, for health consultation or for reading others' health experiences); preferred type of digital messages (text, images, videos or live. Awareness about digital usage included: checking the reliability of digital messages; checking the qualification of the provider; and knowledge about advantages and disadvantages of using digital tools [13]. Prior to the

study, a pilot was conducted involving 20 students (not included in the worked upon sample) to test the clarity of the questions and to estimate time needed.

Data preparation included data cleaning, duplicates removal, and checking participants' eligibility. Coded data were entered into SPSS version 23 to be analyzed. Quantitative variables were summarized using mean, median, and standard deviation. Qualitative variables were summarized using frequency and percentage.

### Ethical consideration

Approval of the institutional review board at Kasralainy Faculty of Medicine, Cairo University was a prior step before starting the study (MD-58-2019). Participants indicated consent to participate at the beginning of the questionnaire after reading a full description about the study. Clicking on a "I agree" button was required to commence the questionnaire. Participation in the study was voluntary and students had the full freedom whether to join or to withdraw from the study at any time. Students were assured that the collected data was of high confidentiality and anonymity. As an incentive, all participants received a certificate of participation at the end of the study.

## Results

The study included a group of 480 medical students in the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> academic years, whose mean age  $\pm$  SD (19.7  $\pm$  1.3). The gender was almost equally distributed with males equal (236, 49.2%) while females were (244, 50.8%). Almost half of the students' fathers (234, 48.8%) and mothers (250, 52.1%) were university graduates, while the least percent were illiterate (28, 5.8% and 31, 6.5%, respectively) (Table 1).

**Table 1: Socio-demographic Characteristics of Participant Students (n = 480)**

Characteristics	Mean	SD	Median	Interquartile range (25 <sup>th</sup> -75 <sup>th</sup> )
Age	19.7	1.3	20	(19-20)
Gender	Male		236	49.2
	Female		244	50.8
Nationality*	Egyptian		423	88.7
	Non-Egyptian		54	11.3
Father's Education	Illiterate		28	5.8
	School		36	7.5
	Institute		33	6.9
	University		234	48.8
	Masters		81	16.9
Mother's Education	PhD		68	14.2
	Illiterate		31	6.5
	School		57	11.9
	Institute		54	11.3
	University		250	52.1
	Masters		50	10.4
	PhD		38	7.9

Table 2 describes the digital usage pattern among student participants, it was obvious that mobile

**Table 2: Digital Usage Pattern among Participant Students (n = 480)**

Pattern of digital usage	No.	%
Frequently used technological devices		
Mobile phone	422	87.9
Laptop	54	11.3
Desktop	4	0.8
Mobile phone type		
Smart phone	473	98.5
Feature phone	7	1.5
Rate of internet usage		
Daily	474	98.8
Weekly	3	0.6
Monthly	3	0.6
Type of preferred digital media		
Applications	51	10.6
Websites	81	16.9
Social Media	348	72.5
Type of preferred digital messages*		
Text	359	74.8
Images	208	43.3
Videos	205	42.7
Live	78	16.3

\*Total may count to >100% due to multiple responses given by participant students.

phones – especially smartphones - were the most frequently used technological devices by participants (422, 87.9%) as compared to laptops (54, 11.3%) and desktops, which were the least frequently used (4, 0.8%). Almost all participants used Internet daily (474, 98.8%), chose social media to be their preferable type of digital media (348, 72.5%) over other types including websites (81, 16.9%) and mobile applications (51, 10.6%). Text messaging was widely preferred (74.8%) as compared to image and video messages (43.3% and 42.7%), respectively, while the live digital messages were the least preferred (16.3%).

Seeking health information was the most common personal health-related purpose for using Internet (87.1%), reading others' health experiences was a frequent health-related purpose for about half of the students (49.4%), while about quarter of participants used the Internet for health consultation (23.8%) (Figure 1).

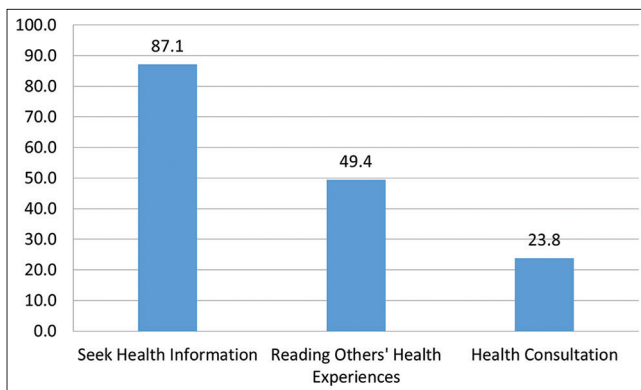


Figure 1: Health-Related Purposes for Using Internet among Participant Students (n = 480)\*. \*Total may count to more than 100% due to multiple responses given by participant students

Table 3 showed that about half of the participants (218, 45.4%) mentioned that they always check the reliability of the digital messages they receive, almost the same percent mentioned that they sometimes check it (220, 45.8%). Most of the participants reported that they do not check the qualifications of the digital message provider (294,

**Table 3: Awareness about choosing OHI among participant students (n = 480)**

Awareness about choosing OHI	No.	%
Checking the reliability of received messages		
Always	218	45.4
Sometimes	220	45.8
Never	42	8.8
Checking the qualifications of the provider		
Yes	186	38.8
No	294	61.3
Know the advantages of digital tools		
Yes	113	23.5
No	175	36.5
Not Sure	192	40
Know the disadvantages of digital tools		
Yes	94	19.6
No	205	42.7
Not sure	181	37.7

OHI: Online health information.

61.3%). The majority of the students were either not sure or know nothing about the advantages of digital tools (192, 40%) and (175, 36.5%) respectively. The same was found regarding the disadvantages of digital tools, where the majority either did not know or not sure about those disadvantages (205, 42.7%) and (181, 37.7%) respectively. Almost one-fifth of the participants expressed their knowledge about the advantages and the disadvantages of the digital tools (113, 23.5%) and (94, 19.6%), respectively.

## Discussion

The participants' mean age  $\pm$  SD was found to be (19.7  $\pm$  1.3), which is almost the same age range of university students that is usually at higher exposure to more challenges than any other age group. During this stage (18–21 years old), youth acquire a lot of behaviors and habits which might have a great impact on their health and make them highly vulnerable group usually at risk of unhealthy behaviors' adoption, especially those related to lifestyle as stated by Schmidt [14]. Almost half of the students' fathers and mothers were institute and university graduates, while the least percent were school and less, which suggested high education level, and consequently a high socioeconomic level. The current study findings are consistent with the findings of the previous study which suggested that lifestyle behaviors such as physical activity and dietary habits can be partially predicted by parents' education level [14].

Regarding the digital usage pattern among student participants, it was obvious that mobile phones were the most frequently used technological devices by participants (422, 87.9%). This finding is not surprising due to the increase in the global and local rate of mobile phones ownership and usage. It also agrees with the "ICT Indicators Annual Report 2014–2018", where the reported percentage of individuals using cellphones was 95.7% [15]. Percentage of those using smartphones according to the "ICT Indicators Annual Report 2014–2018", was very much

less than the current study findings (98.5%). This can be explained by the sociodemographic characteristics of the study participants, being of certain age group and of certain socioeconomic level. The majority of participants chose social media to be their preferable type of digital media (348, 72.5%), over other types including websites and mobile applications. This percentage matches the percentages of individuals using social networks (78.3%) [15]. Participants have reported using different types of digital messages, with highest preference of text messages (74.8%). This goes with the work done by Nguyen *et al.* whose findings revealed that 76.0% of study participants preferred to use text messages in their study to investigate the underlying mechanisms of mode tailoring effects on website attitude and information recall [16]. This finding uncovers the importance of text messaging as a tool of health education and communication being easier and less time and Internet consuming.

Participant students showed variation in their health-related purposes they might have during using the Internet. Seeking health information was found to be the most frequent health-related purpose (87.1%) which is very much higher than the reported percentages of seeking health information among Internet users (33%) according to the Ministry of Communication and Information Technology (2014-2018) [15]. This wide gap might be related to sampling differences. However, the study result is much closer to a finding of another study done in Kuwait, where 62.9% of the participants used the Internet for seeking health information [17]. This might be due to the participants' medical background, being medical students who are expected to be very much concerned with health information.

Different concerns and challenges related to quality of digital health information were identified in a study done by Skinner *et al.* Their study aimed at describing adolescents' usage of technology for their health information needs [18]. OHI seekers tended to use their subjective characteristics and ways of information evaluation rather than relying on clear reliability and accuracy criteria to decide whether online information source is credible or not. The issue of what is called "Confirmation Bias" is also present widely and facilitated by the process of OHI seeking. Confirmation bias occurs when people choose the type of information, which matches their already existing beliefs and is consistent with their culture and backgrounds. They mostly neglect information that is not agreeing with their ideas and traditions. This might happen through "selective exposure" which is obvious at the start of their exposure to the information. They actually might be exposed to a list of results through the search engine but they prefer clicking the ones matching their beliefs. Moreover, when they come to the stage of judging and evaluating, they are subjected

to another type of bias which is the "biased evaluation" as they consider the information that matches their backgrounds as the more accurate and correct ones. This was investigated in a recent study conducted by Meppelink *et al.*, where they stated that confirmation bias is important in the context of OHI to help people choose the information they seek on the Internet, or else such bias may affect their decision-making process [19].

A series of studies explored the quality of digital health information, among which a study by Albrecht *et al.*, who investigated the perception of medical students to quality principles of health mobile applications as a step for their usage decisions. Their study showed that students were unable to identify the necessary quality information [13]. The current study findings about the ability of participants to identify digital tools quality principles including checking the reliability of the digital messages and the qualifications of the digital health messages provider have indicated that although university students are good at using technology, yet they lack the skills which enable them to proper search and evaluate digital information. This is in line with the work of other studies as stated by Lee *et al.* to assess the prevalence of misinformation exposure and beliefs. The study was concerned with misinformation exposure and its association with defective knowledge and fewer adoption of preventive practices [20].

Another important finding about students' awareness of the advantages and disadvantages of using digital tools, which showed low level of knowledge. This gives insight about the students' need for guidance and support to be more competent at using digital tools in a way that ensures their getting the most benefit, and at the same time being protected from any harm they may be subjected to.

## Conclusion

Medical students are frequent Internet users with more preferences towards mobile smartphones, social media, and text messaging. Seeking health information is their main health-related Internet purpose. However, they lack the needed knowledge and skills for proper search and evaluation of OHI.

## Recommendation

Effort should be directed to university students as regards providing them with the required knowledge

and skills aiming at improving their digital awareness and practices.

### Study Limitations

The current study findings were subjected to some limitations. Collection of data depended on the students' questionnaire, which might be affected by recall bias. Choosing medical students, although it was meant to be a privilege because they are the future healthcare providers who can communicate their knowledge to their patients, it was actually another bias due to the challenge in separating their medical background from their health information Internet activities. In order to overcome this limitation students of early years in faculty of medicine were chosen and questions were directed to ask about personal health-related information.

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