

Research Article

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The Level of Cognitive Awareness of Digital Drugs Among Students of Sultan Qaboos University

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Abstract

Objectives: This study aimed to determine the cognitive awareness of digital drugs as a phenomenon among Sultan Qaboos University undergraduate students. It also aimed to identify differences based on certain variables such as gender, college affiliation, ownership of social media accounts, and average Internet usage among students.

Method: This study employed a descriptive-analytical approach. The study tool was distributed electronically via e-mail to a sample of 673 male and female students at Sultan Qaboos University at Oman to measure their cognitive awareness of digital drugs.

Results: The findings showed that undergraduate students at Sultan Qaboos University have an average level of cognitive awareness of digital drugs. The results also revealed no significant differences in the mean sample responses among undergraduate students at Sultan Qaboos University regarding cognitive awareness of digital drugs based on variables such as gender, college affiliation, ownership of social media accounts, and average Internet usage.

Conclusion: The study recommends that special programs be developed and prepared to raise awareness and educate students about the dangers of digital drugs. These programs should be initiated in collaboration with educational institutions, such as universities and the security sector, and should involve faculty members in preparing and activating them.

1. Introduction

Narcotics and other addictive substances pose significant dangers to the mental and physical health of users and threaten the safety of society and the environment. Traditional addictive substances come in various forms and categories, and recent types of drug consumption have emerged due to technological and communicative revolutions. Novel psychoactive substances using sound alone are now designed to mimic the effects of traditional drugs. Internet networks have facilitated the creation of such drugs, commonly known as digital drugs, binaural beats, and I-dosing.

The danger of digital drugs lies in their availability and easy accessibility through international websites specializing in marketing them. They are offered either free or at low prices. Their costs increase according to the desired types and degrees promoted through social media platforms or other websites (Aloufi et al., 2024; Morsi, 2016). Some free samples were broadcast on YouTube to attract various demographics to society. Since there is no official oversight or supervision on such sites, these drugs might pose a significant threat to the younger population considered vulnerable to this deadly epidemic (Alzyoud & Odeh, 2021; Morsi, 2016; Rasheed & Tashtoush, 2023).

Al-Sadeq and Mohammed (2020) point out that digital drugs have become a threat to individuals and societies, especially young adults enrolled in secondary education, slipping into the loop of digital addiction. In this stage, which is considered the foundation for higher education, students are prone to adventures and experimental behavior and believe they are invulnerable to such danger. Some students at this stage favor isolation, introversion, and drift toward relationships and friendships on social media. These students find it challenging to regulate the contradictory emotions that result from the inner struggle between their standards and those of their family and society. This conflict can lead them to fall victim to depression and frustration due to their attempts to prove themselves and assert their individuality.

1.1. Problem Statement

The negative impact of digital drugs, as part of the technological revolution, is drawing increasing research attention. These digital substances, sometimes known as "new-age drugs," are supplied electronically and, as mentioned earlier, might have effects similar to those of traditional drugs. Media reports from various sources, including international and regional outlets, have emphasized the rise of digital drug usage and possible addiction, particularly among youth (Barratt, et al., 2022). Reports on the use of digital drugs by many students in the Netherlands raised potential concerns about its spread in some Arab countries. Many cases of digital drug abuse have been reported in young people.

In light of the rapid development of online communities, communications and information technology, and electronic applications, digital drugs have become popular among various groups. Digital drug abuse poses a threat to the psychological, physical, and neurological health of the youth, especially university students. This age group is sensitive and more vulnerable to deviation due to using social media and the internet without parental supervision. From this perspective, the current study attempted to identify the level of awareness of digital drugs among undergraduate students at Sultan Qaboos University (SQU) and investigate their psychological, physical, and social dangers. This was achieved by addressing the following questions.

RQ1. What is the level of awareness about digital drugs among undergraduate students at SQU?

RQ2. Are there statistically significant differences at the significance level ($\alpha = 0.05$) in undergraduate students' awareness level at SQU about digital drugs based on the following variables: gender, college, owning social media accounts, and average Internet usage?

1.2. Study Objectives

This study aimed to identify the level of awareness of digital drugs among undergraduate SQU students. It also aimed to identify statistically significant differences at the significance level ($p=0.05$) in their level of awareness according to the following variables: gender, college, owning social media accounts, and average Internet usage.

1.3. Study Importance

The importance of this study lies in its theoretical aspect, which sheds light on an unexplored topic that has not received sufficient research and examination by Arab scholars and researchers. This study investigated digital drugs, their content, types, threats, and undergraduate students' level of awareness about them. This study contributes to a growing body of research on digital drugs, while filling the gaps in Arabic scholarship.

The significance of this study stems from the fact that it represents a serious scientific effort to ascertain young people's awareness of digital drugs, raise their awareness of the adverse effects of this phenomenon on their psychological, physical, and social well-being, and suggest the necessary scientific remedies to address it. In addition, this study can be valuable to stakeholders in education, social institutions, higher education institutions, the security sector, and civil society organizations. By adopting its findings and implementing its recommendations, these different sectors and institutions may develop programs to raise awareness of this phenomenon and take preventive measures to protect the future generation from the potential risks of digital drugs.

2. Literature Review

Digital drugs are auditory experiences in which audio files target brain waves. They are auditory illusions listened to in a specific way and lead to hallucinogenic effects or mood, emotional, and biological stimulation. The individual then experiences the same state of influence caused by the use of chemical drugs, such as marijuana or opium (Abdel Wahab, 2017).

Audio files or musical tones of digital drugs have different names and two slightly different frequencies and are found on specific websites. This type of drug was initially identified in 1839 by German physicist Heinrich Wilhelm Dove. In 1970, this concept gained therapeutic application in the field of psychotherapy, when it was used to treat patients diagnosed with mild depression who declined medication-assisted treatment. Music therapy has the most significant impact on treating such cases (Ibrahim, 2022). Binaural Beats is a term used by psychologists and other experts to describe the therapeutic uses of music. Digital drugs are produced when musical tones or sounds are deliberately transformed into musical waves and directed toward both ears (see figure 1). This was accomplished when each ear received a tone at a slightly different frequency. To simulate the effects of conventional drugs, this calculated frequency causes the brain to produce a third wave, which causes the brain to become electromagnetically unstable. It also causes nerve cells to release different hormones corresponding to the desired drug effect (Ismail, 2018; Al-Amawi and Al-Amawi, 2023).

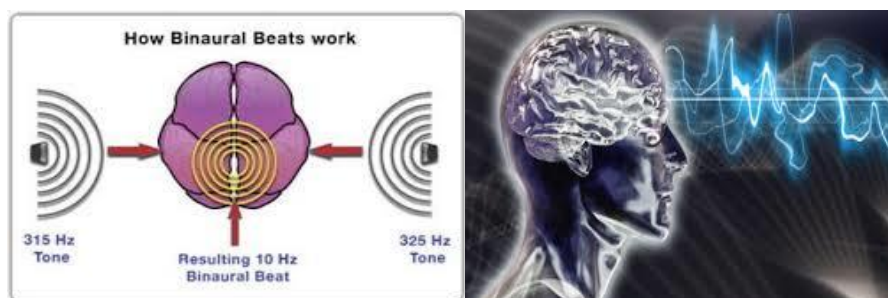


Figure 1. How Binaural Beats Work

Digital drugs come in many forms, depending on the tone frequency. Among them are high-frequency waves that produce loud tones that stimulate all cells in the mind and body and significantly increase an individual's activity level. Opium waves, on the other hand, are another type of wave intended to induce feelings of happiness among users. Other tone waves elicit the sensations of euphoria and tranquility. Marijuana, alcohol, and cocaine waves were among the strongest types. They may endanger users because they target the brain and nervous system (Dvorak et al., 2017; Sati, 2023; Shirawia et al., 2024). The desired state of euphoria can be identified by analyzing electrical signals and their effects on the brain after users consume various digital drugs. Each type of digital drug can replicate a specific brain activity pattern. For instance, listening to cocaine frequencies for several minutes will prompt the brain to be stimulated in a manner similar to consuming substantial amounts of drugs (see figure 2) (Al-Matrouk, 2020).



Figure 2. Euphoria of Digital Drugs

Software that produces digital drugs are widely available. “I - Doser.com” is one of the most notable websites that provides digital sounds intended to induce various effects. To enhance their experience, users are urged to follow particular rituals, such as sitting in a dimly lit room, wearing loose clothing, covering their eyes, and using high-quality headphones. This environment and tools allow users to reach the desired state while hearing audio clips (Azooz & Qureshi, 2020).

Digital drugs may negatively affect an individual’s physical, psychological, and behavioral health. While listening to such music, users can experience symptoms, such as involuntary screaming, muscle and nervous spasms, and body tremors. Some studies have indicated that users may experience hallucinations, a sense of persecution, and fear of others. Some doctors have noted that brain cells could be damaged unless the user was given sedatives to relieve the spasm. They also warned that continued exposure to such drugs may lead to a lack of concentration, separation from reality, impaired memory retrieval, and decline in academic performance (Morsi, 2016; Tashtoush et al., 2023; Hussein et al., 2024). Other studies have shown that users may have hearing loss as a result of hearing high sound frequencies, especially when the user fails at the beginning of the dose to obtain euphoria. Thus, the user repeats the doses and tends to increase the volume and frequency of these headphones to achieve the desired result. Consequently, users are at risk of putting their hearing in danger, potentially leading to deafness. Consequently, digital drugs could become a threat to the lives of many people (Mubarak, 2016).

As many studies have tackled the topic of digital drugs from different perspectives, encompassing various perspectives from both Arab and foreign countries, this study provides reviews

of several studies and foregrounds their most prominent features. Mohammed and Abu Zaid (2024) aimed to reveal addiction to digital drugs among adolescents. It also aimed to reveal the difference in the average scores of the research sample of adolescents on the digital drug addiction scale according to gender (males - females). The research sample consisted of 361 male and female students. The students' ages ranged between 16 and 18 years, with an average of 16.6 and a standard deviation of 0.69 for those enrolled in the academic year 2022-2023. The number of males was 161, and females were 200. The research results have disclosed a moderate degree of addiction to digital drugs among adolescents. The results also indicated that there were differences between the average scores of males and females on the addiction to digital drug scale among adolescents in favor of males.

Houda (2024) aimed to explore and find out the level of awareness of digital drugs and their risks among a sample of parents. To achieve this goal, the descriptive approach was followed. Using the questionnaire and distributing it to a sample of 105 parents of students in secondary schools affiliated to the Directorate of Education in Algiers for the academic year 2022-2023, the results showed that the average total degree of awareness of the phenomenon of digital drugs in the Algerian family and its risks is low. The results also revealed no statistically significant differences between fathers and mothers regarding the degree of awareness and the absence of differences according to the educational level.

El-Shiety (2023) aimed to identify the level of awareness among students from Egyptian and Saudi private universities regarding the negative effects of digital drugs on individual health, social life, the economic aspect of the individual and society, and academic achievement. The sample was selected from private universities in Egypt and Saudi Arabia. The results indicated a moderate level of awareness related to the concept of digital drugs, their types and methods of use, and their impact on individual health, social life, the economic aspect of the individual and society, and academic achievement. The study also revealed that students of private Egyptian and Saudi universities were equally aware of the negative effects of digital drugs. However, there were differences in the level of awareness of the negative impact of digital drugs among students of Egyptian and Saudi private universities based on academic specialization, with scientific majors outperforming other specializations. The study recommended that countries around the world cooperate to monitor and control websites that provide the content of these drugs and work to block them fully.

Alzyoud and Odeh (2021) analyzed the level of awareness of digital drugs among undergraduate students at the University of Jordan. This study adopted a mixed qualitative and quantitative method. The study population consisted of all fourth-year students (approximately 6200 students) enrolled in undergraduate programs. 336 male and female students were selected using a random stratified method. The results showed that the level of awareness of digital drugs among undergraduate students at the University of Jordan was moderate, and there were no differences in the level of awareness.

Abdullah and Hasan (2020) examined graduate students' level of cognitive awareness of the dangers of digital drugs. The study employed a descriptive method with a sample of (100) male and female graduate students at the University of Baghdad. The study found that the students had a high level of cognitive awareness of the dangers of digital drugs and that there were statistical differences in cognitive awareness depending on gender and academic specialization (scientific, humanitarian).

Within the same framework, Al-Sadeq and Mohammed (2020) investigated the level of self-awareness regarding digital drugs among students enrolled at Aswan University and the attitudes of faculty members toward the university's role in confronting this phenomenon. A descriptive method was used to achieve the aims of this study. A sample of 354 university students and 105 faculty members were selected. The results revealed a low level of awareness of the impact of digital drugs

among university students, with no statistically significant differences based on sex, academic level, and age. The results identified a set of preventive, awareness, and educational roles for universities to address this issue. Based on these results, some mechanisms and recommendations have been proposed.

Fawzi and Mansouri (2017) assessed the level of knowledge about digital drug use among health workers in the Kingdom of Saudi Arabia. The study employed a cross-sectional survey method in which an open-ended questionnaire was distributed to a random sample of (200) healthcare professionals (65% male and 35% female) in Medina in May 2015. The findings showed that approximately 96% of the participants were aware of digital drugs through media sources, whereas 14.7% were aware of how digital drugs worked. 65% of the participants believed that digital drugs pose a potential threat to users, and 16.9% participated in awareness programs and seminars on digital drugs.

Morsi (2016) explored digital drug addiction and analyzed its impact on Arab youth by employing a social survey method. A questionnaire was compiled and completed by (309) male students enrolled in the faculty of Al-Azhar University. The findings indicate that the most prominent contributors to the spread of digital drugs were technological, legal, health, and family factors. The study also recommended a multifaceted strategy to safeguard young people from digital drug addiction, which includes religious counsel, technological solutions, social support systems, educational initiatives, and security measures.

Kraus and Porubanová (2015) conducted a study on the effect of binaural beats on working memory capacity. An experimental method was employed and involved (40) students in New York were employed. The participants were divided into two groups, one of which was subjected to listening to the sound of the sea with a difference in frequency, whereas the other group was subjected to listening to the same sound but with no frequency difference. The results revealed that the group exposed to binaural-beat stimulation showed a significant improvement in working memory capacity.

This study has benefited from thoroughly evaluating previous studies on digital drugs. By reviewing the theoretical literature, scientific methodology, and the results of previous studies, the researchers were able to define the research problem, select the appropriate research method, develop a suitable data tool to achieve the purposes of this study, identify key variables to be addressed in the study, and determine the scope of the study. What distinguishes this study from others is its objective, which is to reveal the level of cognitive awareness among undergraduate students at Sultan Qaboos University regarding the phenomenon of digital drugs. This study contributes new data to the existing body of research.

3. Methodology

3.1. Study Design

This study adopted a descriptive method to investigate the level of cognitive awareness of digital drugs among undergraduate students at SQU. This method is suitable for analyzing and interpreting data to achieve results that can contribute to achieving the desired objectives of the study. The descriptive method involves qualitative and quantitative approaches to describe this phenomenon as it exists in real life. The qualitative approach describes the phenomenon and addresses its characteristics, whereas the quantitative approach provides a numerical description that explains this phenomenon, its size, or its interaction with other phenomena (Odeh & Malakawi, 1992).

3.2. Participants

A questionnaire was circulated among all undergraduate students of Sultan Qaboos University at Oman (17156) male and female students across various scientific and humanities faculties. A sample representative of the population was selected from undergraduate students registered in the second semester of the academic year 2023/2024 by distributing the study tool electronically via e-mail to the students. The study sample consisted of 673 male and female students (see table (1)).

Table 1. Participants Distribution

Variable	Categories	Repetition	Percentage
Gender	Male	244	36.3%
	Female	429	63.7%
Total		673	100%
College	Scientific	370	55%
	Humanities	303	45%
Total		673	100%
Social Media Accounts	Owens at least one social media account	666	98.9%
	Does not own social media accounts	7	1.1%
Total		673	100%
Average Internet Usage	Less than 3 hours	37	5.5%
	More than 3 hours and less than 6 hours	438	65.1%
	More than 6 hours	198	29.4%
Total		673	100%

3.3. Instrument

A questionnaire was developed to achieve the goal of understand students' cognitive awareness of digital drugs. A thorough analysis of previous studies on the subject (Abdullah and Hasan, 2020; Al-Sadeq and Mohammed, 2020; Alzyoud and Odeh, 2021), has guided the advancement of the study. In light of this, the study scale consisted of two parts. The first contained demographic characteristics (sex, college, social media accounts, and average internet sage). The second part consists of (26) items. Participants responded to each item using a five-point Likert scale, starting with "Strongly Agree" (scored 5) to "Strongly Disagree" (scored 1). The level of students' cognitive awareness was categorized based on the following criteria: low (1-2.33), medium (2.34-3.67), and high (3.68-5).

To ensure the validity and reliability of the study scale, it was initially reviewed by ten experts specialized in educational psychology, measurement and evaluation, and psychological counseling. They were asked to express their opinions on the scale's items in terms of content validity, clarity, meaning, wording, and suitability for the target population. The experts were encouraged to delete, add, modify any paragraph, or provide any other comments deemed appropriate for improving the study tool. Their comments, which included adjustments to wording for improved clarity, were

considered. Based on these revisions, the scale settled on 26 items. The experts unanimously agreed on the questionnaire's suitability for measuring cognitive awareness. The percentage agreement on the scale ranged from 90% -100%, ensuring the validity of the questionnaire. To assess the construct validity of the questionnaire, a pilot sample was given to (50) SQU students, both male and female, who represented the target population, along with other students who did not belong to the target population. Two criteria for evaluating construct validity were considered: the correlation coefficient (0.20) or more, the statistical significance of the correlation, and the correlation coefficient calculation between each item and the scale. The Pearson correlation coefficients between the items and the scale's total score ranged between 0.39-0.73, indicating the validity of the scale's construction, see Table 2.

To verify the reliability of the scale, the test-retest method was applied to (50) students from outside the sample two weeks after the first application. When students' scores from the two applications were compared using Pearson's correlation coefficient, the result was (0.88). The internal consistency of the study tool was also estimated according to the Cronbach's alpha equation method for the first application. The Cronbach's Alpha value was 0.86, the Cronbach's Alpha coefficients between the items and the scale's total score ranged between 0.68-0.83 (see Table 2), and the values of the correlation coefficients were acceptable. Accordingly, the study tool had statistically acceptable stability. All the correlation coefficients were statistically significant ($\alpha=0.01$). Alpha values also indicated a high level of internal consistency, which ensured the reliability and suitability of the study tool for this investigation.

Table 2. Correlation Coefficients and Cronbach's alpha for all Items of the Scale

Item	Correlation Coefficient	Cronbach's Alpha Coefficient	Item	Correlation Coefficient	Cronbach's Alpha Coefficient
1	0.47*	0.77*	14	0.47*	0.69*
2	0.63*	0.82*	15	0.56*	0.83*
3	0.58*	0.72*	16	0.59*	0.75*
4	0.67*	0.75*	17	0.73*	0.74*
5	0.54*	0.80*	18	0.39*	0.82*
6	0.59*	0.81*	19	0.62*	0.68*
7	0.45*	0.79*	20	0.65*	0.71*
8	0.42*	0.69*	21	0.59*	0.76*
9	0.51*	0.77*	22	0.54*	0.78*
10	0.43*	0.79*	23	0.61*	0.82*
11	0.48*	0.72*	24	0.59*	0.83*
12	0.42*	0.71*	25	0.73*	0.81*
13	0.61*	0.73*	26	0.68*	0.80*

*Statistically significant at ($\alpha=0.05$)

3.4. Procedures

The following procedures were employed to achieve the study objectives: First, the study tool was prepared in its initial form, and its validity and reliability were verified. Then ethical approval was obtained from the Scientific Research Ethics Committee at SQU. After that, a facilitation letter was obtained from the SQU administration to approve the distribution of the study tool among sample members. The study sample was selected from undergraduate students registered in the second semester of the academic year 2023/2024. The questionnaire was distributed electronically using Google Forms. Finally, statistical analyses were performed to extract and interpret the results. Recommendations were generated to contribute to this study topic.

3.5. Study variables

The variables of gender (male, female), college affiliation (scientific, humanities), ownership of social media accounts (Owns at least one social media account, Does not own social media accounts), and Average Internet usage were treated as classification variables (less than three hours, more than three hours and less than six hours, more than six hours). While the level of cognitive awareness of the phenomenon of digital drugs among Sultan Qaboos University students was used as a dependent variable.

4. Results

To answer the first research question, "What is the level of awareness about digital drugs among SQU undergraduate students?", mean scores and standard deviations were applied based on the study sample estimation to investigate their level of awareness of digital drugs; table 3 shows these levels.

Table 3. Means, SD, and Levels of Cognitive Awareness of the Participants

No	Item	Mean	SD	Level
1	I believe that addiction to digital drugs poses a real threat to psychological, physical, and mental health.	3.93	1.21	High
2	Digital drugs make a person abnormal.	3.91	1.04	High
3	Digital drugs affect the auditory system.	3.88	0.98	High
4	Digital drugs spread because of family breakdown, as one of the contributing factors.	3.83	0.84	High
5	Digital drugs spread as a result of a lack of social awareness, as one of the contributing factors.	3.8	1.24	High
6	Digital drugs spread due to the imitation of friend's behavior, as one of the contributing factors.	3.79	1.12	High
7	Digital drugs are widespread because of a lack of public awareness about them, as one of the contributing factors.	3.67	0.79	Medium
8	Digital drugs are audio files containing certain sound frequencies an individual listens to.	3.63	0.95	Medium
9	Digital drugs are easy to get access to.	3.52	0.71	Medium
10	Digital drugs improve mood.	3.46	0.97	Medium

11	Audio frequencies help calm the nerves.	3.24	0.77	Medium
12	Digital drugs are not punishable by law.	3.17	1.15	Medium
13	Digital drugs are not prohibited by Islamic law.	2.92	1.18	Medium
14	Digital drugs do not affect the individual's health.	2.87	0.91	Medium
15	Digital drugs are not addictive, like traditional drugs.	2.71	0.89	Medium
16	Security services are interested in combating digital drugs.	2.65	0.63	Medium
17	I know some websites that provide digital drugs.	2.53	0.79	Medium
18	I know the tools to do digital drugs.	2.46	0.61	Medium
19	I can find out the time required for the digital drug dose to take effect.	2.44	1.16	Medium
20	I know about the types of digital drugs and their motivational uses and effects.	2.39	1.25	Medium
21	I know about the effect of binaural beat waves on the EEG.	2.09	0.83	Low
22	I know about binaural beats and how they occur while listening.	1.98	1.02	Low
23	I learned about digital drugs online.	1.91	1.06	Low
24	I can report websites that promote digital drugs.	1.88	0.93	Low
25	Obtaining digital drugs requires payment.	1.74	0.72	Low
26	I know what digital drugs are and their nature.	1.61	0.87	Low
Overall		2.92	0.95	Medium

Table 3 shows the level of awareness of digital drugs among the undergraduate students at SQU. The overall mean for the level of awareness of digital drugs in the study sample reached 2.92, which indicates an average level. Meanwhile, the arithmetic averages for the items on the level of awareness of digital drugs in the same sample ranged between 1.61- 3.93. The item “I believe that addiction to digital drugs poses a real threat to psychological, physical, and mental health” came in first place and showed an average level with a mean of 3.93. On the other hand, the item “Digital drugs make a person abnormal” came in second place, with a mean of 3.91 at a medium level. The item “I know what digital drugs are and their nature” revealed students’ lowest awareness of the phenomenon, with a mean of 1.61.

The results related to the second question “Are there statistically significant differences at the significance level ($\alpha=0.05$) in the level of awareness of undergraduate students enrolled at SQU about digital drugs based on the following variables: Gender, college, owning social media accounts, and average internet usage?” are shown as follows:

Results Related to the Gender: According to the gender variable, the means and standard deviations were employed, and an independent-sample t-test was used to statistically analyze the

results to measure the level of awareness about digital drugs among undergraduate students at SQU, table 4 shows the results.

Table 4. Means, SD, and Levels of Cognitive

Gender	Number	Means	SD	t	d.f.	Sig.
Male	244	2.94	0.73	1.43	671	0.179
Female	429	2.89	0.79			

As indicated in Table 4, the t-value reached 1.43, which is statistically non-significant at the significance level (0.05). Thus, there were no statistically significant differences in the level of awareness of digital drugs among undergraduate students at SQU based on gender variables (male and female).

Results Related to the College: Arithmetic means and standard deviations were extracted according to the college variable to answer the second question. Further, a t-test was employed to statistically analyze the results for independent samples related to the level of awareness of the phenomenon of digital drugs among undergraduate students at SQU. Table 5 shows the results of the analysis.

Table 5. Independent sample t-test to the level of cognitive awareness

College	Number	Means	SD	t	d.f.	Sig.
Scientific	370	2.95	0.75	1.71	671	0.089
Humanities	303	2.90	0.80			

According to Table 5, the results of the t-test revealed that the t-value reached 1.71, a statistically non-significant value at a significance level 0.05. There were no statistically significant differences in the level of awareness of respondents' experience with digital drugs by the college variable (scientific and humanities).

Results Related to Social Media Accounts: To answer the second question related to the variable of owning social media accounts, arithmetic means and standard deviations were extracted, and an independent sample t-test was used to statistically analyze the results of the level of awareness about digital drugs among undergraduate students at SQU. Table 6 shows the results of the respondents' experiences.

Table 6. Independent sample t-test to the level of cognitive awareness

Social Media Accounts	Number	Means	SD	t	d.f.	Sig.
Owns an account	666	2.96	0.93	0.988	671	0.323
Does not own an account	7	2.87	0.69			

Table 6 reveals that the t-value reached 0.988, which is a non-statistically significant value at the significance level ($\alpha = 0.05$), indicating that there were no statistically significant differences in the

level of awareness of digital drugs among SQU undergraduate students by social media account (owns a social media account, does not own a social media account).

Results Related to the Average Internet Usage: To answer the second question, according to the variable of students' average internet usage, arithmetic means and standard deviations were extracted based on the respondents' experience, table 7 shows these results.

Table 7. Means and standard deviations according to the average internet usage

Average Internet usage	Number	Means	SD
Less than 3 hours	37	2.87	0.84
More than 3 hours and less than 6 hours	438	2.97	0.93
More than 6 hours	298	2.93	0.98
Total	673	2.92	0.94

Table 7 showed the significant differences in the level of awareness of digital drugs among undergraduate students at SQU, as determined by their average Internet usage. To investigate these differences, one-way analysis of variance (ANOVA) was performed, and the results are shown in table 8.

Table 8. ANOVA analysis for levels of cognitive awareness

Source of Variance	Sum of Squares	d.f.	Mean Square	Total Square	F
Between Groups	2.978	2	1.489		
Within groups	105.72	670	0.158	0.124	2.370
Total	108.698	672			

The results of the analysis of variance shown in Table 8 revealed that the "F" value reached 2.370, which is a statistically non-significant value at the significance level (0.05). Therefore, no statistically significant differences in the level of awareness of digital drugs among SQU undergraduate students were found based on average Internet usage.

5. Discussion

The study results showed that the level of awareness of the phenomenon of digital drugs among undergraduate students at SQU was average. This could be attributed to a lack of knowledge among students about this phenomenon, as well as the absence of parental guidance, public awareness campaigns, and scarcity of educational resources available on various platforms about the phenomenon and its threats. In contrast to the well-established risks associated with traditional drugs, the widespread nature of digital drugs has not been fully recognized. As the topic is relatively recent, digital drugs have not been extensively addressed by research or educational programs that

target young people and students. This finding is consistent with Maysoum (2016), who pointed out the novelty of the digital drug phenomenon.

This study confirms the lack of knowledge among university students about the scientific basis, types, and nature of digital drugs. This also indicates that the university and surrounding communities do not have the necessary knowledge and lack awareness about the impact of this phenomenon on young people. Considering the novelty of this topic, researchers believe that preventive measures should be prioritized for university students. In addition to its educational role, a university's involvement in raising awareness and following up on medical and psychological information on the Internet can be improved by including educational initiatives investigating digital drugs' scientific and psychological effects. The study results were similar to those of Mohammed & Abu Zaid (2024), Houda (2024), El-Shiety (2023) and Alzyoud and Odeh (2021), which indicated the average level of university students' awareness of the digital drug phenomenon. However, the study results differed from those of Abdullah and Hasan (2020), revealing participants' high level of cognitive awareness of the dangers of digital drugs. The results of the current study also differed from those of Al-Sadiq and Muhammad (2020) and Anitei and Chraif (2011), who showed that the respondents had a low level of awareness of the phenomenon of digital drugs.

The reason for the non-significant gender difference in awareness could be students' exposure to the same environment of the university and community, which might influence their access to information related to this phenomenon. The researchers also explained that there was no difference in the level of awareness between males and females, as this issue was mostly about psychological awareness rather than the biological variety or special abilities associated with each gender. The results of this study are consistent with those of Houda (2024), El-Shiety (2023), Al-Sadiq and Muhammad (2020), and Alzyoud and Odeh (2021), who indicated that there were no differences between males and females regarding the level of awareness of digital drugs. The study results differed from the results found by Mohammed & Abu Zaid (2024) and Abdullah and Hasan (2020), which showed differences in males and females' level of awareness of the digital drug phenomenon.

There were no statistically significant differences in the level of awareness of respondents' experience with digital drugs by the college variable (scientific and humanities). The study results aligned with those of Al-Sadiq and Muhammad (2020) and Alzyoud and Odeh (2021), in that there were no differences in the level of awareness of digital drugs among university students due to the college variable. However, the findings of this study differed from those of (El-Shiety, 2023; Shirawia et al., 2023) who indicated differences in the level of awareness of the digital drug phenomenon among university students in favor of scientific colleges. This result can be attributed to students with social media accounts having equal opportunities to access the Internet. Students can easily obtain knowledge and information on diverse topics through open and non-restricted websites by viewing books, magazines, studies, research articles, news, pictures, and video clips.

The results indicated that there were no statistically significant differences in the level of awareness of digital drugs among SQU undergraduate students by social media account (owns a social media account, does not own a social media account). According to Alzyoud and Odeh (2021), there were no differences in the level of awareness of the phenomenon of digital drugs among university students based on having or not having social media accounts.

In addition to that, no statistically significant differences in the level of awareness of digital drugs among SQU undergraduate students were found based on average Internet usage. This result implies that students' awareness of digital drugs may not be related to the amount of time they spend online. They may be exposed to multiple media channels, such as audio, visual, and print content, as well as official and unauthorized sources, which may have a more significant impact. This was aligned with

Maysoum's (2016) and Alzyoud and Odeh's (2021) findings, which indicated no significant relationship between average Internet use and awareness of digital drugs among university students.

6. Conclusion

The study aimed to identify the cognitive awareness of the phenomenon of digital drugs among undergraduate students at Sultan Qaboos University. The study also aimed to reveal the existence of differences attributed to the variables: gender, college affiliation, ownership of social media accounts, and average internet usage among students. The results showed that the level of cognitive awareness of the phenomenon of digital drugs among undergraduate students at Sultan Qaboos University was average. The results also showed that there were no differences between the arithmetic means of the responses of the sample members on the cognitive awareness of the phenomenon of digital drugs among undergraduate students at Sultan Qaboos University attributed to the variables: gender, college affiliation, ownership of social media accounts, and average Internet usage. The study recommended that the university develop and prepare special programs for awareness and education about the dangers of digital drugs and involve faculty members in preparing and activating these programs. Various media platforms should be employed to raise awareness of the phenomenon of digital drugs and their dangers to individuals and societies in general. Educational institutions and security agencies collaborate to establish and develop educational programs, seminars, and lectures to address the nature of digital drugs, their dangers, and ways to prevent them. These programs should target and serve all members of society, with a particular focus on university students. The researchers suggest conducting similar studies at other universities in Oman.

7. Limitations

The study was conducted on undergraduate students at Sultan Qaboos University during the spring semester of the academic year (2023/2024). The results of the study were limited to the sample community, and the study relied on the questionnaire only as a tool for collecting data. Therefore, the results of the study are limited by the reliability and stability of the study tool, as well as the accuracy, credibility and objectivity of the answers of the study sample members.

Declarations

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