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Deanship of Scientific Research

The Relationship between Screen Time, Sleep Quality, and BMI among Students at the University of Jordan

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Abstract

Objectives: This study aims to investigate the relationship between screen time, sleep quality, and BMI among students at the University of Jordan. Specific objectives include assessing the levels of sleep quality and average screen time, examining gender differences in these variables, and exploring their correlation with BMI.

Methods: A cross-sectional study was conducted involving 541 students (299 males and 242 females) from the University of Jordan. Participants completed health and lifestyle questionnaires, including the Sleep Quality Scale (SQS) and the Questionnaire for Screen Time of Adolescents (QueST). BMI was calculated from measured height and weight. Statistical analyses, including t-tests and correlation coefficients, were employed to explore the relationships between variables.

Results: The study found a moderate level of sleep quality among students (mean SQS score: 1.45). The average daily screen time was 4 hours and 31 minutes, with significant differences between males and females in non-academic screen time activities. A significant negative correlation was observed between sleep quality and BMI ($p < 0.05$). Additionally, higher screen time was significantly associated with higher BMI ($p < 0.05$), with gender differences observed in both sleep quality and screen time behaviors.

Conclusions: The findings indicate that prolonged screen time and poor sleep quality are prevalent among university students and are significantly associated with higher BMI. These insights highlight the need for interventions targeting screen time reduction and sleep quality improvement to promote healthier lifestyles and prevent obesity among students.

Keywords: Screen time; sleep quality; BMI; gender differences

العلاقة بين وقت الشاشة وجودة النوم ومؤشر كتلة الجسم بين طلاب الجامعة الأردنية

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ملخّص

الأهداف: تهدف هذه الدراسة إلى دراسة العلاقة بين وقت الشاشة، وجودة النوم، ومؤشر كتلة الجسم بين طلاب الجامعة الأردنية. وتتضمن الأهداف المحددة تقييم مستويات جودة النوم ومتوسط وقت الشاشة، وفحص الفروق بين الجنسين في هذه المتغيرات، واستكشاف ارتباطها بمؤشر كتلة الجسم.

المنهجية: أجريت دراسة مقطعية شملت 541 طالبًا (299 ذكرًا و242 أنثى) من الجامعة الأردنية. أكمل المشاركون استبيانات الصحة ونمط الحياة، بما في ذلك مقياس جودة النوم (SQS) واستبيان وقت الشاشة (QueST). تم حساب مؤشر كتلة الجسم من الطول والوزن المقاسين. تم استخدام التحليلات الإحصائية، بما في ذلك اختبارات t ومعاملات الارتباط، لاستكشاف العلاقات بين المتغيرات.

النتائج: وجدت الدراسة مستوى متوسطًا لجودة النوم بين الطلاب (متوسط درجة SQS: 1.45). كان متوسط وقت الشاشة اليومي 4 ساعات و 31 دقيقة، مع وجود اختلافات كبيرة بين الذكور والإناث في أنشطة وقت الشاشة غير الأكاديمية. لوحظ وجود ارتباط سلبي كبير بين جودة النوم ومؤشر كتلة الجسم. بالإضافة إلى ذلك، ارتبط وقت الشاشة الأعلى بشكل كبير بارتفاع مؤشر كتلة الجسم، مع ملاحظة اختلافات بين الجنسين في كل من جودة النوم وسلوكيات وقت الشاشة.

خلاصة الدراسة: تشير النتائج إلى أن وقت الشاشة المطول وسوء جودة النوم منتشران بين طلاب الجامعات ويرتبطان بشكل كبير بارتفاع مؤشر كتلة الجسم. تسلط هذه الرؤى الضوء على الحاجة إلى التدخلات التي تستهدف تقليل وقت الشاشة وتحسين جودة النوم لتعزيز أنماط الحياة الصحية ومنع السمنة بين الطلاب.

الكلمات المفتاحية: وقت الشاشة، جودة النوم، مؤشر كتلة الجسم، الاختلافات بين الجنسين.

Introduction

In modern societies, characterized by the huge influence of technology and digital progress, the issue of high BMI has emerged as public health challenge (Hinchliffe et al., 2022). In recent years, there has been a growing focus on two prominent elements which are sleep quality and screen time (Bani-Issa et al., 2023). Sleep quality is defined as an individual's self-satisfaction with all aspects of the sleep experience (Nelson et al., 2021), whereas screen time pertains to the duration individuals spend involved with electronic devices, such as smartphones, computers, and televisions (Nakshine et al., 2022). There are research indicating a strong connection between inadequate sleep quality and a higher probability of being overweight or obese (Patel et al., 2006; Chaput et al., 2007; Gangwisch et al., 2005; Buxton & Marcelli, 2010; Snell et al., 2007).

Sleep is connected to various hormonal and metabolic processes in the body and is important in maintaining metabolic homeostasis (Sharma & Kavuru, 2010). A correlation exists between insufficient sleep length and disturbed sleep patterns with hormonal changes, specifically in ghrelin and leptin levels, which regulate feelings of appetite and satisfaction (Cooper et al., 2018). Insufficient sleep can result in elevated ghrelin levels and reduced leptin levels. It may prompt excessive food intake and the consumption of energy-dense meals, hence contributing to weight gain (Taheri et al., 2004). Furthermore, it has been observed that inadequate sleep quality has the potential to impact insulin sensitivity and glucose metabolism, which can worsen susceptibility to obesity (Spiegel et al., 2005).

Recent research has shown a significant correlation between inadequate sleep and the development of insulin resistance, impaired glucose tolerance, and type 2 diabetes progression (Spiegel et al., 2005). Research indicates sleep deprivation can lead to weariness and decreased physical activity levels. This decrease in physical activity can, in turn, increase the likelihood of weight gain. The impact of technology on human behavior and lifestyle has been substantial, leading to a notable increase in the amount of time individuals spend engaging with screens (Nakshine et al., 2022; Al-Rahamneh et al., 2022). Prolonged screen time contributes to the development of an "obesogenic" environment, which is known to foster weight gain and obesity, particularly among the younger demographic of children and adolescents. (Kansra et al., 2021). Using electronic devices, particularly during nighttime, can disrupt sleep patterns by disturbing the body's circadian rhythm (AlShareef, 2022).

Study Problem

Prolonged screen time has become a pervasive issue among university students, potentially leading to detrimental effects on their sleep quality and overall health. At the University of Jordan, there is growing concern about the increasing prevalence of sedentary lifestyles and poor sleep habits among students, which may be contributing to higher BMI and associated health risks.

Despite the critical nature of these issues, there is a lack of comprehensive research examining the interconnectedness of screen time, sleep quality, and BMI within this specific population. This study aims to investigate the relationship between screen time, sleep quality, and BMI among students at the University of Jordan.

Study Significance

Excessive screen time can lead to sedentary behavior, contributing to higher BMI and associated health issues like obesity, diabetes, and cardiovascular diseases. Also, poor sleep quality and high BMI are linked to mental health problems such as depression and anxiety, which can impact students' overall well-being.

Sleep quality directly affects cognitive functions such as memory, attention, and problem-solving skills. Poor sleep can impair academic performance. Hence, understanding the relationship between these factors can help in developing educational programs to promote healthier lifestyle choices among students. on the other hand, identifying negative patterns can lead to the implementation of preventive measures, such as encouraging regular physical activity and promoting good sleep hygiene.

Cultural, social, and environmental factors in Jordan might influence screen time, sleep quality, and BMI. Studying these relationships in the local context can provide tailored recommendations and interventions. Also, the study can provide a foundation for further research on related topics, such as the impact of social media usage, the role of diet, and other lifestyle factors affecting students' health. Understanding these relationships is crucial for developing strategies to improve

the overall health and academic success of university students.

Study Purposes

The study aims to investigate:

- The level of sleep quality among students at the University of Jordan.
- The average durations of time spent by students at the University of Jordan using electronic screens.
- The difference between students at the University of Jordan in sleep quality and the number of hours spent watching electronic content attributed to the student's gender.
- The relationship between sleep quality and BMI among students at the University of Jordan.
- The relationship between screen time and BMI among students at the University of Jordan.

Study Questions

The study questions are:

- What is the level of sleep quality among students at the University of Jordan?
- What are the average durations of time spent by students at the University of Jordan using electronic screens?
- Is there a statistically significant difference at the ($\alpha \leq 0.05$) level between students at the University of Jordan in sleep quality and the number of hours spent watching electronic content attributed to the student's gender?
- Is there a statistically significant relationship at the level ($\alpha \leq 0.05$) between sleep quality and BMI among students at the University of Jordan?
- Is there a statistically significant relationship at the level ($\alpha \leq 0.05$) between screen time and BMI among students at the University of Jordan?

Methods

This study was conducted on a sample of 541 students, comprising 299 males and 242 females. The inclusion criteria required participants to be healthy Jordanian students currently enrolled at the University of Jordan, aged 18 years or older. To assess eligibility, participants completed a health questionnaire designed to evaluate their overall health status. This questionnaire included inquiries regarding the presence of chronic diseases or disabilities that might impair their ability to participate in everyday activities. Students diagnosed with any chronic disease, such as diabetes, hypertension, arthritis, asthma, cancer, eating disorders, heart disease, or any other chronic condition or disability, were excluded from participation in this study. Body mass was measured for each subject to the nearest 0.5 kg, and height was measured for each subject to the nearest 1.0 cm while standing barefoot wearing shorts (Al-Rahamneh et al., 2020). Body mass index was used as an indicator relating an individual's weight to their height (CDC, 2022). It is calculated by dividing a person's weight in kilograms by the square of their height in meters (Priest, 2010). Centers of Diseases and Control and Prevention (CDC) consider a BMI of less than 18.5 kg\m^2 underweight, while a BMI equal to or greater than 25 kg\m^2 is considered overweight, and above 30 kg\m^2 is considered obese (CDC, 2022). For adults, BMI is interpreted using standard weight status categories. These categories are the same for men and women of all body types and ages. Table (1) shows means and standard deviations for height, weight measurements, and BMI distributed according to the gender variable.

Table (1): Means and standard deviations for height, weight measurements, and BMI distributed according to the gender variable.

Measurements \ Variables	Males		Females		Total sample	
	mean	SD	mean	SD	mean	SD
Height (m)	1.76	0.07	1.61	0.04	1.69	0.10
Weight (kg)	74.83	11.63	60.12	10.24	68.25	13.23
BMI (kg\m^2)	24.07	3.09	23.26	4.09	23.71	3.59

Table (1) shows that males and females have a normal weight on average (24.07 ± 3.09, 23.26 ± 4.09), respectively. The total mean for the sample was (23.71 ± 3.59), considered normal weight according to CDC categories. Upon obtaining

authorization from the author, the researchers translated the Sleep Quality Scale (SQS) by Shin (2012) into Arabic to assess sleep quality among the University of Jordan students. Consisting of 28 items using a four-point Likert-type scale, respondents indicate how frequently they exhibit certain sleep behaviors (0 = "few," 1 = "sometimes," 2 = "often," and 3 = "almost always") according to the original answer key. Researchers followed a systematic cross-cultural adaptation process that involved forward translation, synthesis, and back-translation. The expert panel Intraclass Correlation Coefficient was calculated for the SQS questionnaire to examine the reliability (ICC) = 0.825. The researchers employed the Questionnaire for Screen Time of Adolescents (QueST) developed by Knebel et al. (2022) to assess screen time. The researchers translated the questionnaire into Arabic after obtaining the author's consent. The expert panel Intraclass Correlation Coefficient was calculated for the QueST to examine the reliability (ICC) = 0.867. Both questionnaires were international tools. This study was conducted following institutional ethics approval from the School of Sport Sciences at the University of Jordan.

Results and Discussion

The present study investigates the relationship between screen time, sleep quality, and BMI among students at the University of Jordan by answering the following questions:

To answer the first question: **"What is the level of sleep quality among students at the University of Jordan?"** arithmetic means, and standard deviations were employed to estimate the periods describing the arithmetic means. Arithmetic means, and standard deviations were computed, utilizing a three-level categorical scale to describe the levels of the arithmetic means obtained (Low level of sleep quality (0.00 – 1.00), Moderate level of sleep quality (1.10 – 2.00) and High level of sleep quality (2.10 – 3.00)) Table (2) illustrates the results of this question:

Table (2): Levels of means for items of the sleep quality questionnaire among the University of Jordan students, arranged in descending order based on arithmetic means (n=541).

Num	Item of the sleep quality questionnaire	mean	SD	Level	Rank
8	I feel refreshed after sleep	2.56	0.70	High	1
5	I wake up easily because of noise	2.04	1.00	Moderate	2
27	I have a clear head after sleep	1.99	0.98	Moderate	3
26	Poor sleep makes me easily tired at work	1.83	0.97	Moderate	4
18	My fatigue is relived after sleep	1.79	1.13	Moderate	5
11	Poor sleep makes me irritated	1.76	0.93	Moderate	6
10	Poor sleep gives me headaches	1.74	0.96	Moderate	7
16	I feel vigorous after sleep	1.69	1.03	Moderate	8
22	Poor sleep makes it hard to concentrate	1.63	1.02	Moderate	9
12	I would like to sleep more after waking up	1.56	1.07	Moderate	10
6	I toss and turn	1.48	1.10	Moderate	11
15	Poor sleep makes hard for me to think	1.46	0.97	Moderate	12
2	I fall into a deep sleep	1.45	0.95	Moderate	13
17	Poor sleep makes me lose interest in work	1.45	0.93	Moderate	14
28	Poor sleep makes my life painful	1.42	1.06	Moderate	15
24	Poor sleep makes me lose desire in things	1.37	1.17	Moderate	16
19	Poor sleep causes me to make mistakes at work	1.29	1.05	Moderate	17
23	Sleepiness interferes with my daily life	1.29	1.03	Moderate	18
21	Poor sleep makes me forget things more easily	1.27	1.14	Moderate	19
13	My sleep hours are enough	1.22	0.96	Moderate	20
25	I have difficulty getting out of bed	1.19	1.09	Moderate	21

Num	Item of the sleep quality questionnaire	mean	SD	Level	Rank
1	I have difficulty falling a sleep	1.16	1.08	Moderate	22
3	I wake up while sleeping	1.07	0.83	Moderate	23
20	I'm satisfied with my sleep	1.07	1.00	Moderate	24
14	Poor sleep makes me lose my appetite	1.03	0.97	Moderate	25
4	I have difficulty getting back to sleep once I wake up	1.02	0.98	Moderate	26
9	I feel unlikely to sleep after sleep	0.99	0.91	Low	27
7	I never go back to sleep after awaking during sleep	0.79	0.81	Low	28
	Total	**1.45**	**0.42**	**Moderate**	

The previous table showed the average values of the items in the Sleep Quality Scale for students at the University of Jordan, arranged in descending order based on arithmetic means. Upon reviewing the arithmetic mean value for the total score, representing all items in the Sleep Quality Scale, it was found to be (1.45). This value indicates a moderate level of sleep quality according to the classification scale used. Notably, item number (8), which indicates "I feel refreshed after sleep," achieved the highest mean value among the arithmetic means, reaching (2.56). This value is classified as high. Conversely, the item number (7), stating " I never go back to sleep after awaking during sleep," achieved the lowest mean value among the item averages, with a value of (0.79) which represents a low level.

As we got the arithmetic mean values for positive and negative items, they fluctuated between 2.56 (high) and 1.45 (low), demonstrating variability in sleep quality across different aspects measured by the scale. The outcomes can be attributed to multiple factors influencing sleep patterns and quality. Various factors may influence the results, including individual variations, stress levels, and personal habits that impact sleep quality. A study by Almojali et al. (2017) documented a statistically significant association between stress and poor sleep quality among a stratified random sample of male and female medical students at King Saud bin Abdulaziz University for Health Sciences in Riyadh, Saudi Arabia. Additionally, occasional and chronic poor sleepers reported being significantly more depressed, without energy, tense, moody, irritable, and less rested and alert than good sleepers in a study done by Kirmil-Gray et al. (1984). Students may have different sleep patterns and strategies for dealing with stress, which can result in differences in their self-reported sleep quality. Personal habits such as caffeine consumption and smoking contribute to poor and insufficient sleep. According to Lohsoonthorn et al. (2013), the use of stimulants like caffeine and nicotine has also been associated with inferior sleep quality and quantity. Students who consume larger amounts of caffeinated beverages have a twofold increased likelihood of encountering sleep difficulties, encompassing both the quality and amount of sleep (Wright et al., 1997). Furthermore, sleep quality can be influenced by environmental factors and living situations, such as the arrangement of dormitories levels of noise. As shown in Table (3), the fifth question came in the second rank: "I wake up easily because of noise," which means that high noise had a negative impact on sleep quality (Younis et al., 2021). A study by Cao et al. (2021) showed that temperature as an environmental factor is the main factor affecting sleep quality, while relative humidity and illuminance have relatively insignificant effects.

Academic and social stressors are additional elements that impact the quality of sleep. University life frequently presents novel intellectual and social obstacles. Academic demands, time constraints, and social engagements can impact stress levels, which may affect sleep quality. A previous study showed that academic stress negatively predicts sleep quality. Individuals with more academic stress may have worse sleep quality (Deng, 2023).

Arithmetic means and standard deviations were employed to answer the second question: "**What are the average durations of time spent by students at the University of Jordan using electronic screens?**". Table (3) illustrates the results of this question.

Table (3): Average durations of time spent by students at the University of Jordan using electronic screens (n=541).

Num	Statement: On a typical day, how much time do you spend...	mean (H:M)	SD (H:M)
1	...studying, watching video classes, reading, doing research, or school work on a computer, television, tablet, smartphone, or other electronic devices?	6:16	5:10
2	...doing job or internship-related work on a computer, television, tablet, smartphone, or other electronic devices?	3:43	3:03
3	...watching TV shows, movies, soap operas, news, sports, programs, or other videos on a computer, television, tablet, smartphone, or other electronic devices?	3:40	3:34
4	...playing video games on a games console, computer, television, tablet, smartphone, or other electronic devices?	2:27	4:08
5	...using social media like Facebook, Instagram, Twitter, Snapchat, or chat applications like WhatsApp, Telegram, Messenger on a computer, television, tablet, smartphone, or other electronic devices?	4:33	4:02

Table (3) illustrates students' average time in front of screens at the University of Jordan. The total average is 4 hours and 31 minutes spent daily in front of screens to study, do a job, watch shows, play games, and use social media. The data demonstrates disparities in the time spent on screens during various activities. The prolonged viewing time for the first-ranked question about academic workload and online learning, related to academic activities such as studying, attending video classes, and doing research, could be attributed to the increasing reliance on electronic devices for education (Smith et al., 2020). Especially after the Corona pandemic, several online courses depend on blended learning or hybrid learning strategies. Also, students may spend extensive time on academic tasks due to the nature of their coursework and the prevalence of online learning resources (Fang & Wu, 2023).

The relatively high average for social media usage (second-ranked question) aligns with the growing influence of social media platforms on students' daily lives. Social media technology has become essential to personal life as users generate content and share photos. The ubiquity of social media is no more apparent than at the university, where technology transforms how students communicate, collaborate, and learn (Tess, 2013). Hence, increased connectivity through social media may contribute to extended screen time as students engage in online social interactions (Twenge and Campbell, 2018).

As indicated by the third-ranked question, the amount of time dedicated to employment or internship-related tasks demonstrates the integration of professional responsibilities into students' daily schedules. Remote work options and digital platforms might lead to students devoting significant amounts of time to work-related tasks, as these remote jobs are becoming more common and appropriate choices for university students as part-time or full-time duties. A study by Kureková and Žilinčíková (2016) showed that full-time work is more harmful to academic performance than part-time work arrangements. However, recent research suggests that students who work and study simultaneously are more likely to obtain a favorable labor market outcome after graduation. Work experience during studies can support the development of soft skills such as time management, a sense of responsibility, job-search skills, or increased confidence.

The viewing time for watching TV shows, movies, and other videos (fourth-ranked question) indicates that a significant portion of students' screen time is allocated to entertainment (Lissak, 2018). The availability of diverse content on electronic devices contributes to leisure-based screen activities that increase sedentary behaviors (Bertuolm et al., 2023).

The average time spent playing video games (fifth-ranked question) is in line with the popularity of gaming among students (Granic et al., 2014). Gaming has become a prevalent form of leisure and recreation, influencing students' screen time patterns.

It's crucial to note that individual differences, technological accessibility, and lifestyle choices also contribute to the

observed variations in screen time (Primack et al., 2017). These results highlight the multifaceted nature of screen-time behaviors among university students.

To answer the third question: **"Is there a statistically significant difference at the (α≤0.05) level between students at the University of Jordan in sleep quality and the number of hours spent watching electronic content attributed to the student's gender?"** arithmetic means, standard deviations and t-test were employed. Table (4) illustrates the results of this question.

Table (4): Results of the t-test for differences in sleep quality among the University of Jordan students attributed to the gender variable (n=541).

Variable	Gender	n	mean	SD	t	Sig.
sleep quality	Male	299	1.42	0.40	1.98	0.049
	female	242	1.49	0.44		
On a typical day, how much time do you spend studying, watching video classes, reading, doing research, or school work on a computer, television, tablet, smartphone, or other electronic devices?	Male	299	5:53	5:27	1.89	0.059
	Female	242	6:44	4:47		
On a typical day, how much time do you spend doing job or internship-related work on a computer, television, tablet, smartphone, or other electronic devices?	Male	299	4:08	2:50	3.65	0.000
	Female	242	3:11	3:14		
On a typical day, how much time do you spend watching TV shows, movies, soap operas, news, sports, programs, or other videos on a computer, television, tablet, smartphone, or other electronic devices?	Male	299	4:02	3:47	2.62	0.009
	Female	242	3:13	3:14		
On a typical day, how much time do you spend playing video games on a games console, computer, television, tablet, smartphone, or other electronic devices?	Male	299	2:47	4:19	2.09	0.036
	Female	242	2:02	3:53		
On a typical day, how much time do you spend using social media like Facebook, Instagram, Twitter, Snapchat, or chat applications like WhatsApp, Telegram, Messenger on a computer, television, tablet, smartphone, or other electronic devices?	Male	299	3:40	2:46	5.86	0.000
	Female	242	5:39	4:59		

The observed results in table (4), specifically the t-test for differences in sleep quality among students at the University of Jordan based on gender, indicate a statistically significant difference in sleep quality between male and female students. The significance level of 0.049, which is less than the conventional threshold of 0.05, suggests that this difference is not likely due to random chance. Differences in sleep quality between genders may be attributed to biological factors, including hormonal variations that influence sleep patterns differently in males and females (Krishnan & Collop, 2006). Circadian rhythms and hormonal fluctuations, such as those associated with the menstrual cycle, can impact sleep quality in females (Boivinet et al., 2022). Psychosocial factors, such as stress and anxiety, can contribute to variations in sleep quality (Alvaro et al., 2013). Females may experience different stressors or cope with stress differently than males, influencing their sleep. Additionally, variations in sleep hygiene practices, such as bedtime routines and electronic device usage before sleep, might differ between male and female students (Cunningham et al., 2016).

The obtained results, as outlined in the analysis of the significance levels for questions related to the time spent watching electronic content on screens, reveal patterns in the viewing habits of male and female students at the University of Jordan. The non-significant result for the question "On a typical day, how much time do you spend studying, watching video classes, reading, doing research, or school work on a computer, television, tablet, smartphone, or other electronic devices?" suggests that there is no statistically meaningful difference in the time spent on academic-related activities between male and female students. Academic workload and study habits may not exhibit gender-based variations significantly. Statistically significant differences favoring females in the remaining four questions imply that, on average, female students spend more

time in front of screens for various non-academic activities than their male counterparts. Researchers ascribe this outcome to the prevalent lifestyle in Jordan, wherein males do not allocate as much time at home as females, who, in contrast, spend more time at home, potentially affording them more opportunities to engage with screens. Psychosocial factors, which may differ between genders regarding entertainment preferences, leisure pursuits, and social interactions, could impact these differences (Boulianne, 2015).

The exception to the trend is observed in the question related to social media usage: "On a typical day, how much time do you spend using social media like Facebook, Instagram, Twitter, Snapchat, or chat applications like WhatsApp, Telegram, Messenger on a computer, television, tablet, smartphone, or other electronic devices?", where males spend more time. This may be linked to varying social behaviors and preferences in online social interactions, aligning with studies highlighting gender-based differences in social media engagement (Dhir et al., 2018). Existing research on media consumption patterns suggests that gender can shape preferences and usage patterns (Livingstone and Bovill, 2001). Hence, Differences in screen time may be related to varying motivations, such as entertainment, information-seeking, or social connection, which are influenced by sociocultural norms and individual preferences (Rideout, 2015).

To answer the fourth question: **" Is there a statistically significant relationship at the level (α≤0.05) between sleep quality and BMI among students at the University of Jordan?"** Table (5) shows the result.

Table (5): relationship between quality of sleep and BMI (n=541)

variables	r	Relation description	sig	result
Quality of sleep – BMI	-0.455	Inverse	0.000	significant

The result presented in table (5) indicates a statistically significant relationship between sleep quality and BMI among students at the University of Jordan. The correlation coefficient (r) of -0.455 suggests a moderately inverse relationship between sleep quality and BMI. This signifies that as the quality of sleep increases, there is a tendency for a reduction in BMI scores, and vice versa. In addition, the obtained p-value of 0.000 is less than the significance level (α≤0.05), indicating a highly significant statistical relationship between sleep quality and BMI.

The negative sign of the correlation coefficient emphasizes the inverse nature of the relationship. This implies that students who report higher sleep quality tend to have lower BMI scores, and those with lower sleep quality may exhibit higher BMI scores. Various factors could contribute to this observed relationship. Adequate sleep is known to influence metabolism, hormonal regulation (e.g., leptin and ghrelin), and appetite control, all of which are linked to body weight and BMI (Cappuccio et al., 2008; Taheri et al., 2004). Existing literature has demonstrated associations between sleep quality and weight-related outcomes. Studies have shown insufficient or poor-quality sleep can contribute to weight gain and obesity (Patel & Hu, 2008; Spiegel et al., 2004). While the results suggest a significant relationship, it is essential to recognize that correlation does not imply causation. Other confounding factors, such as dietary habits, physical activity, and overall lifestyle, may contribute to the observed relationship.

To answer the fifth question: **" Is there a statistically significant relationship at the level (α≤0.05) between screen time and BMI among students at the University of Jordan?"** Table (6) shows the result.

Table (6): relationship between screen time and BMI (n=541)

variables	r	Relation description	sig	Result
Time 1 (studying) - BMI	-0.341	Inverse	0.000	Significant
Time 2 (doing a job) - BMI	-0.013	Inverse	0.767	Not sig
Time 3 (watching shows) - BMI	0.111	proportion	0.010	Significant
Time 4 (playing) - BMI	-0.147	Inverse	0.001	Significant
Time 5 (social media) - BMI	0.113	Inverse	0.009	Significant

The observed relationships between screen time and BMI among students at the University of Jordan, as depicted in Table (6), highlight patterns in electronic content consumption and its association with BMI. In examining the statistical significance of the relationships, the results indicate that the time spent studying (Time 1), playing (Time 4), and on social media (Time 5) is significantly correlated with BMI. These findings align with existing literature that suggests a potential link between sedentary behaviors, such as screen time, and BMI (e.g., Tremblay et al., 2011; Saunders et al., 2014). Conversely, the time spent doing a job (Time 2) is not statistically significant, suggesting no substantial relationship between job-related screen time and BMI.

The correlation coefficients further elucidate the strength and direction of the relationships. The moderate inverse relationship between time spent studying (Time 1) and BMI (-0.341) suggests that as academic screen time increases, there is a tendency for a reduction in BMI. This finding may be associated with increased cognitive engagement during study sessions, potentially affecting energy expenditure.

The positive relationship observed in Time 3 (Watching shows) suggests that prolonged viewing of shows is associated with a slight increase in BMI. This finding is consistent with studies exploring the impact of prolonged screen time, particularly television viewing, on dietary habits and sedentary behavior (Pearson et al., 2014; Barr-Anderson et al., 2010). While these findings provide valuable insights, it is crucial to acknowledge the limitations of cross-sectional studies in establishing causation. The bidirectional relationship between screen time and BMI underscores the need for further longitudinal investigations to discern temporal associations and potential causal pathways (Biddle et al., 2017).

Conclusion

Results showed that students generally had moderate sleep quality, with notable variability in different aspects. The highest satisfaction was reported for feeling refreshed after sleep, while the lowest was for difficulties in returning to sleep after waking. In addition, screen time varied across activities, with academic-related screen use being the highest, reflecting increased reliance on electronic devices for education. Social media usage was also substantial, indicating its strong influence on students' lives.

Gender differences were evident, with female students reporting slightly better sleep quality and spending more time on screens for non-academic purposes. Male students engaged more in social media use.

A significant inverse relationship was found between sleep quality and BMI, suggesting better sleep quality is associated with lower BMI, possibly due to its effects on metabolism and appetite regulation. Screen time for studying, playing games, and using social media was significantly related to BMI. Academic screen time was inversely related to BMI, while watching shows was positively correlated, reflecting the impact of sedentary activities on weight gain.

These findings highlight the need for interventions to promote healthy sleep habits and balanced screen time to improve students' well-being and prevent negative health outcomes. Future research should explore these relationships longitudinally to better understand causal pathways and inform effective health strategies for students.

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