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Effect of Digital Addiction on the Sleep Quality and Sports Performance of University-Level Athletes

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Abstract

This study aimed to examine the effect of digital addiction on the sleep quality and sports performance of athletes at the university level. The research was quantitative in nature and used a cross-sectional design with the study population consisting of university athletes. Data were gathered by using a self-administered questionnaire. Pearson's correlation analysis, and linear regression analysis employed to find out the results. The results showed a significant negative relationship between digital addiction and both the quality of sleep and the level of sports performance. According to Pearson correlation analysis, the results were statistically significant at $p < 0.05$. Furthermore, the results of the regression analysis also confirmed that digital addiction had a significant negative effect on the sleep quality and sports performance of athletes, showing that higher levels of digital addiction were also associated with worse outcomes in these areas. Based on these results, it is recommended that awareness programs and digital usage management strategies must be introduced for athletes to help minimize excessive digital engagement and encourage healthier sleep and performance patterns.

Keywords

Digital Addiction, Sleep Quality, Sports Performance.

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Introduction

Sleep is the physiological process during which metabolic and other regulatory operations cease temporarily, allowing bodily systems to recuperate and ready themselves for subsequent metabolic and regulatory activities (Aldabal & Bahammam, 2011). There are two kinds of sleep: non-REM (sometimes termed slow waves) and rapid eye movement (REM). Depending on the frequencies of alpha, beta, theta, and delta waves, each kind has 2 to 3 phases. During one night of sleep, there are multiple sets of REM, non-REM, and waking stages that happen at different times. It is stated that these mechanisms are vital for the metabolism of cortical centers, different body systems, and their recovery (Bonnet et al., 1991). The biological clock, also known as the circadian rhythm, controls sleep-wake cycles and keeps the body's physiological activities in balance.

Sleep is a homeostatically regulated state of behavior in which movement and susceptibility to sensory stimuli are diminished. It happens again and again over a 24-hour period. The sleep process is regarded as a critical component of the cognitive and physiological activities of the human body (Fullagar et al., 2015). Sleep is important for everyone, not just athletes, to stay healthy and recuperate. It is thought that sleep is connected to homeostatic mechanisms that restore and refresh the body's primary physical and mental functions (Fullagar et al., 2015).

There is a lot of debate over how many hours people should sleep. Scientists say that adequate sleep normally lasts approximately eight hours. Recent research by the National Sleep Foundation show that healthy persons need sleep between seven and nine hours a night in order to be able to do routine daily activities (Hamlin et al., 2021). Despite this, it was shown that sportsmen necessitate much more sleep than the general populace to facilitate proper healing and adaptation between distinct activities. Some sources suggest that people should sleep for nine to ten hours instead of the seven to nine hours that most people need (Watson et al., 2017). Women are more likely to say they have trouble falling asleep and waking up in the middle of the night. Men, on the other hand, are more likely to say they are sleepy throughout the day. This may be attributable to the menstrual cycle in women, which can influence sleep-wake patterns. Numerous studies indicate that women's sleep habits are markedly influenced throughout pregnancy and the postpartum period. Pregnant women often feel quite sleepy during the day (Colten & Altevogth, 2006).

A lot of scientific research looks at how longer and better sleep might help sports performance. For instance, the research conducted by Brandt et al., (2017) involved 576 elite Brazilian athletes who were asked to report their sleep quality and mood just before to a national or

international tournament. Most of the people who took part said their sleep quality was normal or good. However, for those who had bad sleep quality, it was found that bad sleep had a detrimental influence on subsequent competition, even after taking into consideration the effects of anger, energy, and tension.

Researchers are seeing significant progress in many areas of technology, from humanoid robots to artificial intelligence. Digital technologies are changing people's lives in big ways because they are growing quickly, changing all the time, and expanding. So much so that using cellphones, tablets, and computers is now a necessary part of everyday life. This is true for both athletes and people who don't exercise. This type of obsessive technology usage makes everyday living easier, but it also threatens the structure of families and society. Nevertheless, the consequences of this technology addiction are inadequately comprehended at present (Gocer & Oniz, 2023). This study is to investigate the correlation between digital addiction and sleep quality in at-risk athletes, where digital addiction exerts significant influence, and to disseminate the findings to the academic literature.

This study is significant since it offers valuable insights for coaches, researchers, and trainers based on the findings. Addiction is characterized as substances or behaviors that induce atypical behaviors in the individual and hinder the complete fulfillment of their physical, mental, and biological functions (Uzgu et al., 2023).

Digital addiction pertains to individuals' interactions with digital technical devices and surroundings, including tablets, laptops, and social media platforms (Turac & Guler, 2023). Digital addiction is the relationship between a person and a machine that can affect people of any age (Dektas et al., 2023). Addiction arises from excessive computer use, which engenders feelings of fulfillment and a persistent desire in individuals (Cakır et al., 2011). Digital addiction is the most widespread sort of addiction these days. Advanced technology in the digital realm provides comfort to persons; hence, it is unavoidable that individuals, particularly youth, are influenced by digital addiction (Uzgu et al., 2023).

In 2021, 4.66 billion people used the internet for an average of 6.7 hours a day, 4.32 billion people used mobile internet, and 4.2 billion people used social media (Meng et al., 2022; Fiedler et al., 2023). Even if technology makes life easier in many ways, using it for things other than what it was made for might be bad for your health and mind (Cakır et al., 2011). Research unequivocally demonstrates that digital addiction engenders considerable issues in health, occupational, familial, and social domains. Recent study (Fiedler et al., 2023; Ong et

al., 2023) has focused on the effects of excessive social media use, which has the largest usage rate on digital platforms, on rising depression, anxiety, and especially mental health.

People who are addicted to social media think that the digital world they have created is a place where they can get rid of loneliness, yet the contrary is true. In other words, being addicted to social media makes you feel even more lonely (Uzgu et al., 2023). Digital addictions result in persistent inactivity, potentially leading to various health issues, including physiological and psychological disorders, eating disorders, obesity, learning disabilities, psychomotor skill impairments, headaches, visual disorders, sleep disturbances, aggression, body posture abnormalities, antisocial behavior, a propensity for violence, and diseases stemming from neglecting personal hygiene (Onal & Filiz, 2023).

These days, the most important things we use every day are electronics with screens (such TVs, smart phones, tablets, and PCs) that help us watch and listen to different kinds of media (Santos et al., 2024). People rely on their mobile devices and the Internet services they use more and more since they use them for so many different things every day. Méndez et al. (2024) say that being addicted to cellphones and the Internet is a type of behavioral addiction.

With the rise of technology, digital gaming addiction has become one of the behavioral addictions. Every day, more and more people have it. It is characterized by youngsters linking the game to reality, disregarding their real-life obligations, and perceiving the game as a primary task to be accomplished (Tas & Gunea, 2019). The incidence of gaming addiction among teenagers ranges from 2% to 15% (Aydın et al., 2024). In Turkey, the incidence of gaming addiction among teenagers was identified at 25-40% (Okan & Zengin, 2023). Its prevalence is rising everyday (Gulbetekin et al., 2021).

Excessive and frequently unregulated engagement with digital games has been demonstrated to lead to modifications in sleep patterns and the emergence of detrimental behaviors in children and teenagers. (Savcı & Aysan, 2017). Environmental elements, such as the use of digital games, computers, cellphones, tablets, and television, may significantly contribute to teenagers' incapacity to fulfill their sleep requirements adequately and satisfactorily (Tomczyk & Solecki, 2019). Insufficient and substandard sleep has been associated with several detrimental impacts on the physical, psychological, social, and cognitive development of children and adolescents (Brautsch et al., 2023). Sleep is a vital component in improving physical and intellectual performance during adolescence, a phase characterized by rapid physical development (Tuncay & Goger, 2022).

In addition to physical exercise, prior research indicates that excessive engagement in computer gaming and social media adversely affects sleep (Achab et al., 2011). Problematic or addicted gaming significantly correlates with sleep disturbances, including insomnia, reduced sleep length, and worse sleep quality (Levenson et al., 2016). Furthermore, a significant correlation existed between social media utilization and sleep disruption among university students (Achab et al., 2011). Cross-sectional research in Chongqing, China, found that over half of undergraduate students who used social media reported poor sleep quality (Xu et al., 2015). So, the more you play games or use social media on the internet, the more likely you are to have trouble sleeping.

One of the most essential biological functions of humans is sleep. It is a process in which the body's tissues heal from the metabolic processes that happen throughout the day and get ready for the next day's physiological performance (Aldabal & Bahammam, 2011). The influence of sleep on several physiological systems and vice versa has been recognized since antiquity (Coote, 1982). In the last several years, there have been technical breakthroughs in the physiological monitoring of sleep (Signal et al., 2005). There are several parts to sports performance.

Elite athletes' performance is contingent upon neuromotor function, effective cortical regulation, cognitive and motor memory, coordination, visual cueing, balance, concentration, cardiorespiratory endurance, hormonal regulation, and proficient energy metabolism (Gorman et al., 2015). Recent studies examine the physiological and psychological effects of sleep on athletic performance (Arnal et al., 2016).

Given that sleep influences cardiorespiratory endurance, neuromotor performance, mood, concentration, and metabolism, it is reasonable to conclude that sports performance will be significantly impacted by sleep deprivation or fragmentation (Boonstra et al., 2007; Luke et al., 2011). It may be postulated that overtraining, characterized by sleepless nights, travel, micro-sleep, and sleep disruptions resulting from environmental changes and emotional actions, may fragment or deprive sleep (Reilly et al., 2005). This may have an effect on how well you do in sports.

Objectives of the Study

The following objectives of the study are derived from the literature:

i. To investigate the prevalence and nature of digital addiction among university-level athletes.

ii. To examine the relationship between digital addiction and the sleep quality of university-level athletes.
iii. To examine the association between digital addiction and the sports performance of university-level athletes.
iv. To determine the effect of digital addiction on the sleep quality and sports performance of university-level athletes.

Research Questions

The following research questions are formulated from the existing literature:

RQ 1: What is the prevalence and nature of digital addiction among university-level athletes?

RQ 2: What is the relationship between digital addiction and the sleep quality of university-level athletes?

RQ 3: What is the association between digital addiction on the sports performance of university-level athletes?

RQ 4: What is the effect of digital addiction on the sleep quality and sports performance of university-level athletes?

Research Hypotheses

To accomplish the research questions, the following research hypotheses are formulated:

Ha1: There is a significant relationship between digital addiction and the sleep quality of university-level athletes

Ha1: There is a significant association between digital addiction and the sports performance of university-level athletes

Ha2: There is a significant effect of digital addiction on the sleep quality and sports performance of university-level athletes

Literature Review

The quantity and quality of sleep may influence performance, and there is an increasing comprehension of sleep patterns among professional athletes (Gupta et al., 2017). Sleep serves vital psychological and physiological processes that underpin the healing process (Nédélec et al., 2015). A good night's sleep is also important for regulating athletes' hormone levels and getting their metabolism back to normal (Driver et al., 2000). Everyone has a biological or circadian rhythm, which is controlled by several hormones (Vitale et al., 2017).

Regulates the sleep-wake cycle mechanism and many other things that might change over the day, such blood pressure, hormone levels, body temperature, physical performance, alertness,

mood, and intellectual aptitude (Davenne, 2009). In general, there are more disparities between people in how they do things at different times (Lastella et al., 2016). Previous research has shown that the effects of partial sleep deprivation (on cognitive, physical, hormonal, and inflammatory responses to different aspects of athletic performance) vary depending on the time of day. For example, performances in the evening went down, but performances in the morning stayed the same (Mejri et al., 2014).

Digital addiction is a phrase that includes being addicted to the internet, video games, social media, and other digital media (Ercan et al., 2023). Digital addiction encompasses not just excessive internet usage but also the compulsive engagement with mobile and PC games on digital devices that are operable offline (Meng et al., 2022; Gulu M et al., 2023; Fiedler et al., 2023). There is no agreement on whether men or women are more addicted to mobile phone use (Ong et al., 2023), although research indicates that males are more likely to get hooked because they spend too much time online and playing video games (Meng et al., 2022). There is agreement, though, that men and women use mobile phones for various things. Men tend to use their phones for gaming and entertainment, while women tend to use their phones for socializing (Ong et al., 2023).

Digital addiction is a significant contemporary issue. This study seeks to investigate the impact of digital addiction on sports performance. This part of the paper gives a synopsis of the literature, which includes descriptions of different studies done in this area. People who live a sedentary lifestyle have bad physical and mental health. People all throughout the world live a sedentary lifestyle. Exercise has many benefits, but only around 80% of teens and kids ages 13 to 18 do it regularly (Gulbetekin et al., 2021).

Research has shown that the frequency and duration of mobile phone usage are significant markers for evaluating mobile phone dependence, with persons utilizing mobile phones for over four hours daily regarded as prospective mobile phone dependents (Song et al., 2023). Currently, models elucidating the influence mechanisms of internet addiction have been established within psychology, suggesting that internet addiction may precipitate anxiety and depression, thereby impairing the ability to respond to life stressors or adverse events rationally, and exacerbating psychological symptoms and pain associated with such behavioral addictions (Mei et al., 2024).

Mobile phones have greatly enhanced the lives and training of athletes in the sports world. Athletes use their phones to keep track of their duties and responsibilities in many different areas of their lives, such school, family, and society (DesClouds & Durand-Bush, 2021). For

young athletes, MPD can cause a number of physical and mental health problems, such as emotional disturbance, poor sleep quality, trouble getting along with others, lower cognitive function, and trouble focusing, all of which can make them perform worse in sports (Encel et al., 2017; Gould et al., 2020; Jones et al., 2021). In recent years, MPD has emerged as a significant study subject, garnering heightened focus within the domain of sports psychology. Chronic problematic mobile phone usage may deplete the attentional resources and cognitive capacities of athletes (DesClouds & Durand-Bush, 2021; Ong et al., 2022), resulting in mental fatigue and constraining athletic performance in both training and competition (Fortes et al., 2022).

The increase in psychological problems caused by social media addiction makes it much harder for people to grow into well-rounded adults who are good at morals, intelligence, physical health, and art (Guoliang, 2022).

Teenagers' mental health problems are complicated, and one of the main causes is their addiction to social media (Fardouly & Vartanian, 2015). Young athletes often use social media to talk about their training, give tips on how to win competitions, and find out more about fitness. But they haven't been able to achieve their competitive peaks because they spend too much time on social media and have addiction issues. This takes up their time and makes them feel worse mentally, especially when it comes to dealing with unpleasant emotions.

The abundance of information and constant interactions on social media might cause young athletes to compare their looks more often, which can lower their self-esteem and make them feel bad (Schaefer & Thompson, 2014). Adolescent athletes who spend too much time on social media may have trouble sleeping and have worse sleep quality, which is important for controlling their emotions. Adolescent athletes' bad feelings might get worse since they compare their looks to others and don't get enough sleep (Lin et al., 2025).

Research Methodology

The research methodology is based on the following parameters:

The research utilized a quantitative research design to examine how digital addiction impacts the sleep quality among the athletes in university level. The cross-sectional research design was used, which enabled the researcher to gather data at one point and examine the relationship between the two variables. The study concentrated on male and female university players, and there was gender representation.

The research used simple random sampling to get reliability and fairness in the selection of the participants. This approach gave all the athletes equal opportunities of becoming part of the sample. The sample size of 250 players was enough to perform meaningful statistical analysis. This sampling plan reduced bias and enhanced the validity of the results of the study.

The self-administered questionnaires were used to conduct data collection as they provided athletes with a chance to answer on their own and be honest. Questionnaire content validity was maintained by professionals in the field of sports sciences. The questionnaire was pilot tested on 30 players before actual data collection to test the clarity, reliability and validity of the questionnaire. The pilot test provided feedback that enabled the instrument to be refined so that the final tool was well-suited to measure digital addiction and sleep quality in athletes at the university.

Pilot Testing of Sleep Quality

Table 3.1 KMO and Bartlett's Test of Sleep Quality

Variable	Test		Adequacy
Sleep Quality	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.758
	Bartlett's Test of Sphericity	Approx. Chi-Square	416.160
		Df	105
		Sig.	.000

KMO value of 0.758 for sleep quality showed that the sampling adequacy was considered acceptable, indicating that the data can be used for the variable factor analysis. Bartlett's Test of Sphericity showed that the Chi-Square was 416.160 at a = 105 degrees of freedom, which was very significant ($p < 0.001$), and proved that the items were enough correlated as displayed in Table 3.1. Taken together, these results confirmed the appropriateness of the dataset for conducting further factor analysis.

Table 3.2 Pattern Matrix of Sleep Quality

Items	Factor Loading
Subjective Sleep Quality	
I am generally satisfied with the quality of my sleep.	.860
My sleep is restful and refreshing.	.890
I am often dissatisfied with the quality of my sleep.	.821
Overall, I would describe my sleep as high quality.	.787
I believe the quality of my sleep is good compared to others.	.842
Sleep Duration	
I get enough sleep to feel alert during the day.	.766
I maintain a consistent sleep duration on weekdays and weekends.	.888

I feel that the number of hours I sleep is sufficient for my health.	.663
My average sleep duration meets the recommended 7–9 hours.	.773
My sleep duration is usually shorter than my peers.	.865
Daytime Dysfunction	
I often feel sleepy during lectures or training sessions.	.565
Lack of sleep affects my sports performance.	.765
I can maintain focus throughout the day without feeling drowsy.	.848
Daytime sleepiness negatively affects my social or academic life.	.858
I feel energetic and active during the day.	.768

The result of pattern matrix of sleep quality showed that the items of three sub-dimensions of subjective sleep quality, sleep duration, and daytime dysfunction had good factor loadings of .565 to .890. So, all values were well over the acceptable threshold value of .40, so the items were well representative of their factors. The arrangement of items within each sub-dimension was logical, which provided evidence of the validity and reliability of the scale. Thus, the factor structure of sleep quality was deemed suitable for additional statistical analysis as revealed in Table 3.2.

Table 3.3 Reliability Scores of Sleep Quality

Variable	No of Items	Cronbach's Alpha
Sleep Quality	15	.881

A 15-item Sleep Quality scale with a high reliability coefficient of .881 was obtained. This finding indicates good internal consistency, which suggests that the items were highly reliable in measuring the construct well as displayed in Table 3.3.

Pilot Testing of Sports Performance

Table 3.4 KMO and Bartlett test of the Sports Performance of Athletes

Variables	Test		Adequacy
Players' Performance	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.735
	Bartlett's Test of Sphericity	Approx. Chi-Square	66.132
		Df	17
		Sig.	.000

The Kaiser-Meyer-Olkin (KMO) value for sports performance was found to be .735 which indicated the sample was adequate for a factor analysis. Bartlett's Test of Sphericity revealed Chi-square of 66.132 with 17 degrees of freedom and a level of significance of .000 that confirmed a correlation matrix was not an identity matrix as shown in Table 3.4. These results suggested that data of the sports performance of athletes had acceptable validity and were

suitable for further statistical analysis in the study on the effect of digital addiction on sleep quality and sports performance of athletes at the university level.

Table 3.5 Pattern Matrix of Sports Performance

Items	Factor Loading
I can maintain a high level of energy throughout my training sessions.	.865
My reaction time during matches or training is quick and effective.	.765
I am satisfied with my endurance and stamina during sports activities.	.765
I can maintain concentration and focus during competitions.	.781
My speed and agility meet the demands of my sport.	.821
I am able to recover quickly after intense physical activity.	.876
I consistently perform well under pressure during competitions.	.711
I am satisfied with my overall technical skills	.811
My coordination and balance help me perform effectively in my sport.	.671
I feel confident in my ability to contribute to my team's performance.	.781

Pattern matrix items for sports performance included major aspects of energy, reaction time, endurance, focus, speed, recovery, and confidence with range between .865-.711. These items were regarded as appropriate for factor analysis and further statistical examination as shown in Table 3.5.

Table 3.6 Reliability Scores of Sports Performance

Variables	No of Items	Cronbach's Alpha
Sports Performance	10	.831

The reliability analysis of sports performance revealed that the scale made of 10 items had a value of .831 which was determined by Cronbach's Alpha, indicating that the internal consistency of the scale was good. This suggested that the items used in measuring sports performance of athletes were reliable and provided similar results which made the scale suitable for further statistical analysis in the study on the effect of digital addiction on sleep quality and sports performance of university level athletes as revealed in Table 3.6

Pilot Testing of Digital Addiction

Table 3.7 KMO and Bartlett's Test of Digital Addiction

Variable	Test		Adequacy
Digital Addiction	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.780
	Bartlett's Test of Sphericity	Approx. Chi-Square	500.501
		Df	190
		Sig.	.000

The KMO and Bartlett's Test for digital addiction revealed that the KMO value was .780, which indicated a good level of sampling adequacy for factor analysis as displayed in Table 3.7. Bartlett's Test of Sphericity was also significant (chi squared = 500.501, df = 190, $p < .001$), confirming the correlation matrix was not an identity matrix. These results proved that the data was appropriate to carry out a factor analysis.

Table 3.8 Pattern Matrix of Digital Addiction

Items	Factor Loading
Online Gaming Addiction	
I spend more time playing online games than I initially planned.	.754
I feel restless or irritated when I cannot play online games.	.777
Online gaming interferes with my sleeping schedule.	.843
I often sacrifice my sleep to continue playing games.	.754
My sports performance suffers when I spend long hours gaming.	.865
I find it difficult to stop gaming even when I feel sleepy.	.675
I neglect my training or study schedule because of gaming.	.876
Smartphone Addiction	
I check my smartphone right before going to bed.	.877
I wake up at night to check my smartphone.	.776
I feel anxious when I am away from my smartphone.	.767
Using my smartphone late at night affects my sleep quality.	.754
I delay my sleeping time because of smartphone use.	.786
I cannot concentrate during training because of late-night phone usage.	.757
I experience reduced sleep hours due to smartphone overuse.	.834
Social Media Addiction	
I cannot fall asleep without checking my social media accounts.	.832
I lose track of time while scrolling social media.	.754
I feel compelled to check social media updates even at night.	.753
I prioritize social media over rest or sleep.	.676
I often wake up tired because of late-night social media usage.	.711
Social media distractions reduce my focus on sports activities.	.671
I find it difficult to limit my social media use at night.	.729

The pattern matrix of digital addiction resulted in three distinct factors, namely Online Gaming Addiction, Smartphone Addiction, and Social Media Addiction with factor loadings between .671 and .877. All items had strong associations with respective constructs, above the acceptable threshold of .40, indicating validity of the scale. Clusters of items under the three categories signified a logical and consistent structure. Therefore, the factor structure of digital addiction proved to be suitable and reliable for subsequent statistical analysis as Shown in Table 3.8

Table 3.9 Reliability Scores of Digital Addiction

Variable	No of Items	Cronbach's Alpha
Digital Addiction	23	.815

The reliability analysis of digital addiction showed that the 23 items produced a Cronbach's alpha value of .815. This score was above the acceptable level of .70 for good internal consistency of the scale as revealed in Table 3.9. Hence, the instrument was regarded as reliable to measure digital addiction and it was suitable to be further analyzed.

Results

The findings of the present study were analyzed using different statistical techniques.

Table 4.1 Mean and Standard Deviation of Demographic Variables (n=250)

	N	Minimum	Maximum	Mean	Std. Deviation
Age in years	250	18	28	22.06	2.360
Gender	250	1	2	1.70	.459
Field of Study	250	1	2	1.34	.473
Average Daily Screen Time	250	1	6	3.12	1.397
Nature of Digital Addiction	250	1	5	3.01	1.616

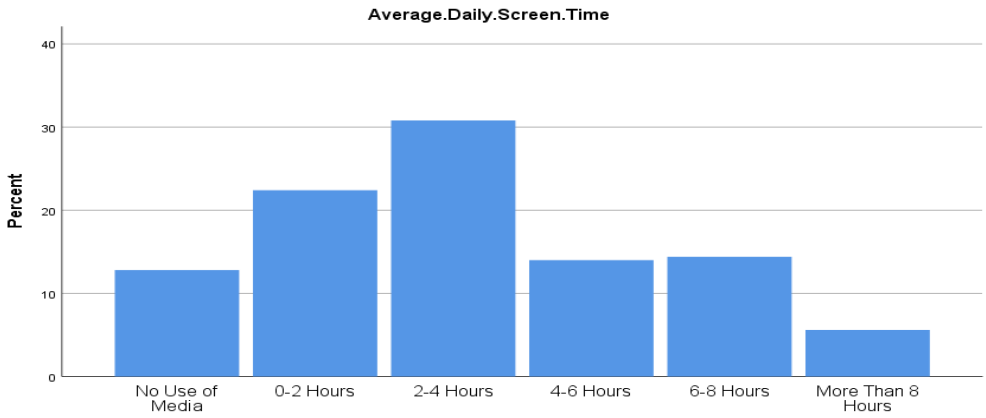
The results revealed that the ages of the athletes were from 18-28 years old with a mean of 22.06, indicating the majority of the participants were young adults. The small standard deviation (2.360) reflected the fact that the sample was fairly homogeneous with regard to age. Gender distribution showed that male and female athletes were represented in the group with an average score of 1.70 indicating slightly more males than females. The low standard deviation (.459) indicated a balanced representation with no wide variation. Similarly, the field of study indicated an average score of 1.34 indicating a trend that most participants were concentrated on one dominant academic field. The small spread, which had a standard deviation of .473, indicated that athletes were primarily from one of two categories assessed.

In terms of digital habits, the mean time the athletes spent on their screens per day was 3.12, which is a moderate use, but the higher standard deviation (1.397) indicated a significant variance between individuals. Some participants spent much more or less time on screens than the average. For the nature of digital addiction, the mean score was 3.01 which indicates moderate tendency towards addictive behaviors through different digital platforms. The relatively large standard deviation (1.616) revealed great variations in participants, indicating

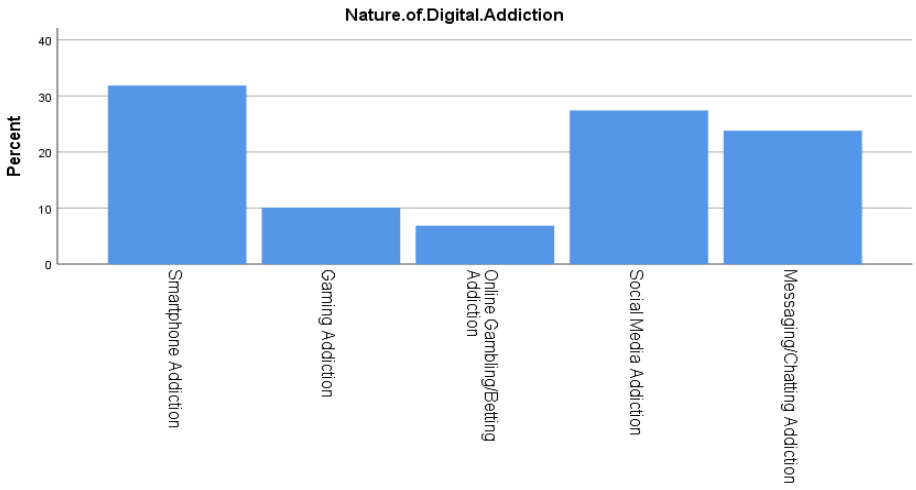
that while some athletes were strongly affected by digital addiction, others were barely affected at all as displayed in Table 4.1.

Prevalence and Nature of Digital Addiction Among University-Level Athletes

The following graph presents the prevalence and nature of digital addiction among athletes at the university level. It shows the percentage of athletes who are affected and the exact patterns of digital usage that lead to addictive behavior.



The distribution of the percentage average daily screen time of the athletes was presented in bar graph form. Most respondents (roughly 30%) said they used digital media for 2-4 hours a day, which means moderate screen use was the most prevalent among participants. Almost 23% of the population was estimated to have used screens for only 0-2 hours, and relatively small but similar proportions (approximately 14%) for 4-6 hours and 6-8 hours per day. A small portion of athletes (almost 13%) indicated no media use while the rarest group of athletes (approximately 7%) reported screen time more than 8 hours per day. Overall, the results appeared to indicate that majority of the athletes had moderate screen usage with excessive screen usage less common but present.



The bar graph was used to visualize the percentage digital addiction among university level athletes. It was discovered that smartphone addiction was the most widespread, with almost 32 percent of cases, which revealed that the major source of dependency was mobile devices. The second place in the list of addictions is social media, with approximately 27 percent, which shows the strong power of such services as Facebook, Instagram, and Tik Tok.

Also prevalent was messaging/chatting addiction, which was experienced by about 23% of athletes, meaning that continuous online communication was a significant influence in their digital use behaviour. Comparatively, gaming addiction was quite low at approximately 10% with online gambling/betting addiction the least at approximately 7%. In general, the findings revealed that communication- and entertainment-based online activities were the most common among the addiction behavior of athletes, with smartphones and social media being the most frequent mediums.

Relationship Between Digital Addiction and Sleep Quality

The relationship between sleep quality and digital addiction is shown in the section below. The analysis examines the association of excessive use of digital on various aspects of sleep.

Table 4.2 Relationship between Online Gaming Addiction and Sleep Quality

Variables	Correlation Coefficient (r)	p-value
Online Gaming Addiction and Sleep Quality	-.691**	0.000

The findings indicated that there was a significant negative correlation between online gaming addiction and sleep quality in university-level athletes ($r = -.691$, $p < 0.001$), such that the more they were preoccupied with excessive gaming the worse they slept. This implied that period gaming interfered with their sleep pattern, resulting in less restfulness and general deterioration in the quality of sleep, as shown in Table 4.2.

Table 4.3 Relationship between Smartphone Addiction and Sleep Quality

Variables	Correlation Coefficient (r)	p-value
Smartphone Addiction and Sleep Quality	-.661**	0.000

It was also found that there was a strong negative correlation between smartphone addiction and sleep quality ($r = -.661$, $p < 0.001$). Athletes with increased rates of smartphone dependency were more likely to report reduced levels of quality of sleep as displayed in Table 4.3. This underscored the fact that overuse of the smartphone, especially during the night, had been

disrupting their sleeping habits and also led to disruptions in rest, which in turn had an impact on their recovery and performance.

Table 4.4 Relationship between Social Media Addiction and Sleep Quality

Variables	Correlation Coefficient (r)	p-value
Social Media Addiction and Sleep Quality	-.593**	0.000

In addition, sleep quality was also identified to have a strong negative association with social media addiction ($r = -.593$, $p < 0.001$). Athletes imbibing more time on social media sites recorded low sleep quality, indicating that a constant engagement with the Internet and exposure to Internet content interfered with their healthy sleep habits, as revealed in Table 4.4. This was a regular pattern in all types of digital addictions, which validated the harmful impact of overuse of technology on sleep quality among athletes.

Association Between Digital Addiction and Sports Performance

The results below illustrate the relationship between digital addiction and sports performance.

Table 4.5 Relationship between Digital Addiction and Sports Performance

Variables	Correlation Coefficient (r)	p-value
Digital Addiction and Sports Performance	-.734**	0.000

The findings revealed that there was a strong negative correlation between digital addiction and sports performance with the correlation coefficient being ($r = -.734$, $p < 0.001$). This result was an indication that the greater the digital addiction, the worse sport performances among university-level athletes were achieved.

Effect of Digital Addiction on Sleep Quality and Sports Performance

In the next section, the effect of digital addiction on the quality of sleep and sports performance was examined.

Table 4.6 Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.942[a]	.887	.880	1.649	2.128

Regression analysis indicated that the sleep quality of university-level athletes was explained by digital addiction at the rate of approximately 88.7% provided that (R2) equals 0.887. This very negative correlation ($r = 0.942$) meant that the more the digital addiction levels, the less the sleep levels as demonstrated in Table 4.10. Adjusted R-squared (0.880) demonstrated that

the model was sound, and the Durbin-Watson of 2.128 did not show that the model was having serious issues with autocorrelation of residuals as displayed in Table 4.6.

Table 4.7 ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	5290.486	1	5290.486	1945.267	.000[b]
	Residual	674.478	248	2.720		
	Total	5964.964	249			

ANOVA findings proved the statistical significance of the regression model of digital addiction and sleep quality. Digital addiction values (F = 1945.267 and p =.000), (df=1,248) indicated that digital addiction was significant in elucidating the differences in sleep quality among university-level athletes as revealed in Table 4.7. This result confirmed that the model was not only valid but also very effective in the process of modeling a strong negative relationship between the variables.

Table 4.8 Coefficient

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model	B	Std. Error	Beta	T	Sig.	Tolerance	VIF
1(Constant)	72.526	1.015		71.479	.000		
Digital Addiction	-.651	.015	-.942	-44.105	.000	1.000	1.000

Coefficient analysis showed that digital addiction (β=-.942, t = -44.105, p = 0.000) had a negative and significant effect on the quality of sleep in university athletes. In addition, the collinearity statistics (Tolerance = 1.000, VIF = 1.000) did not show multicollinearity, which implied that the predictor variable was quite valid in the model as shown in Table 4.8.

Table 4.9 Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.734[a]	.539	.537	2.77925	1.848

In a regression analysis, the digital addiction explained approximately 53.9% of the variation in the performance of sport athletes at the university level when (R 2) was 0.539. Such a negative correlation (R = 0.734) showed that more digital addiction was associated with less sports performance as Table 4.10 indicates. The adjusted R-squared (0.537) was used to

indicate that the model was credible and the Durbin-Watson value (1.848) indicated that no serious issues existed with residual autocorrelation as revealed in Table 4.9.

Table 4.10 ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2236.859	1	2236.859	289.591	.000[b]
	Residual	1915.605	248	7.724		
	Total	4152.464	249			

The ANOVA outcomes showed the statistical significance of the regression model between digital addiction and sports performance. The (F = 289.591 and p =.000), (df 1,248) indicated that digital addiction was an important factor in explaining the differences in sports performance among athletes at the university level as shown in Table 4.10. The discovery confirmed that the model was not only valid but it also worked in capturing a strong negative relationship between the variables.

Table 4.11 Coefficient

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model	B	Std. Error	Beta	T	Sig.	Tolerance	VIF
1(Constant)	48.457	1.710		28.338	.000		
Digital Addiction	-.423	.025	-.734	-17.017	.000	1.000	1.000

The coefficient analysis showed that digital addiction (β= -.734, t = -17.017, p = -.000) had a significantly negative and significant impact on sports performance in university-level sport participants as revealed in Table 4.11. In addition, the Collinearity statistics (Tolerance = 1.000, VIF = 1.000) were clear that there was no multicollinearity which helped to support the usefulness of the predictor variable in the model.

Discussion of Results

The results showed that online gaming addiction strongly and negatively correlated with the quality of sleep among university level athletes. The correlation study revealed that athletes who played too much online gaming reported a much worse sleep. This implied that long periods of playing games, especially at night, disturbed the normal sleep cycle, delayed

bedtime, and the quality of sleep (Gocer & Oniz, 2023). The findings affirmed the harmful effect of gaming addiction on the recovery and well-being of athletes.

It was also discovered that smartphone addiction had a strong and negative correlation with sleep quality. The participants who had a high smartphone dependency had a disrupted sleep, which could have been due to frequent notifications, exposure to screens after late hours, or the addictive nature to use smartphones before going to sleep (Mei et al., 2024). A strong positive association between smartphone addiction and the quality of sleep was observed in athletes (Qin et al., 2025). These results showed that smartphones were not only damaging the quality of sleep but also its period, causing fatigue and deterioration of the sporting performances.

On the same note, social media addiction was significantly negatively associated with sleep. Athletes who devoted more time to the social media platforms were likely to have worse sleep results. Social media is significantly negatively associated with sleep of athlete (Prasetya and Chow, 2023). This association indicated that constant scrolling, internet use, and exposure to stimulating information before going to sleep posed a challenge to getting a good sleep. Social media habits may be considered one of the key determinants of problematic sleep habits (Gunes et al., 2018). Sleep is highly significant regarding mental and physical performance and recovery among athletes (O'Donnell et al., 2018; Kolling et al., 2019).

The findings revealed that there was a significant negative correlation between digital addiction and the sports performance of athletes of university level. Fiedler aet al., 2023 showed negative and significant correlation between digital addiction and sports performance of athletes. This meant that the athletes that devoted more time to digital platforms like smartphones, games, or social media had poor chances of doing well in their sports activities. Probably, the excessive utilization of digital resources upset the training process, decreased physical preparation, and impaired concentration in competitions. Moreover, digital addiction might have caused fatigue and lack of motivation, which reduced their stamina and consistency in performance (Polat and Topal, 2022).

It is naturally anticipated that the daily consumption of technology can result in the rising level of go up digital game addiction and exacerbate the lack of physical activity and performance among players (Çar & Ahraz, 2022). it was stated that digitally addicted athletes on an elite level are more susceptible to the adverse outcomes of digital addiction compared to recreationally active players (Fiedler et al 2023).

The correlation analysis, in general, highlights that, the more intense the degree of digital addiction, the worse the quality of sleep that athletes get. These findings conformed to previous studies on digital overuse and they indicated the emergent awareness and interventions that focused on screen time management. In the case of athletes, who greatly depend on adequate rest as a means of recovery and performance, digital addiction proved to be a serious obstacle to healthy sleeping habits.

These findings were also reinforced by the results of the regression which showed that digital addiction was a good predictor of sleep quality among athletes. Sleep quality is negatively affected by high levels of digital addiction and can reduce the ability of athletes to compete (Watkins et al., 2022). These findings revealed that an addiction to digital was not only correlated with, but also directly influenced the outcomes of sleep. The increased digital interaction at higher levels led to a drastic decrease in the possibility of obtaining healthy and restful sleep among athletes (Fiedler et al 2023).

The results of the research pointed out that digital addiction exerted an evident adverse effect on the sport performance of university-level athletes. The more involved were the athletes in excessive digital activities, including social media consumption, video gaming, and exposure to the night screen, the lower the levels of stamina, concentration, and overall performance in sport (Gocer & Oniz, 2023). This result implied that the time and energy used on the digital addiction minimized the time to have a proper rest, recovery, and focused practice which is critical to athletic performance. The findings were also in line with earlier studies that have highlighted that poor online behaviors disorient bodily preparedness, psychological acuity, and ability to perform their tasks in a competitive situation.

Digital game addiction and sleeping issues impact the physical and psychological well-being of game players and their academic performance adversely (Tuncay and Goger, 2022). Addiction to social media among adolescents causes mental problems that may negatively affect their physical health. The extensive and frequent use of social media by young individuals may not only predispose to a number of mental symptoms, but also make physical health worse. The hypertension caused by prolonged stress, which is one of the most common side effects of social media use, may destroy the organs, including the heart and kidneys (Zhong, Huang, and Liu, 2021).

Moreover, overuse of social media may also cause more common somatic symptoms like headaches, chest or back pain (Zhong et al., 2021) and physical inactivity that may cause obesity (Khajeheian, 2018). Moreover, social media may cause addiction, sleeping delays,

which are possible due to long-term smartphone usage, which can alter sleep patterns among athletes and cause insomnia (Beeres et al., 2021).

Furthermore, the evidence supporting the concept that sports performance is not only predetermined with the physical training but also with such aspects of lifestyle as the use of technologies and digital behavior was made. Digital addiction seemed to interfere with the normal routine of the athletes, their training, their discipline and their performance under stress. It meant that the higher the control of athletes about their digital activities, the more they could work effectively as well as in the team. Thus, discussing the issue of digital addiction among college athletes might be a significant move to enhance their results in the sphere of performance and prevent the fact that their potential is not undermined by the excessive and uncontrolled adoption of digital technologies.

Conclusion

The study found that digital addiction is harmful to university student athletes' performance because it directly reduced their ability to get healthy and restful sleep, which is essential to performance, concentration, and well-being. Sleep deprivation not only affects the recovery process but also causes fatigue, stress, and exposure to mental health problems. Besides the poor quality of sleep, there is also the effect of digital addiction that undermines sports performance among athletes, which includes reduced stamina, concentration, and consistency in training and events. The over-digitalization diminished the physical preparedness and psychological confidence, which are essential to athletic performance. In order to combat these negative outcomes, athletes should practice healthy digital behaviors, including limiting screen time in the evening, enforcing strict screen time routines, and implementing digital detox methods. It is also possible to build an awareness of the effect of overutilizing devices, time management, and other forms of relaxing activities, such as reading, meditation, or a simple brisk walk in the evening. With steady discipline and supportive intervention from coaches, parents, and institutions, the negative effects of digital addiction may be minimized, and the athlete can sustain a good sleep quality and enhance performance in sports.

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