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Investigation of the Effects of Recreational Esports Players' Nighttime Gaming Frequency on Chronotype and Sleep Quality

Rujin ASLAN[1], and Fırat ÖZDALYAN[2]*

[1] Department of Exercise and Sports Sciences, Faculty of Health Sciences, Izmir Demokrasi University, Izmir, Türkiye

[2] Department of Physical Education and Sports, Necat Hepkon Faculty of Sports Sciences, Dokuz Eylul University, Izmir, Türkiye

ABSTRACT

Purpose: The lifestyle habits of recreational esports players are current topic of research. The number of studies examining the sleep quality and chronotype characteristics of these individuals is increasing. This study aimed to examine the relationship between nighttime gaming frequency, chronotype, and sleep quality among recreational esports players.

Methods: The study included 101 university students who had been engaged in esports for at least one year (male: n=68, age=22.65±4.58; female: n=33, age=21.73±2.27). Participants' demographic information and nighttime gaming frequency were collected using a data form. Additionally, participants' sleep qualities and chronotypes were assessed using the Pittsburgh Sleep Quality Index (PSQI) and the Morningness-Eveningness Questionnaire (MEQ). Survey scores for groups with high and low frequencies of nighttime gaming were compared using the T-test or the Mann-Whitney U-test. The ordinal data were compared using chi-square test.

Results: No significant difference was observed in PSQI scores. While no significant difference was observed in MEQ scores for women, it was found that men who played games more frequently at night had lower MEQ scores (tendency toward evening-type) ($p<0.05$). Chi-square test results indicated that participants with an evening chronotype played games more frequently at night ($p<0.01$) and tended to have poor sleep quality ($p<0.05$). Chi-square test results showed no significant relation between sleep quality and the frequency of nighttime gaming.

Conclusion: The findings indicated that participants with an evening chronotype exhibited poorer sleep quality and more frequent nighttime gaming. It is recommended that esports players/coaches take individuals' chronotype characteristics into account when planning training sessions.

Keywords: Esports; Chronotype; MEQ; Sleep quality; PSQI; Video gaming

Corresponding Author:
**Fırat ÖZDALYAN*
Dokuz Eylul University, Izmir-TÜRKİYE
firat.ozdalyan@deu.edu.tr

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INTRODUCTION

Esports, which was recognized by the International Olympic Committee in 2024, is currently one of the fastest-growing sports disciplines (Pang et al., 2025; Smithies et al., 2024). Having evolved into a professional occupation, esports also enjoy considerable popularity among recreational players (Klier et al., 2024; Kristensen et al., 2021; Pang et al., 2025). The presence of more than three billion active esports players has led to a growing body of scientific research focusing on esports and individuals engaged in esports (Bonnar et al., 2023; De Rosa et al., 2024; Kidcaff et al., 2025, 2026; Klier et al., 2024; Kristensen et al., 2021; Pang et al., 2025; Smithies et al., 2024). These studies primarily focus on the health status of esports players, due to the sedentary nature of esports activities and prolonged screen exposure associated with esports participation (Klier et al., 2024; Pang et al., 2025).

Unlike traditional sports, esports players are able to train or compete with other players located anywhere in the world, enabling continuous 24-hour access to gameplay opportunities (Kidcaff et al., 2025). As a result of time zone differences, esports players may prefer “or in some cases be required” to play esports late at night (Kidcaff et al., 2025, 2026). Furthermore, the cultural norm within esports of engaging in prolonged late-night gaming sessions further reinforces this tendency (Kidcaff et al., 2025; Pang et al., 2025; Smithies et al., 2024). In addition, the fact that young adults and esports players tend to exhibit chronotypes that are more closely aligned with the evening type constitutes another factor contributing to the frequency for nighttime gaming (De Rosa et al., 2024; Kidcaff et al., 2025).

Due to the inherent characteristics of esports ”such as the excitement associated with winning and losing, as well as the high cognitive load involved” players are highly likely to become physiologically and psychologically aroused, thereby entering a heightened state of alertness (Kidcaff et al., 2025; Kristensen et al., 2021; Smithies et al., 2024). Furthermore, exposure to blue light emitted from screens suppresses the production of melatonin, a hormone that promotes sleep onset, causing individuals to feel more awake (Kidcaff et al., 2025; Kristensen et al., 2021; Smithies et al., 2024). Consequently, playing esports during nighttime hours may delay sleep onset, and as a result, sleep quality may deteriorate (Kidcaff et al., 2025, 2026; Klier et al., 2024; Kristensen et al., 2021).

For these reasons, the lifestyle habits and biological rhythms of esports players remain a current topic of scientific investigation (Kidcaff et al., 2026; Mancı & Günay, 2023; Mancı

& Özdalyan, 2023; Pang et al., 2025). A review published by De Rosa et al. (2024), which included 26 studies, demonstrated that the existing literature presents conflicting findings regarding the effects of esports playing on sleep. The limited number of studies available and the inconsistency of their findings highlight the need for further research in this field. Therefore, the present study aimed to examine the relationship between nighttime gaming frequency, chronotype characteristics, and sleep quality among individuals engaged in esports.

MATERIAL and METHODS

Participants

The sample size was determined using *WebPower statistical power analysis online* tool (WebPower, 2018). The analysis indicated that a minimum total sample of 88 participants was required for a two-tailed independent samples t-test with a statistical power of 0.80, a significance level of 0.05, and an effect size of 0.60 (WebPower, 2018). To recruit volunteers, announcements were distributed through esports communities at universities. As a result of these announcements, data were collected from 102 participants; however, one volunteer was excluded from the study for failing to meet the inclusion criteria. Consequently, the study included 101 university students aged 18–41 years who had been engaged in esports for at least one year (male: n = 68, age = 22.65 ± 4.58; female: n = 33, age = 21.73 ± 2.27). Consents to participate were obtained from participants online via Google Forms prior to the data collection process. The current research was conducted in accordance with the Declaration of Helsinki and was approved by Non-Interventional Research Ethics Committee of İzmir Demokrasi University (approval number 2026/66).

Study Design

The study was designed as an observational cross-sectional study. The data were collected online, and the participants completed a demographic data form prepared by the researchers, the Pittsburgh Sleep Quality Index questionnaire (PSQI; Ağargün et al., 1996), and the Morningness–Eveningness Questionnaire (MEQ; Özdalyan et al., 2021). Subsequently, questionnaire scores were compared between participants with high (3-7 days/week) and low (0-2 days/week) frequencies of nighttime gaming (between 11:00 pm and 05:00 am). Furthermore, the relation between chronotype and sleep quality variables was assessed.

Demographic Data Form

Participants' age, gender, years of gaming experience, and frequency of nighttime gaming were collected via the demographic data form developed by the researchers. The frequency of nighttime gaming was gathered using 0-2 days/week or 3-7 days/week options. Additionally, for this variable, the time interval from 11:00 pm to 05:00 am was defined as nighttime.

Pittsburgh Sleep Quality Index (PSQI)

The PSQI, originally developed by Buysse et al. (1989), was adapted into Turkish by Ağargün et al. (1996). The scale assesses participants' sleep quality over the previous month. The PSQI consists of 24 self-report items; however, only 18 of these items are included in the scoring procedure and used to determine sleep quality. Responses obtained from these 18 items are converted into seven component scores, with participants receiving a score ranging from zero to three for each component. The total questionnaire score is calculated as the sum of the component scores and ranges from zero to 21. Higher scores indicate poorer sleep quality, with scores greater than 5 defined as poor sleep quality and scores of 5 or below defined as good sleep quality (Ağargün et al., 1996; Buysse et al., 1989).

Morningness–Eveningness Questionnaire (MEQ)

The MEQ, originally developed by Horne and Ostberg (1976), was adapted into Turkish by Özdalyan et al. (2021). The scale consists of 19 self-report items and is used to determine participants' chronotypes. Based on their responses, participants receive scores ranging from one to four points for 11 items, one to five points for five items, zero, two, four, or six points for two items, and zero, two, three, or five points for one item. The total questionnaire score is calculated as the sum of the scores obtained from all 19 items and ranges from 16 to 86. Higher scores indicate a greater tendency toward morningness. Scores are classified as follows: 16–30, definitely evening type; 31–41, moderately evening type; 42–58, neither type; 59–69, moderately morning type; and 70–86, definitely morning type (Horne & Ostberg, 1976; Özdalyan et al., 2021).

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics (Version 30.0), and the alpha level used for determining statistical significance was set at $p < 0.05$. Female and male participants were separately divided into two groups according to their nighttime gaming frequency: those who played more frequently between 11:00 pm and 05:00 am (3–7 days per

week) and those who played less frequently (0–2 days per week). Subsequently, the MEQ and PSQI scores of these two groups were compared. The normality of the data distribution was assessed using the Shapiro–Wilk test. Based on these results, PSQI scores were analyzed using the Mann–Whitney U test, whereas MEQ scores were analyzed using the independent samples t-test.

In addition, participants were grouped according to their chronotype classifications (e.g., morning type, neither type, evening type) and sleep quality status (poor vs. good), and differences in nighttime gaming frequency across these groups were analyzed using the chi-square test. The suitability of the data for chi-square analysis was evaluated according to Cochran's principles, and because some cells had expected value below five and observed value of zero, data from convenient cells were merged as recommended in the literature (Aksakoğlu, 2006). For this reason, chi-square analyses were conducted without stratifying participants by gender. Furthermore, for the chi-square analysis, chronotype categories were recoded into two groups: "Evening type" (definitely evening type + moderately evening type) and "Others" (neither type + moderately morning type + definitely morning type). Additionally, because n > 40, Yates' continuity correction was applied for 2×2 chi-square tests, as recommended in the literature (Aksakoğlu, 2006).

RESULTS

A total of 101 participants were included in the study. The descriptive characteristics of the participants are presented in Table 1. Of the participants, 49.5% (n = 50) reported playing esports at least three nights per week between 11:00 pm and 05:00 am. This proportion was found to be 60.6% (n = 20) among female participants and 44.1% (n = 30) among male participants.

No significant difference was found between the PSQI scores of participants who played esports frequently at night and those who played less frequently at night (females: U = 103.5, Z = −0.984, p = .325; males: U = 541.5, Z = −0.355, p = .723; Table 2). When the same analysis was applied to MEQ scores, no significant difference was observed between the groups among female participants (t = 1.865, p = .072; Table 2). However, among male participants, those who played esports more frequently at night were found to have significantly lower MEQ scores (t = 2.626, p = .011; Table 2).

The relationships among participants' nighttime gaming habits, chronotypes, and sleep quality were also examined using the chi-square test. The results revealed that participants with an evening chronotype engaged in nighttime gaming more frequently ($\chi^2(1, N = 101) = 7.314$, $p = .007$). However, no significant difference in sleep quality was found between participants who played more frequently at night and those who played less frequently ($\chi^2(1, N = 101) = 0.100$, $p = .751$). When the relationship between participants' sleep quality and chronotype was examined, poor sleep quality was found to be more prevalent among esports players with an evening chronotype ($\chi^2(1, N = 101) = 8.180$, $p = .004$).

Table 1: Descriptive Characteristics of the Participants (Mean ± SD)

Variable	All Participants (n=101)	Male (n=68)	Female (n=33)
Age (years)	22.4 ± 4.0	22.7 ± 4.6	21.7 ± 2.3
Gaming Experience (years)	8.5 ± 4.7	9.9 ± 4.2	5.4 ± 4.2
Good Sleep Quality (n)	43	35	8
Poor Sleep Quality (n)	58	33	25
Definitely Morning Type (n)	0	0	0
Moderately Morning Type (n)	7	6	1
Neither Type (n)	72	50	22
Moderately Evening Type (n)	22	12	10
Definitely Evening Type (n)	0	0	0

Note. SD: Standard Deviation.

Table 2: Comparison of the PSQI and MEQ Scores According to Nighttime Gaming Frequency

Comparison of PSQI Scores via Mann-Whitney U Test				
Gender	**Nighttime Gaming Frequency**	**Mean Rank**	***U*-value**	***p*-value**
Female	Low (n=13)	14.7	103.5	.325
	High (n=20)	18.3		
Male	Low (n=38)	33.8	541.5	.723
	High (n=30)	35.5		
Comparison of MEQ Scores via T-Test				
Gender	**Nighttime Gaming Frequency**	**Mean ± SD**	***t*-value**	***p*-value**
Female	Low (n=13)	48.5 ± 5.6	1.865	.072
	High (n=20)	43.9 ± 7.7		
Male	Low (n=38)	51.2 ± 7.7	2.626	**.011***
	High (n=30)	46.3 ± 7.6		

Note. PSQI: Pittsburgh Sleep Quality Index, MEQ: Morningness-Eveningness Questionnaire, Low: Low frequency (0-2 days/week), High: High frequency (3-7 days/week), SD: Standard Deviation, * $p < .05$.

DISCUSSION

The findings of this study indicate that recreational esports players with an evening chronotype tend to play esports more frequently during late-night hours (between 11:00 pm and 05:00 am), and this relationship appears to have a stronger effect among male players. Furthermore, the analyses revealed no significant association between the frequency of nighttime gaming and sleep quality. However, chronotype characteristics were found to influence sleep quality among esports players.

De Rosa et al. (2024) included twenty-six studies in their systematic review examining the relationship between esports playing and sleep in adults. Of these studies, 12 reported that esports playing had a negative effect on sleep, whereas six reported findings similar with those of the present study, indicating that esports playing had either no effect on sleep or even a positive effect. The remaining eight studies produced mixed and contradictory findings,

reporting both positive and negative outcomes within the same study. De Rosa et al. (2024) suggested that these inconsistent findings in the literature may be attributable to differences in the characteristics of esports players. For example, Ko et al. (2020) categorized participants as addicted gamers, regular gamers (with no addiction), and non-gamers, and found that sleep-related problems were observed only in the addicted gamer group, whereas no such problems were identified in the other groups. In that study, participants were classified as addicted gamers according to three criteria: (i) being between 20 and 38 years of age; (ii) playing esports for more than six hours per day on weekdays and more than four hours per day on weekends; and (iii) engaging in regular esports play for the previous two years. Since the participants in the present study consisted of recreational esports players, their characteristics are considered to more closely resemble the regular gamers group described by Ko et al. (2020). This assumption is further supported by the expectation that recreational esports players engage in less gameplay hours than professional esports players, who reportedly play approximately 28 hours per week (Rudolf et al., 2020). Considering these findings, the present result indicating no esports-related change in sleep quality among recreational esports players may be interpreted as being consistent with the findings of Ko et al. (2020).

There are studies in the literature that have examined esports players according to their chronotype characteristics and reported findings consistent with those of the present study. For example, Kidcaff et al. (2026) reported that esports players with an evening chronotype exhibited poorer sleep quality, later bedtimes, and longer sleep onset latency. Furthermore, De Rosa et al. (2024) noted that adults generally tend to have free time during the evening due to their daily routines. Considering these findings, it may be expected that this population ”who typically have time to play only during evening hours, tend to go to bed late, and often experience prolonged sleep onset latency “would engage in nighttime gaming more frequently than individuals with other chronotype profiles. This interpretation supports the findings of the current study, which demonstrated that esports players with an evening chronotype engaged more frequently in nighttime gaming and exhibited poorer sleep quality.

Practical Applications

The findings of the present study revealed that recreational esports players with an evening chronotype tend to play esports more frequently at night and exhibit poorer sleep quality. Therefore, it is recommended that individuals within this population organize their gaming habits with consideration for potential sleep-related problems and their consequences, and seek support from a healthcare professional if necessary. Furthermore, since evening-type

recreational esports players appear to show a greater frequency for nighttime gaming, whereas players with other chronotype profiles tend to engage in nighttime gaming less frequently, it is recommended that players and/or coaches take chronotype characteristics into account during the planning of training sessions and competitions.

Limitations

There are studies in literature, such as that of Ko et al. (2020), in which esports players have been examined by grouping them according to their gaming routines. Moreover, the findings obtained have shown differences across these groups. In the present study, however, the inability to collect similarly detailed data regarding participants' gaming routines constitutes the most important limitation of this research. Therefore, future studies incorporating more comprehensive and detailed data collection are recommended.

In their study, Klier et al. (2024) used actigraphy, a more objective method, to assess sleep-related parameters. Another limitation of the current study is that these parameters were obtained using the PSQI, a self-report questionnaire, rather than a comparable objective measurement device. Since self-reporting tools may lead to biased results, it is recommended that future studies involving esports players employ more objective assessment methods when examining sleep-related parameters.

CONCLUSION

In conclusion, the present study demonstrated that the nighttime gaming habits and sleep quality of recreational esports players are influenced by their chronotype characteristics. The findings indicated that participants with an evening chronotype exhibited poorer sleep quality than other participants and engaged in video gaming more frequently between 11:00 pm and 05:00 am. In light of these findings, it is recommended that esports players and esports coaches take individuals' chronotype characteristics into account when planning training sessions and competition schedules.

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Conflict of Interest*:* The authors declare no conflict of interest.

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Data Availability: The data supporting the findings of this study are not publicly available due to confidentiality restrictions. Requests for access to the data may be considered on a case-by-case basis by contacting the corresponding author.

Declaration of AI Use: During the preparation of this work, the authors used Grammarly and ChatGPT 5.1 to improve the readability and language. After using this tool/service, the authors reviewed and edited the content as needed and took full responsibility for the publication's content.

Credit Authorship Contribution Statement

Rujin ASLAN: Data Collection, Writing – Review & Editing

Fırat ÖZDALYAN: (https://orcid.org/0000-0003-3577-0235) Conceptualization, Methodology, Data Curation, Data Analysis, Writing – Original Draft, Writing – Review & Editing

*All authors read and approved the final manuscript.

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