

Examining the Impact of Gacha Game Use on Sleep Quality and Aggression among University Students in Jordan

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ABSTRACT: Objective: Despite growing use of online video games globally, studies examine their impacts on health behaviors and sleep remains limited. This study investigates the relationship between Gacha game use, sleep quality, and aggression among Jordanian university students, addressing a gap in understanding the health impacts of excessive gaming. **Material and Methods:** A descriptive cross-sectional design was used with 1001 undergraduate students from a private university in Jordan. Data were collected using the Buss-Perry Aggression Questionnaire-Short Form and the Pittsburgh Sleep Quality Index. **Results:** Students demonstrated poor sleep quality (mean = 7.49 ± 3.55) and moderate aggression (mean = 31.16 ± 9.08). The highest reported aggressive behaviors were hostility (mean = 9.19 ± 3.10) and physical aggression (mean = 8.72 ± 3.59). There was no significant correlation between gameplay duration and either sleep quality ($r = -0.06$, $p = 0.06$) or aggression ($r = -0.04$, $p = 0.19$) among university students.

Conclusion: Family and community involvement in monitoring gaming habits is crucial to promoting healthy lifestyle practices.

Keywords: Aggression, Gacha games, Sleep quality, Smartphone, University students.

INTRODUCTION

Since their introduction in the 1990s, online video games have become one of the most popular forms of entertainment, especially among young adults, including university students from various backgrounds [1,2]. For instance, the Interactive Software Federation reports that 52% of smartphone users aged 6 to 64 in Europe engage in video gaming [3]. Similarly, the Entertainment Software Association found that 66% of the U.S. population plays games on smartphones, while 93.8% of 15-year-olds in Spain have access to one [4,5]. As smartphone usage continues to grow, especially among younger individuals, video game engagement is becoming increasingly common.

A notable genre within mobile gaming is Gacha games, such as Fire Emblem Heroes and Fate/Grand Order. These free-to-play games often encourage in-game purchases and have been linked to addictive behaviors, leading to prolonged play that can interfere with academic and personal responsibilities [6,7]. Excessive use of Gacha games has been associated with negative outcomes, including physical symptoms like headaches and eye strain, as well as psychological issues such as increased anxiety and depression. Socially, gaming can negatively impact academic performance and reduce face-to-face interactions, contributing to isolation [8,9,10]. Despite the popularity of Gacha games among young adults, research on their effects on health outcomes like sleep quality and aggression is limited [11].

Sleep quality is crucial for overall health, influencing cognitive function, emotional regulation, and physical well-being. Poor sleep, characterized by difficulties in falling or staying asleep, can lead to various health issues [12]. Aggression, which includes hostile behaviors and anger, also poses significant risks

to mental and physical health [13]. Previous studies indicate that Gacha game players may be more vulnerable to gambling problems, stress, and anxiety [14]. However, research specifically examining the relationship between Gacha game use, sleep quality, and aggression among university students is scarce [15].

This study in Jordan is both timely and important due to the rapid increase in smartphone use and gaming among Jordanian youth. Over 90% of university students in Jordan own smartphones, with mobile gaming being a primary leisure activity [16,17]. Despite this widespread engagement, there has been limited research on the potential negative effects of excessive gaming, particularly concerning sleep quality and aggression. Jordanian students also face unique stressors, such as high academic demands and financial pressures [18], which may heighten the risks of prolonged Gacha game use. Understanding these impacts is crucial, as poor sleep can impair cognitive function and academic performance, while increased aggression may lead to strained relationships and mental health issues [8,10,12]. As Gacha games gain popularity, it is essential to investigate their potential negative effects to inform public health strategies and interventions [19].

Purpose of study

The purpose of this study was to explore the relationships between Gacha game use and sleep quality and aggression among Jordanian university students.

MATERIALS AND METHODS

Design

A descriptive cross-sectional correlational design was employed.

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Sample and setting

A nonprobability convenience sample was used to recruit undergraduate students from a private university located in the capital of Jordan. Using G*Power software for sample size calculation, the minimum required sample size was 319 students, based on the following parameters: $\alpha = 0.05$, power = 95%, effect size = 0.3, and a two-tailed correlation test. A total of 1001 students were ultimately included, providing a relatively large sample size. Although this convenience sampling method may limit the generalizability of the findings to the broader Jordanian university student population, efforts were made to recruit a diverse group of students by including a large sample from various academic levels and both genders.

Inclusion criteria targeted any registered students who were able to read and write, and who agreed to install the software required for participation. Students diagnosed with mental health conditions such as anxiety disorders, depression, or sleep disorders, as well as those with medical conditions that could significantly affect sleep or trigger aggressive behavior, were excluded.

Instruments

A self-administered questionnaire package was distributed to the participants, which included a sociodemographic sheet, the Aggression Questionnaire [20], and the Pittsburgh Sleep Quality Index [21].

Sociodemographic sheet which includes questions about students' age, gender, marital status, current residence (with parents/Married), smoking status (yes/no), alcohol drinking (yes/no), caffeine drinking (yes/no), work status (working/not working), and educational level (1st year/2nd year/3rd year/4th year).

The Buss-Perry Aggression Questionnaire-Short Form (BPAQ-SF) is a questionnaire that has the potential to measure aggression [20]. The BPAQ-SF consists of 12 items that assess four factors of aggression: physical aggression, verbal aggression, anger, and hostility. The 12-item measure of aggression in individuals. The 12 items were designed to assess the different types of aggression. The participants were asked to rate how the item was characteristic of them. Ratings were subsequently assigned numerical values of 1 (Extremely uncharacteristic of me) to 5 (Extremely characteristic of me), resulting in minimum and maximum possible total scores of 12 and 60, respectively. Higher scores indicate higher aggression levels. Bryant & Smith demonstrated high internal consistency reliability for the total BPAQ ($\alpha = .89$) [17]. The test-retest reliability is .68--0.80 [18]. The Arabic version of the short form of the BPAQ has demonstrated good validity and reliability among the Egyptian population [19].

The Pittsburgh Sleep Quality Index (PSQI) questionnaire was used to assess sleep quality over a 30-day period [20]. It consists of 19 questions that are self-rated and summed to form seven subscales, each with scores ranging from 0 to 3, with higher scores indicating poorer sleep. The seven subscales are subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medications, and daytime dysfunction. The scores for each subscale are added together to obtain a global score, which ranges from 0 to 21. Higher scores indicate poorer sleep quality. The component scores are calculated via the revised scoring method recommended by Beck et al. [21]. An average global score of 5 or higher reflects poor sleep status, whereas a score of less than 5 reflects good sleep status. The PSQI has been validated and has high internal consistency reliability across different cultures and groups of patients ($\alpha = .83$) [21-23].

Procedure

Institutional Review Board (IRB) approval was obtained (Ref no. 22/16/2021–2022). The research team developed an application available on the Play Store to collect data on Gacha game usage. All registered students in the semester of data collection received an invitation via their university email. These invitations were sent at the beginning of the semester, before exams and assignments. Interested participants were asked to sign a consent form on the app's front page before clicking a link to access it. After checking the agreement box, an anonymous account was created for each student in the database. The app included a message clarifying that it was designed to gather data related to Gacha game usage. Students uploaded the app to their phones, and the research team distributed a self-report questionnaire through the application itself. Prior to the study, permission to use both tools was obtained. A reminder message frequently appeared on the app's front page, informing students of their right to withdraw from the study at any time and assuring them that all collected information would remain confidential in a locked file.

Data Analysis

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 23. All data were checked for missing values and outliers. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were calculated. Inferential statistics included correlation coefficients, t-tests, and analysis of variance (ANOVA). A t-test was used to compare differences in sleep quality and aggression scores between two groups, while ANOVA was employed for comparisons among three or more groups. For continuous variables, Pearson's correlation coefficient was used. A significance level of $p < 0.05$ was established for all tests.

RESULTS AND DISCUSSION

Characteristics of the Sample

A total of 1,200 questionnaires were distributed, with 1,001 completed questionnaires returned, resulting in a response rate of 84%. The average age of the students was 22.25 years ($SD = 5.59$). Approximately half of the participants were female ($n = 566$, 56.5%) (see Table 1). Most students were unmarried ($n = 924$, 92.3%), not working ($n = 779$, 77.8%), and lived with their parents ($n = 910$, 90.9%). The participants were evenly distributed across the four educational levels. Regarding habits, the majority were caffeine consumers ($n = 803$, 80.2%), nonsmokers ($n = 806$, 80.5%), and had no history of alcohol use ($n = 989$, 98.8%).

Table (1): Sociodemographic Characteristics of the Sample (N= 1001).

Variable	Mean SD (range)	N (%)
Age	22.25 5.59 (18-40)	
GPA	76.13 15.6 (55-94)	
Gender		
- Male		435 (43.5%)
- Female		566 (56.5%)
Marital status		
- Not Married		924 (92.3%)
- Married		77 (7.7%)
Residence		
- With parents		910 (90.9%)
- Married		91 (9.1%)
Smoking status		
- No		806 (80.5%)
- Yes		195 (19.5%)
Alcohol drinking		
- No		989 (98.8%)
- Yes		12 (1.2%)

Variable	Mean SD (range)	N (%)
Caffeine drinking		
- No		198 (19.8%)
- Yes		803 (80.2%)
Work status		
- No work		779(77.8%)
- Working		222 (22.2%)
Educational level		
- 1 st year		240(24%)
- 2 nd year		289 (28.9%)
- 3 rd year		210(21%)
- 4 th year		262(26.2%)

Sleep Quality and Aggression

The mean global Pittsburgh Sleep Quality Index (PSQI) score was 10.43 (SD = 3.49), with almost all students reporting poor sleep (global PSQI scores > 5). On average, students slept 7.49 hours (SD = 3.55) and rated their sleep quality as poor. They took an average of 16.09 minutes (SD = 9.16) to fall asleep, with a range from 3 to 24 minutes. Additionally, 90% of the sample scored over 80.5% in sleep efficiency. They reported moderate sleep disturbances, with low scores for daytime dysfunction and sleep medication use.

For aggression, the mean total score was 31.16 (SD = 9.08). The average scores for physical, verbal, anger, and hostility subscales were 8.72 (SD = 3.59), 8.00 (SD = 2.53), 5.24 (SD = 2.59), and 9.19 (SD = 3.10), respectively.

Relationships Among PSQI, BPAQ-SF, and Sociodemographics

There was no significant correlation between the global PSQI score and age ($r = 0.08$, $p = 0.01$) or GPA ($r = -0.08$, $p = 0.01$), indicating that older students with lower GPAs experienced more sleep disturbances. No significant correlation was found between the global PSQI score and income ($r = 0.01$, $p = 0.57$). Additionally, there were no significant differences in the global PSQI score based on sex, marital status, alcohol consumption, or caffeine use. However, significant difference was observed regarding smoking status, residency employment status, and educational level. Specifically, second year students who smoked, did not live with their parents, or 435 (43.5%) were not working had more sleep disturbances (Table 2).

Table (2): PSQI Global and Components Means and Standard Deviations.

PSQI component	Total possible scores	Mean	Standard deviation	Range in sample
Component 1 (Subjective sleep quality)	0-3	1.40	1.06	0- 3
Component 2 (sleep latency)	0-3	1.12	0.73	0- 2
Component 3 (sleep duration)	0-3	1.14	1.08	0- 3
Component 4 (sleep efficiency)	0-3	2.80	0.20	2-3
Component 5 (sleep disturbances)	0-3	1.49	0.65	0-3
Component 6 (sleep medication)	0-3	1.31	0.92	0-3
Component 7 (Daytime dysfunction)	0-3	0.87	0.87	0-3
Global PSQI	0-21	10.43	3.49	3-20

Note: PSQI = Pittsburgh Sleep Quality Index.

The total Aggression Scale (PBAS) score was significantly correlated with age ($r = 0.08$, $p = 0.008$), GPA ($r = -0.15$, $p < 0.001$), and income ($r = 0.78$, $p = 0.014$). Higher-income older students with lower GPAs exhibited higher aggression scores. There were no significant differences in total PBAS scores across different levels of marital status, residency, employment,

or educational level; however, significant differences were found based on sex, smoking status, alcohol consumption, and caffeine use. Male students who smoked and consumed alcohol and caffeine displayed more aggressive behaviors. (Table 3).

Table (3): Sleep quality characteristics and demographic variables.

Variable	Total (n=945*)	Statistics	
		Mean (SD)	t/f (p value)
Gender	N (%)		
Male	400 (42%)	10.57(3.51)	0.29
Female	545 (58%)	10.33(3.48)	
Marital status	N (%)		
Not married	868 (92%)	10.39(3.49)	0.23
Married	77 (8%)	10.88(3.52)	
Residence	N (%)		
With parents	858 (91%)	10.35(3.48)	0.028
Not with parents	87 (9%)	11.21(3.55)	
Work status	N (%)		
No work	733 (78%)	10.22(3.45)	0.001
Work	212 (22%)	11.14(3.55)	
Smoking status	N (%)		
No	764 (80%)	10.10(3.33)	<0.001
Yes	181 (20%)	11.79(3.82)	
Drinking alcohol	N (%)		
No	933 (99%)	10.43(3.51)	0.72
Yes	12 (1%)	10.08(1.50)	
Drinking caffeine	N (%)		
No	182 (20%)	10.07(3.62)	0.122
Yes	763(80%)	10.51(3.46)	
Study level	N (%)		
1st year	230 (24%)	10.34(3.67)	0.003
2nd year	276 (30%)	11.04(3.17)	
3rd year	195 (20%)	10.31(3.80)	
4th year	244 (26%)	9.91(3.33)	

*Missing data 46 participants.

The results indicated that during a one-month period, most students were not extensive Gacha game players. Approximately 35% ($n = 351$) reported not spending any time playing Gacha games. While a small number ($n = 23$, 2%) played for more than 2,000 minutes, the majority ($n = 562$, 86.6%) were moderate players, logging fewer than 1,000 minutes. (Table 4).

Table (4): PBAS Global and subscales Means and Standard Deviations.

PBAS and subscales	Total possible scores	Mean	Standard deviation	Range in sample
PBAS physical aggression	4-20	8.72	3.59	4-20
PBAS verbal aggression	3-15	8.00	2.53	3-15
PBAS anger aggression	2-10	5.24	2.59	2-10
PBAS hostility aggression	3-15	9.19	3.10	3-15
Total PBAS	12-60	31.16	9.08	12-60

Note: PBAS = Puss and Berry Aggression Scale.

There was no significant correlation between total gaming duration and age ($r = 0.28$, $p = 0.37$), GPA ($r = -0.04$, $p = 0.12$), or income ($r = -0.02$, $p = 0.42$). Additionally, no significant differences in gaming duration were found across different levels of gender, marital status, alcohol consumption, smoking status, residency, employment status, or educational level. To address the study's objectives, a Pearson correlation coefficient was calculated to examine the relationships between Gacha game duration and sleep quality and aggression. The results indicated no significant correlation between game duration and sleep quality ($r = -0.06$, $p = 0.06$) or aggression ($r = -0.04$, $p = 0.19$) among university students. (Table 5).

Table (5): Aggression characteristics and demographic variables.

Variable	Total (n=945*)	Statistics	
		Mean (SD)	t/f (p value)
Gender	N (%)		
Male	435(43%)	32.54(9.33)	<0.001
Female	566 (57%)	30.10(8.74)	
Marital status	N (%)		
Not married	924(93%)	31.30(9.21)	0.08
Married	77 (7%)	29.46(7.16)	
Residence	N (%)		
With parents	910 (91%)	31.21(9.16)	0.57
Not with parents	91 (9%)	30.67(8.22)	
Work status	N (%)		
No work	779 (78%)	30.89(9.23)	0.08
Work	222 (22%)	32.09(8.49)	
Smoking status	N (%)		
No	806 (81%)	29.97(8.65)	<0.001
Yes	195 (91%)	36.08(9.17)	
Drinking alcohol	N (%)		
No	989 (99%)	31.09(9.09)	0.03
Yes	12 (1%)	36.58(5.93)	
Drinking caffeine	N (%)		
No	198 (20%)	28.81(8.57)	<0.001
Yes	803(80%)	31.74(9.11)	
Study level	N (%)		
1 st year	240 (24%)	32.29(9.09)	0.14
2 nd year	289 (29%)	30.52(8.67)	
3 rd year	210 (21%)	30.83(9.94)	
4 th year	262 (26%)	31.16(8.74)	

DISCUSSION

The findings of this study reveal a significant prevalence of sleep disorders among university students in Arabic-speaking nations, with most participants scoring above the threshold on the Pittsburgh Sleep Quality Index (PSQI), indicating poor sleep quality. Although previous studies did not primarily use the PSQI, they similarly reported high rates of sleep disturbances among Arab students, suggesting comparable patterns of poor sleep quality. These findings are consistent with research in other regions, although direct comparisons are challenging due to differing measurement tools [24,25].

Our results align with Lin et al., who found that students with moderate to severe internet addiction exhibited poorer sleep quality, characterized by increased sleep latency and daytime dysfunction, as assessed by the PSQI [26]. Similarly, Demirci et al. reported a strong correlation between high smartphone usage and poor sleep quality among university students, reinforcing the growing evidence of technology's negative impact on sleep patterns [8]. Additionally, our findings support those of White et al., who noted that excessive mobile gaming disrupts sleep habits and quality, suggesting that prolonged online activity contributes to sleep disturbances by altering circadian rhythms and reducing restorative sleep [27].

Regarding aggression, our study identified moderate levels of aggression among Gacha game users across the four dimensions measured by the Buss-Perry Aggression Questionnaire-Short Form (BPAQ-SF). T'ng et al. and Aleissa et al. reported a strong relationship between video game use and elevated aggression levels [30]. These results suggest that prolonged exposure to competitive or reward-based games like Gacha games can trigger aggressive tendencies, potentially due to stress from in-game challenges or frustration from unmet goals.

Additionally, we found that male students exhibited significantly higher aggression scores than their female counterparts. This gender difference is well-documented and may be attributed to cultural norms in Jordan, where the open expression of aggression is often more socially acceptable for males. Aleissa et al. reported similar findings, indicating that male players in combat or competitive games tend to display higher aggression levels, further emphasizing the gendered

nature of these behaviors [29]. The heightened aggression among male participants may also reflect broader sociocultural dynamics, where societal expectations shape emotional expression, particularly in competitive environments like gaming.

The relationships among Gacha game use, sleep quality, and aggression are complex and continue to be debated. While some studies, including those by Amadiou et al. and Kersten et al., suggest a direct link between prolonged video game use and increased sleep disturbances or aggression, our study did not find a significant correlation between Gacha game duration and either sleep quality or aggression levels [30,31]. Cultural factors may play a role in moderating aggressive behaviors.

In Jordan, cultural norms significantly influence behaviors related to aggression and gaming. In many Middle Eastern societies, including Jordan, overt expressions of aggression are often discouraged, particularly among young adults, as they may conflict with values of respect and harmony [18,32]. This cultural framework may affect how aggression manifests among gamers, potentially leading to underreporting or internalization of aggressive feelings. Moreover, the immersive nature of Gacha games may create a complex interplay between escapism and cultural expectations regarding emotional regulation. Understanding these cultural nuances is crucial for interpreting the psychological outcomes associated with Gacha game use among Jordanian university students. Future research should further explore how local social norms and cultural expectations influence both gaming behavior and the psychological effects, providing a more comprehensive view of this issue. Additionally, catharsis theory suggests that video games may serve as outlets for emotional release, potentially alleviating aggression rather than exacerbating it, which could explain the lack of direct correlation in our sample [33].

The rise of Gacha games among adolescents raises concerns about their impact on psychological well-being, particularly regarding gaming addiction and social isolation. Gacha games engage players by offering numerous tasks that yield rewards, often leading to prolonged gaming sessions without the necessity of spending money. This extended gameplay can disrupt sleep patterns, as players may prioritize gaming over essential activities, resulting in sleep deprivation. Poor sleep quality is closely linked to emotional regulation, which may heighten irritability and aggressive behaviors.

Furthermore, factors such as stress, academic pressure, and individual coping mechanisms may contribute to sleep disturbances and aggression. Adolescents facing significant academic demands or social stressors may resort to gaming as a means of escapism, further exacerbating sleep issues. Research by Chamarro et al. (2020) underscores the negative impact of psychological need frustration on addictive gaming behaviors, emphasizing the importance of both gaming duration and player expectations in this relationship [34]. Additionally, studies by Hart (2016) and Kapoor & Subida (2023) indicate that players may engage in gaming to explore alternative identities or compensate for unmet psychological needs, often resulting in negative associations [35,36]. Yildirim (2021) links gaming addiction to unfulfilled basic psychological needs and inadequate social support, suggesting that while games can provide avenues for self-exploration, they may also perpetuate addictive behaviors [37].

Our study's lack of significant relationships between Gacha game use and sleep quality or aggression levels suggests that other factors, such as stress, academic pressure, and individual coping mechanisms, may play a more substantial role in influencing these outcomes. Future research should delve deeper into these factors using longitudinal designs to better

understand the complex dynamics between gaming behaviors and psychological outcomes over time.

Overall, while this study offers valuable insights into the behavioral impacts of Gacha game use among university students in Arabic-speaking nations, particularly in Jordan, there is a need for longitudinal studies to examine the long-term consequences of Gacha game usage on sleep quality and aggression. Understanding these relationships is crucial for developing effective interventions to promote healthier gaming habits and minimize potential negative outcomes for students' mental health and well-being.

Implications and recommendations

To address the potential risks associated with excessive Gacha game use among university students, it is essential to implement awareness campaigns that educate individuals about the impacts on sleep quality and aggression. Promoting healthy gaming habits, such as setting time limits and encouraging alternative leisure activities, can foster a balanced lifestyle. Additionally, universities should provide supportive resources, including counseling services and workshops, to help students manage stress and develop healthier coping mechanisms. The integration of monitoring tools, like tracking apps, could offer insights into gaming behaviors and their effects on mental health. Finally, supporting further research initiatives, particularly longitudinal studies, will enhance our understanding of the long-term consequences of gaming and inform effective policies and interventions.

Strengths and limitations

This study, like others, has several limitations. A significant limitation is the short duration of the study and the absence of baseline assessments for sleep quality and aggression prior to its implementation, which may affect the interpretation of the findings. Additionally, the lack of a control group limits the ability to definitively attribute changes in sleep quality and aggression solely to Gacha game use. Future interventions with comparative groups are recommended to provide greater accuracy in detecting the effects of Gacha game use on sleep quality and aggression among Gacha game players and non-Gacha game players.

Furthermore, this study relies on self-report measures, which introduces the potential for response biases, such as social desirability bias, particularly when participants report on sensitive behaviors like gaming and aggression. Cultural factors may also have influenced participants' responses, especially given societal norms surrounding gaming and aggression in Jordan, which could impact the generalizability of the results.

The reliance solely on self-reported data may introduce inaccuracies in participants' accounts of their gaming habits and experiences. Incorporating objective measures, such as tracking apps or physiological data, would provide a more comprehensive understanding of gaming behaviors and their effects on sleep quality and aggression. Lastly, other factors associated with potential influences on students' sleep quality and aggression levels, such as stress, academic pressure, and individual differences, were not examined. Future studies should explore these variables in conjunction with Gacha game use to provide a more nuanced understanding of their interrelationships with sleep quality and aggression levels.

CONCLUSION

This study explored the relationships among Gacha game use, sleep quality, and aggression among university students. The findings indicate that Gacha game players experience poorer sleep quality and moderate levels of aggression. However, no significant correlations were found between game

duration, sleep quality, and aggression, possibly due to cultural factors or the catharsis theory. These results highlight the need for increased awareness of the potential negative consequences of excessive Gacha game use and the importance of monitoring and self-regulation to minimize adverse effects.

Disclosure Statement

- **Ethics approval and consent to participate:** The Institutional Review Board at Al-Zaytoonah University of Jordan approved this study on 11/5/2022 (Ref no. 22/16/2021-- 2022). The current study followed the Declaration of Helsinki provisions, and all participants provided informed consent. The permission to use the measurement instruments was received from the original author. Data were collected anonymously from January to February 2023.
- **Consent for publication:** The authors grant the Publisher permission to publish this work. All the data generated for this study are included within the article.
- **Availability of data and materials:** All data generated during this study are included in this published article.
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