

Association Between Violent Video Game Exposure and Sleep, Academic Functioning, and Mood Among Moroccan Adolescents: A Cross-Sectional Study

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Abstract

Original Research Article

Violent video games remain a widely debated genre in adolescent mental health, with growing international evidence linking gaming exposure to disturbed sleep, poorer academic functioning, and altered mood, though data specific to Moroccan and wider North African adolescents remain scarce. This cross-sectional study assessed the association between the frequency and duration of exposure to violent video games and self-reported sleep, academic functioning, and mood outcomes among 100 Moroccan adolescents aged 10–18 years who reported playing violent video games, recruited via an anonymous questionnaire administered online and on paper. Frequency of play (daily vs. non-daily) and session duration (>2 hours vs. ≤2 hours) were analyzed as separate exposures, and bivariate associations with outcomes were assessed using chi-square or Fisher's exact tests, with odds ratios (OR), 95% confidence intervals (CI), and a Bonferroni-corrected threshold given multiple comparisons. Sixty-six percent of participants were aged 16–18 years and 62.0% were male. Daily players (n = 20) were more likely than non-daily players (n = 80) to report sleeping <6 hours on holidays (45.0% vs. 15.0%; OR 4.64, 95% CI 1.58–13.57) and impaired sleep quality on school days (75.0% vs. 42.5%; OR 4.06, 95% CI 1.34–12.25), though neither association survived Bonferroni correction. Daily players were also more likely to report a negative effect of gaming on academic results (60.0% vs. 27.5%; OR 3.95, 95% CI 1.43–10.97) and academic motivation (70.0% vs. 36.2%; OR 4.10, 95% CI 1.42–11.84), both remaining significant after correction. Adolescents who believed that violent video games worsen sadness (n = 40) were more likely to report a negative mood after gaming than those who did not (45.0% vs. 15.0%; OR 4.64, 95% CI 1.80–11.91; p < 0.001), also significant after correction. An exploratory analysis of irritability after prolonged sessions did not reach significance (OR 1.92, 95% CI 0.73–5.06, p = 0.181). Frequent and prolonged exposure to violent video games was thus associated with poorer self-reported sleep, academic functioning, and mood among Moroccan adolescents, with the academic and mood associations remaining robust after correction for multiple comparisons; given the cross-sectional design, these findings reflect associations rather than causal effects and warrant confirmation in larger, prospective studies using validated instruments.

Keywords: Violent video games, adolescents, sleep, academic performance, mood, Morocco, cross-sectional study.

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INTRODUCTION

Video games occupy a central place in adolescent daily life worldwide, and violent video games characterized by graphic content and aggressive interactions remain one of the most debated genres in child and adolescent mental health research. In the Middle East and North Africa (MENA) region specifically, adolescent screen time and gaming use appear at least as high as in Western countries: regional survey data have shown that daily gaming exposure of five hours or more on non-school days is more common

among adolescents in Eastern Mediterranean countries than in Western Mediterranean ones [1], and problematic video game use has been documented among adolescents in several Arab countries [2].

A growing body of evidence links video gaming to poorer sleep outcomes in young people. A recent systematic review and meta-analysis of over 50,000 participants found that problematic gaming was associated with roughly double the odds of poor sleep quality and sleep problems, with a stronger inverse effect on sleep duration in adolescent samples specifically than

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in adult samples [3]. Experimental work focusing specifically on violent content found that prolonged violent video-gaming sessions were followed by measurable disruption of adolescent sleep architecture [4].

Beyond sleep, violent video game exposure has also been associated with poorer academic functioning. An early study of adolescent gaming habits linked frequency of violent video game play to increased school-related problems alongside hostility and aggressive behavior [5], and more recent Lebanese data have linked problematic gaming to academic achievement as well as sleep habits [6], suggesting that these two domains may be interrelated rather than independent.

The relationship between violent video game exposure and adolescent mood and emotional well-being is less consistent in the literature: while some studies have reported associations between daily violent video game play and depressive symptoms in preadolescents [7], others have found this relationship difficult to isolate once confounding factors are accounted for a discrepancy this study's own data will need to be interpreted against.

Despite this large international literature, data specific to Moroccan adolescents remain scarce. A recent study of Moroccan high-school students described patterns of screen time and compulsive internet use in this population [8], but to our knowledge no published study has specifically examined the association between violent video game exposure and sleep, academic functioning, and mood outcomes among adolescents in Morocco. Given the documented high prevalence of adolescent gaming in the wider MENA region [1,2] and the potential clinical relevance of sleep, academic, and mood disturbances for child and adolescent mental health practice, this gap warrants direct investigation.

Objective. This study aimed to assess the association between the frequency and duration of exposure to violent video games and self-reported sleep, academic functioning, and mood outcomes among Moroccan adolescents aged 10–18 years.

MATERIAL AND METHODS

Study design and setting

We conducted a descriptive and analytical cross-sectional study among Moroccan adolescents attending middle school ("collège") and high school ("lycée"). Data were collected between November 21 and December 4, 2023.

Participants

Inclusion criteria were: age between 10 and 18 years, and current playing of violent video games. Exclusion criteria were: refusal to participate,

questionnaires with missing data on key variables, and age above 19 years. One hundred adolescents met the inclusion criteria and were included in the final analytic sample ($n = 100$).

Data collection

Data were collected using an anonymous, self-administered, investigator-developed questionnaire, covering sociodemographic characteristics, video game habits, and self-reported outcomes in three domains: sleep, academic functioning, and mood. The questionnaire was administered both online and on paper. Paper questionnaires were subsequently transcribed by the investigator into the same online form (Google Forms), so that all responses were consolidated into a single dataset. Data were entered and managed in Microsoft Excel® 2021.

Study variables

Exposure variables. Two independent measures of exposure to violent video games were collected and analyzed separately:

- Frequency of play, categorized as daily, 4–6 times/week, or ≤ 3 times/week. For bivariate analysis, this was dichotomized a priori into daily players versus non-daily players.
- Session duration, categorized as <1 hour, 1–2 hours, or >2 hours. For bivariate analysis, this was dichotomized a priori into sessions >2 hours versus ≤ 2 hours.
- Outcome variables, grouped into three domains:
- Sleep: self-reported sleep duration (school days and holidays, 3 ordinal categories: <6 h, 6–8h, >8 h) and self-reported effect of gaming on sleep quality (school days and holidays, binary yes/no).
- Academic functioning: self-reported decrease in classroom concentration, perceived negative effect of gaming time on academic results, and perceived negative effect of gaming on academic motivation (all binary or 3-level categorical with a "not sure" option).
- Mood: general mood after a gaming session (categorical: unaffected / negatively affected / positively affected), and belief that violent video games worsen feelings of sadness or hopelessness (categorical: yes / no / not sure).

Statistical analysis

Categorical variables are described as frequencies and percentages. Bivariate associations between each dichotomized exposure variable and each outcome were assessed using the chi-square test when all expected cell counts were ≥ 5 , and Fisher's exact test otherwise. Effect sizes are reported as odds ratios (OR) with 95% confidence intervals (Woolf's method). Given the number of bivariate comparisons performed on the same dataset ($n = 7$), a Bonferroni-corrected significance

threshold is also reported alongside the nominal p-value for transparency. A nominal two-sided p-value <0.05 was considered statistically significant; results are discussed with explicit reference to whether they retained significance after Bonferroni correction. Statistical analyses were performed using Python (pandas and SciPy libraries).

RESULTS

Participant characteristics

One hundred adolescents were included (Table 1). Most participants were aged 16–18 years (66.0%), male (62.0%), and enrolled in high school (70.0%). Regarding gaming habits, 63.0% played violent video games 3 times per week or less, 17.0% played 4–6 times per week, and 20.0% played daily. Session duration was <1 hour for 34.0% of participants, 1–2 hours for 23.0%, and >2 hours for 43.0%.

Table 1: Sociodemographic characteristics and gaming habits (n = 100)

Variable	Category	n (%)
Age	10–12 years	9 (9.0%)
	13–15 years	25 (25.0%)
	16–18 years	66 (66.0%)
Sex	Male	62 (62.0%)
	Female	38 (38.0%)
School level	Middle school	30 (30.0%)
	High school	70 (70.0%)
Frequency of play	Daily	20 (20.0%)
	4–6 times/week	17 (17.0%)
	≤3 times/week	63 (63.0%)
Session duration	<1 hour	34 (34.0%)
	1–2 hours	23 (23.0%)
	>2 hours	43 (43.0%)

General emotional profile of the sample

Self-reported stress level after gaming was low in 49.0%, moderate in 41.0%, and high in 10.0% of participants. Forty percent believed that violent video games worsen feelings of sadness or hopelessness, 27.0% did not, and 33.0% were not sure. General mood after a gaming session was unaffected in 51.0% (50/98), negatively affected in 27.6% (27/98), and positively affected in 21.4% (21/98) of participants with non-missing data on this item (2 participants, 2.0%, did not answer this question and were excluded from this specific denominator).

Missing responses for this item (n = 2, 2.0%) were excluded from the denominator, consistent with standard practice for item-level missing data; this differs

from the original poster figures, which appeared to include the missing responses within a 100% total.

Association between gaming frequency and sleep outcomes

Daily players (n = 20) were significantly more likely than non-daily players (n = 80) to report sleeping less than 6 hours per night on holidays (45.0% vs. 15.0%; OR 4.64, 95% CI 1.58–13.57; p = 0.011, Fisher's exact test) and to report that violent video games affected their sleep quality on school days (75.0% vs. 42.5%; OR 4.06, 95% CI 1.34–12.25; p = 0.009, χ^2) (Table 2). Neither association retained significance after Bonferroni correction for multiple comparisons (adjusted p = 0.077 and p = 0.065, respectively).

Table 2. Sleep outcomes by gaming frequency

Outcome	Daily (n=20)	Non-daily (n=80)	Test	p (raw)	p (Bonf.)	OR (95% CI)
Sleep <6h/night on holidays	9 (45.0%)	12 (15.0%)	Fisher exact	0.011	0.077	4.64 (1.58–13.57)
Gaming affects sleep quality (school days)	15 (75.0%)	34 (42.5%)	χ^2	0.009	0.065	4.06 (1.34–12.25)

Association between gaming frequency and academic outcomes

Daily players were significantly more likely to report that the time spent gaming negatively affected their academic results (60.0% vs. 27.5%; OR 3.95, 95% CI 1.43–10.97; p = 0.006, χ^2) and that violent video

games negatively affected their academic motivation (70.0% vs. 36.2%; OR 4.10, 95% CI 1.42–11.84; p = 0.006, χ^2) (Table 3). Both associations retained significance after Bonferroni correction (adjusted p = 0.042 and p = 0.045, respectively).

Table 3: Academic outcomes by gaming frequency

Outcome	Daily (n=20)	Non-daily (n=80)	Test	p (raw)	p (Bonf.)	OR (95% CI)
Negative effect on academic results	12 (60.0%)	22 (27.5%)	χ^2	0.006	0.042	3.95 (1.43–10.97)
Negative effect on academic motivation	14 (70.0%)	29 (36.2%)	χ^2	0.006	0.045	4.10 (1.42–11.84)

Association between beliefs about violent video games and mood

Among adolescents who believed that violent video games worsen feelings of sadness or hopelessness (n = 40), 45.0% reported that their mood was negatively

affected after a gaming session, compared with 15.0% of those who did not hold this belief or were not sure (n = 60) (OR 4.64, 95% CI 1.80–11.91; $p < 0.001$, χ^2). This association retained significance after Bonferroni correction (adjusted $p = 0.006$) (Table 4).

Table 4: Mood outcome by belief that violent video games worsen sadness

Outcome	Believes "yes" (n=40)	Believes "no/not sure" (n=60)	Test	p (raw)	p (Bonf.)	OR (95% CI)
Mood negatively affected after session	18 (45.0%)	9 (15.0%)	χ^2	<0.001	0.006	4.64 (1.80–11.91)

Figure 1 summarizes the odds ratios and 95% confidence intervals for all bivariate associations tested in this study, including the exploratory irritability and

perceived psychological impact analyses described below.

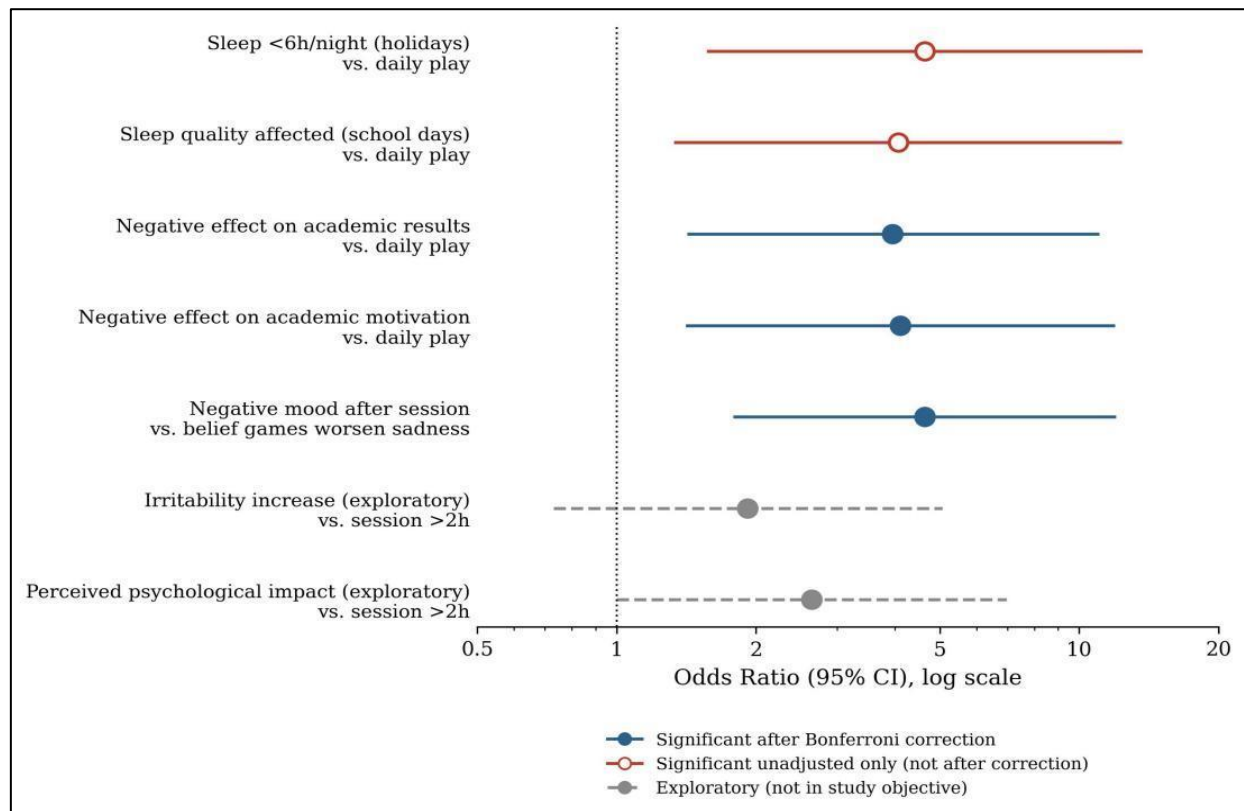


Figure 1: Forest plot of odds ratios (95% CI) for associations between violent video game exposure and sleep, academic, mood, and exploratory outcomes.

An exploratory analysis of self-reported irritability and perceived psychological impact among adolescents with sessions >2 hours (n = 23) was also conducted; neither association reached significance after Bonferroni correction (irritability: OR 1.92, 95% CI 0.73–5.06, $p = 0.181$; perceived psychological impact: OR 2.64, 95% CI 1.00–6.96, $p = 0.046$ raw / 0.322

Bonferroni), and this domain is not further discussed in Results.

DISCUSSION

Summary of main findings

In this cross-sectional study of 100 Moroccan adolescents exposed to violent video games, daily play

was associated with higher odds of short sleep duration and self-reported sleep quality disturbance, as well as with self-reported negative effects on academic results and motivation. Adolescents who believed that violent video games worsen feelings of sadness were also markedly more likely to report a negative mood after gaming sessions. After correction for multiple comparisons, the academic and mood associations remained statistically significant, while the two sleep associations, though significant in unadjusted analysis, did not survive correction.

Sleep

The direction and pattern of our sleep findings are consistent with the broader international literature. A meta-analysis of over 50,000 participants found that problematic gaming was associated with approximately double the odds of poor sleep quality and sleep problems, with adolescent samples showing a stronger inverse effect on sleep duration than adult samples [3]. Experimental data specifically on violent video games have similarly shown disruption of adolescent sleep following prolonged violent gaming sessions [4]. The odds ratios observed in our sample (4.06–4.64) are numerically larger than those reported in this meta-analytic evidence, which may reflect our reliance on single-item, non-validated self-report measures rather than standardized sleep instruments a difference in measurement precision that likely inflates effect-size estimates and widens confidence intervals, and is consistent with the loss of significance after correcting for multiple testing.

Academic functioning

The association between daily violent video game play and self-reported negative effects on academic results and motivation is in line with earlier work linking violent video game habits to declining school performance [5] and with more recent Lebanese data linking problematic gaming to both academic achievement and sleep habits in the same population [6], supporting the idea that sleep disruption and academic difficulties may be interrelated consequences of excessive gaming rather than fully independent outcomes. Unlike the sleep associations, both academic associations in our sample remained statistically significant after Bonferroni correction, suggesting a comparatively more robust signal though this should still be interpreted cautiously given the small subgroup size (daily players, $n = 20$).

Mood

Adolescents who believed that violent video games worsen sadness were more likely to report a negative mood after gaming, an association that remained strongly significant after correction for multiple comparisons. This finding should be compared only cautiously with prior work linking daily violent video game play directly to depressive symptoms in preadolescents [7], since our analysis examined a belief-

outcome pairing rather than testing gaming frequency directly against a validated depression measure; we did not find that frequency or duration of play were themselves directly associated with a validated mood or depression score, since no such instrument was included in our questionnaire. This distinction matters: our data speak to how adolescents' own beliefs about violent video games relate to their reported mood, not to a directly measured causal or dose-dependent effect of gaming on depressive symptoms, an association previous authors have also found difficult to demonstrate empirically [7].

Regional context

To our knowledge, this is the first study to specifically examine associations between violent video game exposure and sleep, academic, and mood outcomes among Moroccan adolescents. Our findings extend regional evidence from Tunisia and Lebanon, which has documented high prevalence of problematic gaming and its association with mental health and academic outcomes in nearby Arab adolescent populations [1,2,6], and align with a recent description of high screen-time and compulsive internet-use patterns among Moroccan high-school students [8], though that study did not examine violent content specifically or the sleep/academic/mood outcomes assessed here.

Exploratory analysis (not included in study objective)

An exploratory analysis of irritability following prolonged (>2 hours) gaming sessions did not reach statistical significance after correction for multiple comparisons (OR 1.92, 95% CI 0.73–5.06, $p = 0.181$), consistent with our decision not to include this domain in the study's primary objective; this null finding may reflect genuine absence of association, insufficient statistical power given the small subgroup size ($n = 23$), or both, and should not be interpreted as evidence against an association without further study in a larger sample.

Strengths and limitations

This study has several limitations that should temper the interpretation of its findings. First, the cross-sectional design precludes any causal inference; reverse causality is plausible, for instance if adolescents already experiencing sleep or academic difficulties turn to gaming as an escape or coping behavior, rather than gaming causing these difficulties. Second, all outcome measures were single-item, self-reported perceptions rather than validated psychometric instruments (e.g., no standardized sleep, mood, or academic-performance scale was used), which limits measurement precision and comparability with the cited validated-instrument literature. Third, the sample size was modest ($n = 100$), and subgroup analyses were based on small strata (daily players, $n = 20$; long-session players, $n = 23$; adolescents believing games worsen sadness, $n = 40$), producing wide confidence intervals; this likely explains why two associations that were significant in unadjusted analysis did not survive correction for multiple comparisons, and

underlines that our findings including the significant ones warrant replication in larger samples. Fourth, bivariate analyses were not adjusted for potential confounders such as age, sex, or school level, all of which may independently relate to both gaming habits and the outcomes studied. Finally, the recruitment approach (a convenience sample of adolescents completing an anonymous questionnaire online or on paper) limits the generalizability of these findings to the broader Moroccan adolescent population.

Despite these limitations, this study benefits from a statistically transparent approach explicit reporting of both unadjusted and multiple-comparison-corrected results, a rarely applied standard in comparable regional literature and addresses a population and exposure combination (violent video games specifically, rather than gaming or screen time in general) not previously studied in Morocco.

CONCLUSION

In this cross-sectional study of Moroccan adolescents, daily violent video game use was associated with self-reported negative effects on academic performance and academic motivation, while associations with sleep outcomes were observed in unadjusted analyses but did not remain statistically significant after correction for multiple comparisons. Adolescents who believed that violent video games worsened feelings of sadness were also more likely to report a negative mood following a gaming session.

These findings suggest that frequent violent video game use may be associated with several aspects of adolescent functioning, particularly academic functioning and perceived mood. However, the cross-sectional design, modest sample size, convenience sampling, use of non-validated self-reported measures, and lack of adjustment for potential confounders preclude causal inference and limit generalizability.

Larger prospective studies using validated measures of sleep, mood, and academic functioning, with appropriate adjustment for potential confounding factors, are needed to confirm these associations and clarify their direction. Nevertheless, these findings highlight the relevance of routinely exploring gaming

habits when adolescents present with sleep difficulties, academic problems, or mood changes.

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