



Original Research Article

Impact of video-games on academic performance and sleep duration in medical students

Prashanth Babu¹, Ravindra P N¹, Chandrashekhar D Mudabasappagol^{1,*}¹Dept. of Physiology, Gadag Institute of Medical Sciences, Gadag, Karnataka, India

ARTICLE INFO

Article history:

Received 06-11-2019

Accepted 07-12-2019

Available online 31-12-2019

Keywords:

Video-games

Academic performance

Sleep duration

ABSTRACT

Introduction: Video-gaming has become one of the most preferred leisure activities among adolescents, with prevalence rate being as high as 75% in some of the industrialized countries. Video games provide a 'virtual world' where the gamer can seek challenges and thrills in a safe way and fulfill his need for adventure and excitement. The popularity of video-games has raised concern over their possible impact on the physical, mental and emotional well being of an individual.

Aims and Objectives: The aim of the present study was to assess the impact of video-games on academic performance and sleep duration in medical students.

Materials and Methods: The present study was conducted in GIMS, Gadag, after being cleared by the Ethical committee. Fifty healthy male medical students who regularly played video-games acted as subjects, and fifty age and gender matched students were controls. Information related to duration of video-gaming, sleep duration and academic performance was assessed using comprehensive questionnaire. Comparison between the groups was done using students t-test. Correlation between duration of video-gaming with academic performance and sleep duration in the subjects was assessed using Pearson's correlation. Effect size was calculated.

Results: In students, who regularly played video games, the academic performance was less and the duration of sleep was more, when compared to the students who didn't play videogames. The difference was statistically significant ($P < 0.05$).

Conclusion: Video-games have a negative effect on academic performance in medical students, and they also seem to increase the duration and requirement of sleep.

© 2019 Published by Innovative Publication. This is an open access article under the CC BY-NC-ND license (<https://creativecommons.org/licenses/by/4.0/>)

1. Introduction

A video game can be considered as an electronic game that involves interaction with a user interface to generate visual feedback on a video display device such as a TV screen or a computer monitor. Video-gaming is a highly popular and prevalent entertainment option that is fast catching the interest of not just children but adults as well. Demographic data on video gaming shows that the mean age of video game players is now thirty one years, and video-gaming has become a common activity among young adults.¹

Video-games provide their users a 'safe haven' in a virtual world where they can indulge their curiosity and satisfy their needs for thrill and excitement, without any obvious consequences in real life. Video-games play and exploit on the inherent urge for excitement and novelty that is hardwired in the human 'psyche'. This makes them a potentially dangerous candidate for addiction.

The increasing ubiquity, accessibility and availability of smart-phones and computers have exposed the majority of the population to the world of video-games. This has triggered an interest in knowing the possible mental, emotional, cognitive and social effects of long-term exposure to video-games. The extent to which video-games affect the brain and behavior is uncertain and it is likely that

* Corresponding author.

E-mail address: chandrashekardm3@gmail.com (C. D. Mudabasappagol).

the specific beneficial or harmful effects are determined by the characteristics of both the individual and of the game.²

Playing video-games may improve visuospatial capacity, visual acuity, task switching, decision making and object tracking in healthy individuals. There are video-games that are effective for training perceptual and cognitive skills in an individual, however they are also equally capable of producing maladaptive effects on brain and behavior.² Some studies have even demonstrated beneficial effects of playing video games on psychological and physical health.^{3,4}

However there are studies which suggest that excessive video gaming is associated with reduced sleep time, insomnia, attention problems, poor academic performance, anxiety, depressive symptoms, deterioration of interpersonal relationships, family conflicts, anti-social behavior, lower self-esteem, and lower satisfaction with daily life.^{5–7}

With the rise of smart-phone usage across the world and easy accessibility to a myriad of video-games online, the issue of video-games and their impact on the overall health of an individual can no longer be ignored. The possibility of video-game addiction - in susceptible adolescents - leading to various mental health issues and hindrance in academic performance is a very real one.

With this in mind, we have undertaken the present study to assess the extent to which regular video-gaming can have an impact on academic performance and sleep duration in an otherwise healthy adolescent who indulges in regular video-gaming.

Our goal is to find out whether video-gaming is just a harmless past time or a potential cause which can impair the academic performance of an adolescent, and also impact sleep duration.

2. Materials and Methods

The present study was conducted in Department of Physiology, GIMS, Gadag. The study and its conduct were cleared by the Ethical Committee of the Institute.

This was a cross sectional study done on first MBBS students of the Institute. Fifty male students who regularly played video-games were enlisted in the study group, and fifty age and gender matched students who didn't play video-games were taken as controls.

The criterion for Video-gamers was a minimum of 30 minutes of Video-gaming per day.

Routine health check-up was done in all the volunteers who took part in the study. The aim and design of the study was explained in detail to all the volunteers and written informed consent was taken.

2.1. Inclusion criteria

1. Healthy male volunteers in the age range of 18-20 years

2.2. Exclusion criteria

1. Students suffering from insomnia, depression or any other mental disorders.
2. Students on allergy/asthma medications, thyroid supplements or any medications that can influence sleep duration.
3. Students who indulged in smoking, alcohol or usage of recreational drugs.

2.3. Method of collection of data

Duration of sleep per day and average time spent on video-games per day was assessed by questionnaire method.

Academic performance was calculated by taking the average of the marks scored in the last three most recent exams, taken by the students. The marks were expressed as percentage.

The comparison between the two groups was done by students' t - test. Correlation between duration of video-games with academic performance and sleep duration was done using Pearson's correlation. Effect size was calculated to know the magnitude of influence of videogame on academic performance and sleep duration. All analysis was done in SPSS 16.

3. Results

The present study had a total of hundred participants who were divided into two groups: Subjects-those who played video-games on a regular basis (n=50) and Controls - those who didn't play video-games (n=50).

The average Video-gaming duration among the subjects was 1.2 ± 0.82 hours/day (Mean \pm SD).

In the present study the academic performance expressed as percentage marks (Table 1) in students who played video-games was 88.98 ± 6.53 (Mean \pm SD), whereas the academic performance expressed as percentage marks in students who didn't play video-games was 91.88 ± 5.41 (Mean \pm SD). The academic performance of video-gamers was less and the difference was statistically significant ($t=2.416$, $P=0.0175$).

In the present study the hours of sleep duration in video-gamers (Table 2) was 7.48 ± 0.844 (Mean \pm SD), whereas the sleep duration in students who didn't play video-game was 7.09 ± 0.66 (Mean \pm SD). The sleep duration in video-gamers was more and the difference was statistically significant ($t= 2.572$, $P=0.0116$).

Among the video-gamers the correlation (Table 3) between duration of time spent on video-games (Figure 1) had a strong negative correlation with academic performance ($r= 0.302$, $p=0.033$), however no correlation was seen between duration of sleep (Figure 2) and video games ($r=0.016$, $p=0.912$). Whereas, the effect size calculation showed moderate effect of video game on sleep duration (Cohen's $d = 0.514$) and mild effect on academic

performance (Cohen’s d = 0.483).

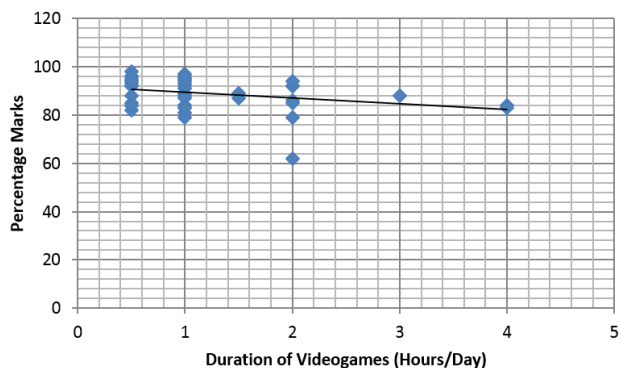


Fig. 1: Showing duration of video-games and academic performance

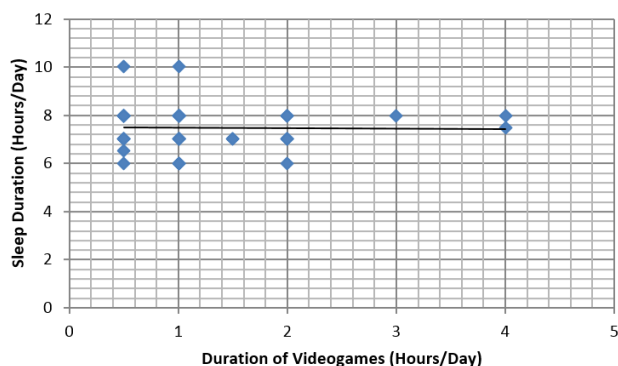


Fig. 2: Showing duration of videogames and sleep duration

4. Discussion

In the present study we observed that students who regularly played video-games secured significantly less percentage of marks than their counter-parts who didn’t play video-games. Moreover there was a significant negative correlation between the duration of time spent on video-games and academic performance. Video gamers had significantly less duration of sleep than controls. Among academic performance and sleep duration, the effect of video game seems to be more on sleep duration.

Our observation of reduced academic performance among video gamers is in consistent with a earlier studies which have reported that video gamers secure significantly less scores in GPA,⁸ SAT⁹ and also in other general academic assessments.^{10,11} These reports have demonstrated that leisure type of video games adversely influence academic performance irrespective of type and competitiveness of the assessment. However, in contrast, no negative influence of video games on adolescent academic performance in Science, Mathematics

or Reading is also reported.¹² The discrepancies in these observations are due to the content and nature of video games. The video games that are designed to enhance critical thinking are known to have a beneficial effect in developing /improving in certain cognitive domains. However, the most prevalent video games that are of entertainment utility, designed for leisure activity, fast action games do not contribute towards developing any of the higher cognitive skills. Video games that are designed to experience thrill and excitement are known to bring about emotional disturbances, aggressiveness and hamper cognitive enhancement, hence have negative influence on academics.^{10,11} In the present study, video-gamers engaged in games that are designed for leisure and entertainment activities and fast action games which have a potential negative impact on academic performance.

The very nature of a video-game is designed to be novel, engaging and addictive. The progressively difficult levels of a video-game and the reward at the successful completion of a level keep the player ‘hooked’ to the game and interfere with his daily routine. The time spent in video-games makes a huge dent in the study time available to students and also affects their routine home work assignments. Time spent playing video-games is time spent away from other school related, social or outdoor activities, which are needed for cognitive development and mental well being of an individual.² Exposure to fast action games has been shown to contribute to an increase in ADHD-related behaviors. It has been argued that fast paced action games can lead to listlessness and discontent in slower-paced and less stimulating academic, work or social environments. Violent and graphic action games with anti-social content have been shown to reduce empathy in an individual and to increase confrontational and disruptive behaviors in the real world. They also seem to distant the individual from the society, breed loneliness and hamper social skills.² All of these factors collectively could lead to a decreased interest and effort in academic related activities, leading to poor performance in the exams.

In the present study we also noted that video-gamers sleep more than their counterparts. In a self report assessment, video-gaming during presleep period led to video-gamers experiencing trouble falling asleep within 30 minutes, they were also not getting enough night time sleep, displayed daytime sleepiness and felt dissatisfied with their current sleep pattern.¹³ In particular, activity as playing video-games, watching TV, reading e-books, texting with mobile phone and browsing before falling sleep, determine a delay in bedtime, causing the reduction of total sleep time, since individuals tend to go to bed later.¹⁴ Objective evaluation of sleep has demonstrated reduction of total sleep time (TST), increase of sleep onset latency (SOL) and reduced quality of sleep through mechanisms like-increased physiological arousal due to delay to bed and the exposure

to light monitor during the night.^{15–17} In the present study, we have evaluated general habit of video gaming and its effect on total sleep duration. No pre - sleep habit of video gaming was assessed. Our study has emphasized that video gaming has adverse effect in reducing the sleep duration and academic performance in young adults.

Two outcome variables in the present study i.e. academic performance and sleep duration when subjected to the assessment of effect-size; sleep duration was influenced more than academic performance with video games. This demonstrates that video games loaded with contents to experience thrill and excitement have strong and immediate direct effect on sleep. Paucity of time due to spending more hours in sleep could hamper academic performance. With this pilot study, we hypothesis that, video games with intent of entertainment directly influence sleep with mechanisms like physiological arousal during sleep, and reduced academic performance may not be causatively related to video games. In this direction, more studies in this direction are warranted to know the underlying mechanisms.

Table 1: Academic performance (Percentage Marks) in subjects and controls

Video Gamers(n= 50) Mean ± SD	Controls(n= 50) Mean ± SD	't' value	P value
88.98 ± 6.53	91.88 ± 5.41	2.416	0.0175

Table 2: Sleep duration (Hours per day) in subjects and controls

Video Gamers(n= 50) Mean ± SD	Controls(n= 50) Mean ± SD	't' value	P value
7.48 ± 0.844	7.09 ± 0.66	2.572	0.0116

Table 3: Correlation of duration of videogames with academic performance and sleep duration

Parameter	'r' value	P value	Cohen's d (effect size)
Academic Performance (Percentage Marks)	-0.302	0.033	0.483
Sleep Duration	0.016	0.912	0.512

5. Conclusion

Video-games have a negative impact on the academic performance in medical students, and they also tend to impair the sleep pattern leading to an increased demand for sleep. Scientific literature shows several evidences highlighting the negative outcomes of video-games on behavioral, emotive, cognitive and physical well being of an individual. With the popularity of video-games on the rise in the last decade, they can no longer be ignored as a

harmless past-time and have to be treated as a serious health issue that has the potential to negatively affect the health and well being of an individual.

6. Limitations

The present study didn't take into consideration the type of video-game played by the subjects. Future studies including the type and nature of the video-game can shed valuable insights into the effect of video-games on human behavior.

7. Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

8. Contribution of authors

Prashanth babu: Data collection, preparing the manuscript
Ravindra PN: Idea, designed study, data collection and finalizing the manuscript
Chandrashekhar: Prepared questionnaire, Data analysis and preparation of manuscript.

9. Acknowledgements

The authors are immensely gratefully for all the volunteers who took part in the study.

10. Source of funding

Self.

11. Ethical clearance

Taken from the institutional ethical committee.

References

- Entertainment and Software association. 2018 essential facts about the computer and video game industry. ESA factsheet ;. Available from: <https://www.theesa.com/esa-research/2018-essential-facts-about-the-computer-and-video-game-industry/>.
- Bavelier D, Green CS, Han DH, Renshaw PF, Merzenich MM, Gentile DA. Brains on video games. *Nat Rev Neurosci*. 2011;12(12):763–768.
- Cole H, Griffiths MD. Social interactions in massively multiplayer online role-playing gamers. *Cyberpsychol Behav*. 2007;10(4):575–583.
- Blumberg FC, Altschuler EA, Almonte DE, Mileaf MI. The impact of recreational video game play on children's and adolescents' cognition. *New Directions for Child and Adolescent Development*. 2013;139:41–50.
- Wan CS, Chiou W. Why are adolescents addicted to online gaming? An interview study in Taiwan. *Cyberpsychol Behav*. 2006;9(6):762–766.
- Rehbein F, Psych G, Kleimann M, Mediasci G, Moble T. Prevalence and risk factors of video game dependency in adolescence: results of a German nationwide survey. *Cyberpsychology, Behavior, and Social Networking*. 2010;13(3):269–277.
- Ko C, Yen J, Chen C, Chen S, Yen C. Gender differences and related factors affecting online gaming addiction among Taiwanese adolescents. *Journal of Nervous and Mental Disease*. 2005;193(4):273–277.

8. Wright J. The effects of video game play on academic performance. *Modern Psychol Stud.* 2011;1(1):37–44.
9. Anand V. A study of time management: The correlation between video game usage and academic performance markers. *Cyber Psychol Behav.* 2007;10(4):552–559.
10. Anderson C, Dill K. Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *J Personal Soc Psychol.* 2000;78(4):772–790.
11. Wack E, Tantleff-Dunn S. Relationships between electronic game play, obesity, and psychosocial functioning in young men. *CyberPsychology and Behavior.* 2019;12(2):241–244.
12. Aaron D, Sauer J. Video-Games Do Not Negatively Impact Adolescent Academic Performance in Science, Mathematics or Reading. *PLoS one.* 2014;9:87943.
13. Usman N ;.
14. Chang AM, Aeschbach D, Duffy JF, Czeisler CA. Evening use of light-emitting eReaders negatively affects sleep, circadian timing, and next-morning alertness. *Proc Natl Acad Sci.* 2015;112(4):1232–1239.
15. Weaver E, Gradisar M, Dohnt H, Lovato N, Douglas P. The effect of presleep video-game playing on adolescent sleep. *J Clin Sleep Med.* 2010;6(2):184–193.
16. Dworak M, Schierl T, Bruns T, Strder HK. Impact of singular excessive computer game and television exposure on sleep patterns and memory performance of school-aged children. *Pediatrics.* 2007;120(5):978–985.
17. Higuchi S, Motohashi Y, Liu Y, Maeda A. Effects of playing a computer game using a bright display on presleep physiological variables, sleep latency, slow wave sleep and REM sleep. *J Sleep Res.* 2005;14(3):267–273.

Author biography

Prashanth Babu Assistant Professor

Ravindra P N Professor and HOD

Chandrashekhar D Mudabasappagol Assistant Professor

Cite this article: Babu P, Ravindra P N , Mudabasappagol CD. Impact of video-games on academic performance and sleep duration in medical students. *Indian J Clin Anat Physiol* 2019;6(4):396-400.