

Effect of Video Games on Medical Students' Academic Performance: A Two-Institutions, Cross-Sectional Study

Ali Alkhaibary, Fahad Alghanim, Abdullah Najdi, Mohammed Bajaber, Abdulrahman Alakeel, Mohammed Aljabir, MohamudMohamud, Amir Omair

Abstract— Background: Several studies have been conducted to investigate the effect of video games on the academic performance of students at different educational levels. However, there is no universal agreement on the association between video-gaming with the level of academic performance.**Aim:** To identify the association between playing video games and the academic performance at two male medical schools in Riyadh, Saudi Arabia.**Materials & Methods:** A cross-sectional, questionnaire-based study was conducted at two male medical schools in Riyadh, that utilized a four-section questionnaire to investigate the effect of video games on the academic performance on a sample size of 234 medical students.**Results:** A total of 234 students participated in this study. Around 149 participants (63.7%) are active players of video games. Most students were studying at the first academic year in the college of medicine (N=139 ; 59.4%) and only 95 [40.6%] participants were in the second year. The academic performance, reflected by the mean GPA, was almost equal between video game players (GPA = 4.36) and non video-game players (GPA = 4.33). **Conclusion:** The findings suggest that there is no significant difference in the mean GPA of those who play video games on a regular basis and those who do not play video games..

Index Terms— Academic Performance, GPA, Medical Education, Medical Students, Saudi Arabia, Study Habits, Video Games.

1 INTRODUCTION

University students go through intensive and stressful exams, assignments and research projects during their studies. Because of these stressful educational events, students like to get some relief from these stressors by spending their free time enjoying their hobbies and doing activities they love, one of which is playing video games. A video game is an electronic game that provides an interactive way of playing by moving graphic features or objects on a display screen using a device like computers, consoles, or mobile devices[1]. Playing video games is one of the most common activities university students like to entertain themselves with.

A number of studies have been conducted to investigate the effect that video gaming may have on the academic performance of students at different educational levels. According to a study published in 2014, video games have had little effect on the academic performance of adolescent males aged around fifteen years old across twenty two Organizations within Economic Co-operation and Development countries (OECD)[2].

Another study was conducted on high school students in the United States, showed that as the amount of time spent on video games increases, the academic performance and grades of the students decreases. The study concluded that video-gaming has a negative impact on the overall academic performance of the students[3]. Other studies also stated that the school performance is negatively associated with the time spent of video games[4][5].

In Saudi Arabia, a study was conducted in Jeddah, showed that video-gaming may improve academic performance of medical students by providing an important form of entertainment which can result in improved concentration during study time. The results also suggested that limited usage of video games can be associated with moderate improvement in GPA among medical students in Saudi Arabia[6].

The main aim of this research, therefore, is to determine the prevalence and habits of video-gaming among medical students, and whether video games have an impact on the academic performance of medical students.

2 METHODS

2.1 Participants and study Setting

This cross-sectional study included King Saud bin Abdulaziz University for Health Sciences (KSAU-HS) and Al-Imam Muhammad Ibn Saud Islamic University (IMAMU). In Riyadh, Saudi Arabia. These two universities are public, and do not require any fees for Saudis to study medicine therein.

This study investigated the effect of video games on the academic performance among the pre-clinical male medical students at KSAU-HS and IMAMU from January 2017 through June 2017.

2.2 Questionnaire

A self-developed questionnaire was used for this study, which included four sections. The first section, included the participant demographics (age, academic year, high school attended, ...etc). The second section, asked about the habits of playing video games (duration, reason, type of devices, ...etc), and the third and fourth sections primarily focused on the studying habits among the students (time spent on studying, classes missed, satisfaction with studying habits).

The content validation of this study was done by three medical education specialists in the College of Medicine of KSAU-HS. Cronbach's α showed the internal consistency as 0.72. The questionnaire included 27 questions and was piloted

in a convenience sample of 30 participants in. The participants were asked if they had any difficulties in filling the questionnaire. Finally, the average overall time for completing the questionnaire was estimated.

2.3 Sampling & Data Collection

A Sample size calculator website (Rasoft) has been used with a margin of error of 5% confidence level of 95%, population size of 560. The recommended sample size is 227 students across the two universities.

The questionnaires were distributed electronically either through E-mail or social media applications among the pre-clinical medical students (the first two years in the College of Medicine). The questionnaires were then sent to the students three times to maximize the overall response rate.

2.4 Data Management & Analysis Plan

Data were coded and entered into IBM Statistical Package for the Social Sciences (SPSS), version 20. Descriptive statistics were used to present the prevalence related data; such as university attended, academic year, types of gaming devices. These were presented as frequencies and percentages. Mean and standard deviations were calculated for numerical variables; such as age, GPA scores, etc. All tests with a p-value of less than 0.05 were considered significant.

2.5 Ethical Considerations

This study was approved by The Institutional review board (IRB) at King Abdullah International Medical Research Center (KAIMRC), National Guard Health Affairs (NGHA), Riyadh, Saudi Arabia. Participation to fill and complete the questionnaire was voluntary, and all students had the right to not to accept and fill the survey without stating their reason to do so. Furthermore, students' information were kept anonymous and, therefore, no one was able to identify the student through the questionnaire. Lastly, the students' names were not a requirement for the present study.

3 RESULTS

A total of 234 participants responded to the electronic questionnaire. The survey included Participants with an age range from 19 to 26. However, most of the participants were at the age of 21 with a standard deviation of 0.991 (N=94 ; 40.2%). Of the 234 responses, most were studying at the first academic year in the college of medicine (N=139 ; 59.4%) and only 95 [40.6%] participants were in the second year of college.

When the participants were asked about the high school that they have attended, most responded that they have attended a private school (N=126 ; 53.8%) and the rest (N=108 ; 46.2%) have studied at a public high school. Details of the participants demographics are listed in Table 1.

Variable	N	%
Age		
19	1	0.4%
20	55	23.5%
21	94	40.2%
22	64	27.4%
23	17	7.3%
24	1	0.4%
25	1	0.4%
26	1	0.4%
Academic Year		
1	139	59.4%
2	95	40.6%
High School		
Public	108	46.2%
Private	126	53.8%
University		
KSAU-HS	172	73.5%
IMAMU	62	26.5%

Table 1
Participants Demographics (N = 234)

The first question that was asked in the questionnaire was whether the participant is an active video games player or not. Around 149 participants (63.7%) are active players of video games. Furthermore, those 149 participants were asked about what motivated them to play video games, and the two most frequently reported reasons for them were self-interest (73.3%) and friends (73.3%).

Most of the students (N = 103 ; 69.1%) have been playing video games for more than ten years. Furthermore, participants were asked about the average total number of hours for playing video games on the weekdays as well as the weekends, respectively. The number of hours for playing video games are listed in Table 2.

- Ali Alkhaibary is currently pursuing bachelor degree program in Medicine in KSAU-HS University, Saudi Arabia. E-mail: AlkhaibaryA@hotmail.com
- Fahad Alghanim, Abdullah Najdi, Mohammed Bajaber, Abdulrahman Alakeel, Mohammed Aljabir are currently pursuing Bachelor degree program in Medicine in KSUA-HS, Saudi Arabia.
- Dr. MohamudMohamud& Dr. Amir Omair are Medical Education lecturers at KSAU-HS

Table 2	Question	N	%
How many hours do you play on the "weekends" per day?			
	>12 hours	5	2.1%
	8-12 hours	16	6.4%
	4-8 hours	50	21.4%
	<4 hours	70	29.9%
	None	8	3.4%
How many hours do you play on "weekdays" per day?			
	>6 hours	2	0.9%
	4-6 hours	15	6.4%
	2-3 hours	52	22.2%
	< 1 hour	57	24.4%
	None	23	9.8%

Table 2

Number of hours for playing video games (N = 149)

Most students (N = 123 ; 82.6%) responded that they have used to play video games more in the past, and when they were asked about the reason for reducing the time spent on video games, most (N = 101 ; 80.8%) responded that they do not have enough time for playing anymore, or not interested anymore (N = 36 ; 28.8%). However, only 21 students (16.8%) responded that they have reduced the time spent on playing video games because it affected their grades. Moreover, most students (N = 47 ; 31.5%) had a "Neutral" answer when asked whether they think that playing video games affects their grades negatively (Table 3). Fortunately though, most students (N = 50 ; 21.4%) stated that they rarely miss some sleep hours just to accommodate some time for playing video games

Table 3	Question	N	%
Do you think that playing video games affects your grades negatively?			
	Agree	30	12.8%
	Disagree	38	16.2%
	Neutral	47	20.1%
	Strongly Agree	11	4.7%
	Strongly Disagree	23	9.8%
Do you miss some sleep hours just to accommodate some time for playing Video games?			
	Always	6	2.6%
	Usually	15	6.4%
	Sometimes	39	16.7%
	Rarely	50	21.4%
	Never	39	16.7%

(Table 3)

Table 3 :Playing and sleeping hours.

The last two sections of the questionnaire primarily focused on the studying habits of the students. The first two questions were about total average hours of studying during both the weekdays and the weekends. Both During the weekdays and weekends, most students stated that they study around 1-3 hours per day (Table 5). Students were also asked about the number of hours they get of sleep each day; and most (N = 127 ; 54.3%) responded that they get 4-6 hours of sleep each day. Also, most students (N = 70 ; 29.9%) responded that they tend to skip some sleep hours just to accommodate some time for studying (Table 5).

Lastly, the mean GPA of those students who play video games was compared with those students who do not play video games. The mean GPA for video-game players was 4.36 with standard deviation of 0.437, whereas, the mean GPA and standard deviation for those students who do no play video games were 4.336, 0.437 respectively. Table 4

Question	N	Mean GPA	Std. Deviation
Do you play video games (e.g on tablet.Playstation, PC, ..etc)?			
No	78	4.3362	.43733
Yes	141	4.3642	.43780
Not Answered	15		

Table 4 : Number of VG players vs non-VG players

Table 5	Question	N	Percent
	How long do you study during the "weekends" per day?		
	<1 hour	43	18.4%
	1-3 hours	89	38.0%
	>3hours	81	34.6%
	None	21	9.0%
	How long do you study during "weekdays" per day?		
	<1 hour	42	17.9%
	1-3 hours	122	52.1%
	>3hours	60	25.6%
	None	10	4.3%
	How much do you think you understand during most lectures?		
	Almost all	29	12.4%
	Around half	76	32.5%
	Less than half	44	18.8%
	More than half	66	28.2%
	Very little	19	8.1%
	How many hours do you sleep?		
	<4 hours	3	1.3%
	4-6 hours	127	54.3%
	7-8 hours	94	40.2%
	>8 hours	10	4.3%
	Do you think that you are skipping some sleep hours just to accommodate some time for studying?		
	Strongly disagree	23	9.8%
	Disagree	47	20.1%
	Neutral	46	19.7%
	Agree	70	29.9%
	Strongly disagree	48	20.5%
	I only study before exam days?		
	Strongly agree	22	9.4%
	Agree	46	19.7%
	Neutral	43	18.4%
	Disagree	67	28.6%
	Strongly disagree	56	23.9%
	I am very satisfied with my studying:		
	Strongly agree	21	9.0%
	Agree	69	29.5%
	Neutral	62	26.5%
	Disagree	54	23.1%
	Strongly disagree	28	12.0%
	I write down notes during lecture:		
	Strongly agree	21	13.2%
	Agree	69	24.8%
	Neutral	62	23.5%
	Disagree	54	17.5%
	Strongly disagree	28	20.9%
	I often arrive to college late in the morning:		
	Strongly agree	19	8.1%
	Agree	67	28.6%
	Neutral	71	30.3%
	Disagree	42	17.9%
	Strongly disagree	35	15.0%
	I have my own schedule for studying (i.e specific time for studying):		
	Strongly agree	27	11.5%
	Agree	63	26.9%
	Neutral	62	26.5%
	Disagree	38	16.2%
	Strongly disagree	44	18.8%

4 DISCUSSION

This study aimed to investigate whether video games have an impact on the academic performance at two colleges of medicine in Riyadh, Saudi Arabia. The two medical schools were selected to have a more representative and homogenous sample. These two medical schools are different in regards to their way of accepting applicants, and curriculum. A newly developed validated questionnaire was sent to the students electronically several times with a response rate of 41.78%.

According to Cassady JC (2001), the self-reported GPA scores of students were found to be remarkably similar to the official records, and upon performing the proper statistical tests, it was found that there is a significant correlation between the self-reported GPA and the actual cumulative GPA[7]. Another study, Bacon DR et al. also concluded that GPA can be used as a covariate when conducting educational research studies[8]. The GPA in the present study was, therefore, used to reflect the academic performance of the students. The academic performance, in turn, is usually reflected by how well a student does in school [9]. Our findings suggest that around 63.7% of the sample play video games on a regular basis (either during their weekdays or weekends). Moreover, most of the sample size were first-year medical students that have graduated from a private high school.

This questionnaire targeted both video-game players and non video-game players. The mean GPA was compared between those who play video games and those who do not. Our findings suggest that there is no significant difference in the mean GPA of those who play video games on a regular basis and those who do not play video games. Gentile DA et al. stated that video games are not by themselves good or bad, and just like any matter, video games can have both positive and negatives impact[10]. Furthermore, our null hypothesis was that the mean GPA was equal in both video-game player and non video-game player. To test for this hypothesis, we used the independent samples T-test and significance level (P-value) was found to be 0.65. This is less than our confidence level which was determined to be 95%. Thus we fail to reject the null hypothesis that means GPA is equal whether a person play or not.

Our data also shows that 54.3% of medical students get 4-6 hours of sleep each night. According to Hidalgo MP, medical students presenting sleepiness, insomnia, arousal and sleeping less than 7 hours/day have an increased risk for minor psychiatric disorders[11]. Furthermore, 20.5% and 29.9% have answered "strongly agree" and "agree", respectively, when asked whether they miss some sleep hours just to accommodate some time for studying. According to Daugherty SR, sleep deprivation in residents and medical students may occur because they consider their time without sleep as a symbol of dedication to the profession [12]. Fortunately though, only three (1.3%) students get less than four hours of sleep each night in the present study. According to Trockel MT, there is a relationship between sleep habits and higher GPA scores, and that it accounts for some variations in 1st year college students GPA scores. The previous study also stated that for each hour delay in

weekdays wake up time, the GPA score decreased by approximately 0.123 on 4.00 GPA. Concluding that, weekends and weekdays wake up times have largest impact on semester GPA scores[13].

To investigate the effect of video games on the academic performance, previous studies have separated weekdays and weekends playing time[14], [15]. Therefore, In the present study, the number of hours for playing video games have been asked twice for each student, that is, weekdays and weekends playing time. On the weekday, most students (N=57 ; 24.4%) played less than one hour per day. However, on the weekends, most students (N=70 ; 29.9%) played less than four hours per day.

According to Clump MA, attendance was considered important when it comes to the overall test scores. The previous study also stated that, despite the fact that we live in an era where students can easily gain access to the course information, attendance was still important for success in a given course[16]. Fortunately, in the present study, only six students (2.6%) reported attending less than 75% of class time, whereas all the other students reported attending 75% or more of class time. Interestingly, there wasn't a significant difference between the number of missed classes between those who play video games and those who do not.

According to Weaver J (2013), time management and study habits are two essential factors corresponding with the academic success. Therefore, the last section of the questionnaire included 6 statements represented by a 5-point likert scale to measure the students' studying habits during their college years. Studying habits can be defined as the degree to which a student engages in a regular, appropriate routine of studying[17]. Interestingly, Most students (N=69 ; 29.5%) agreed that they are not satisfied with their studying habits. Please Refer to Table 4 for more information in regards to studying habits..

5 CONCLUSION

The overall results showed that there is no significant difference in the mean GPA (4.36 vs 4.33) of those who play video games on a regular basis and those who do not play video games. Proper time management and studying habits might significantly contribute to the academic performance of the students. However, most students were not satisfied with their way of studying. Therefore, more effort should be put to guide medical students especially in the beginning of their college years and medical career.

6 LIMITATIONS

This study has a number of limitations. First, our sample size only represents pre-clinical medical students, that is, first and second year in the college of medicine, and therefore these data cannot be generalized on all medical schools in Saudi Arabia. Second, these data only included male medical students without the female students. Furthermore, the study would have been more comprehensive if it included more than two universities across Riyadh with a convenience sample of both males

and females of various academic levels at medical school. However, numerous efforts have been made to overcome these limitations in the study

7 ACKNOWLEDGMENTS

The authors also would like to thank Dr. Ibrahim Alahmed for his help with data collection.

8 REFERENCES

- [1] Granic I, Lobel A, Engels RC. The benefits of playing video games. *American Psychologist*. 2014 Jan;69(1):66
- [2] Drummond A, Sauer JD. Video-games do not negatively impact adolescent academic performance in science, mathematics or reading. *PloS one*. 2014 Apr 3;9(4):e87943.
- [3] Anand V. A study of time management: The correlation between video game usage and academic performance markers. *CyberPsychology & Behavior*. 2007 Aug 1;10(4):552-9.
- [4] Anderson CA, Dill KE. Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of personality and social psychology*. 2000 Apr;78(4):772.
- [5] Anderson CA, Gentile DA, Buckley KE. *Violent video game effects on children and adolescents: Theory, research, and public policy*. Oxford University Press; 2007 Jan 11.
- [6] Aljohaney A. Effect of Video Game Usage on Academic Performance of Medical Students in King Abdulaziz University. *Journal of King Abdulaziz University: Medical Sciences*. 2015 Jan 1;22(1).
- [7] Cassady JC. Self-reported GPA and SAT: A methodological note. *Practical assessment, research & evaluation*. 2001 Aug 21;7(12):1-6.
- [8] Bacon DR, Bean B. GPA in research studies: An invaluable but neglected opportunity. *Journal of Marketing Education*. 2006 Apr;28(1):35-42.
- [9] Böö, Rickard. "Video game playing, academic performance, educational activity, and motivation among secondary school students." (2014).
- [10] Gentile DA, Anderson CA, Yukawa S, Ihori N, Saleem M, Ming LK, Shibuya A, Liau AK, Khoo A, Bushman BJ, Rowell Huesmann L. The effects of prosocial video games on prosocial behaviors: International evidence from correlational, longitudinal, and experimental studies. *Personality and Social Psychology Bulletin*. 2009 Jun;35(6):752-63.
- [11] Hidalgo MP, Caumo W. Sleep disturbances associated with minor psychiatric disorders in medical students. *Neurological sciences*. 2002 Apr 19;23(1):35-9.
- [12] Daugherty SR, Baldwin Jr DC. Sleep deprivation in senior medical students and first-year residents. *Academic Medicine*. 1996 Jan 1;71(1):S93-5.
- [13] Trockel MT, Barnes MD, Egget DL. Health-related variables and academic performance among first-year college students: implications for sleep and other behaviors. *Journal of American college health*. 2000 Nov 1;49(3):125-31.
- [14] Sharif I, Sargent JD. Association between television, movie, and video game exposure and school performance. *Pediatrics*. 2006 Oct 1;118(4):e1061-70
- [15] Gentile DA, Lynch PJ, Linder JR, Walsh DA. The effects of violent video game habits on adolescent hostility, aggressive behaviors, and school performance. *Journal of adolescence*. 2004 Feb 29;27(1):5-22.
- [16] Clump MA, Bauer H, Whiteleather A. To attend or not to attend: is that a good question?. *Journal of Instructional Psychology*. 2003 Sep 1;30(3):220.
- [17] Credé M, Kuncel NR. Study habits, skills, and attitudes: The third pillar supporting collegiate academic performance. *Perspectives on Psychological Science*. 2008 Nov;3(6):425-53.