

Research article

Exploring the Impact of Physical Inactivity on Digital Gaming Attitudes and Addiction among Secondary School Students

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Abstract: The escalating concern regarding internet and digital game addiction among pre-adolescent children and its potential link to psychological issues prompted this study, aimed at evaluating digital game addiction levels and attitudes towards gaming in secondary school students. Conducted with a sample of 897 students from Ankara, Türkiye, the study employed a survey method, utilizing the "Attitude Scale towards Digital Game Addiction and Digital Games". Results indicated significant gender differences in addiction levels and attitudes, with boys showing higher scores. Age also played a role, with seventh graders exhibiting the lowest and eighth graders the highest addiction behaviors. Notably, those engaged in martial arts games and using consoles for gaming reported the highest addiction and positive attitude scores. The study underscores the prevalent issue of digital game addiction among youths, suggesting a strong correlation with physical inactivity. It concludes that promoting physical activity is essential not only for physical health but also as a preventative measure against the development of psychological issues stemming from digital game addiction.

Keywords: digital game addiction, adolescent psychology, physical inactivity, secondary school students, attitudes towards gaming, gender differences in gaming, gaming platforms, behavioral impacts of gaming

1. Introduction

In recent years, the proliferation of digital technologies has significantly transformed leisure activities, particularly among the youth [1, 2]. This transformation is characterized by a marked increase in engagement with digital games, a trend that raises both opportunities for learning and concerns about addiction [3, 4]. The allure of these digital environments presents a complex interplay of entertainment, social interaction, and escapism, capturing the attention and time of children and adolescents globally [2, 5]. Concurrently, this shift towards sedentary leisure activities has been paralleled by a concerning decline in physical activity levels among the younger population, contributing to a plethora of adverse health outcomes [6, 7]

Concerns have been raised regarding the possible effects of digital gaming on physical activity levels [8], [9] and general well-being among secondary school students, given the sharp increase in its use in recent years [10]. Even though digital gaming provides engaging experiences and amusement, extended sedentary behavior linked to excessive gaming has become a serious public health risk [11, 12]. An insatiable desire to play video games despite the negative effects is known as digital gaming addiction, and it has attracted the interest of academics, practitioners, and decision-makers alike [13]. Furthermore, teenagers' views and perceptions regarding digital gaming have a significant impact on how they play games and how easily they become addicted [14]. To effectively promote healthy lifestyles and lessen the negative impacts of excessive gaming on adolescent health and well-being, it is imperative to comprehend the intricate interactions between digital gaming attitudes, physical inactivity, and gaming addiction.

Studies have found that as the level of physical activity increases, digital game addiction decreases. In a study conducted by Güllü et al. on 405 adolescents, it was found that increasing physical activity level reduced obesity and digital game addiction by 1.5 times [15]. Some studies have reported that gaming addiction causes some health problems such as visual impairment [16]. Some studies have focussed on the psychiatric problems caused by game addiction [17]. In a study by Nagata et al. on the social epidemiology of digital game addiction in the United States, 8753 people were followed up for 2 years and reported that boys were more likely to use video games and girls were more likely to use social media [18].

When the literature is examined, it is determined that digital game addiction in all age groups is one of the main problems of many countries. There is no research examining the relationship between digital game attitude and digital game addiction. This study aims to delve into this intricate relationship by examining the levels of digital game addiction and attitudes towards digital gaming among secondary school children and exploring how these aspects correlate with physical inactivity. Through this investigation, we seek to contribute to the body of knowledge on adolescent health and development, offering insights that could inform interventions designed to promote a balanced lifestyle in the digital age.

A more thorough investigation of the psychological, social, and educational impacts of digital games is required due to their growing appeal among middle school pupils. According to research, playing digital games can have positive effects on one's hand-eye coordination, problem-solving abilities, and collaboration. It is impossible to overlook their detrimental impacts on academic performance, social isolation, game addiction, and attention deficit disorder. To guarantee that children benefit the most from digital games, educators and legislators must create fair and regulated strategies. In light of this, developing a thorough plan to optimize the potential benefits of using digital games as teaching aids while reducing any negative consequences is crucial.

The purpose of this study was to ascertain middle school kids' gender, grade level, game type, and game type variables.

H₀: Does the digital gaming addiction and attitude of middle school pupils differ based on factors such as gender, grade level, kind of game, and game type?

H₁: Do the gender, grade level, kind of game, and game type of digital gaming addiction and attitude of secondary school pupils differ from one another?

2. Materials and Methods

In this section, explanations about the research model, research group, data collection tools, and data analysis are given.

2.1. Research Model

The study group of the research consists of a total of 897 secondary school students (417 boys and 480 girls) studying in schools in Keçiören district of Ankara province. It was determined that 818 of these students had their own mobile phones or computers and more than half of them played digital games for 3 hours or more a day. The sample group, a middle school kid who uses digital technologies, plays digital games, and is aware of digital gaming platforms like esports, formed the basis of our study's design when choosing the research group. Convenient sampling method, one of the non-probability-based sample selection techniques, was used. The convenient sampling method involves the use of existing situations for the study to be conducted due to the limitations in terms of time, money and labor force.

Inclusion criteria,

- Volunteering for research,
- To be a secondary school student,
- Making use of any digital technology (phones, laptops, smart watches, etc.).

Exclusion Criteria,

- Not being a secondary school student but not studying in any educational institution,
- Participants were not included in the absence of parental consent.

Ethics committee approval for this study was obtained by Bandırma Onyedi Eylül University Social and Human Sciences Ethics Committee with meeting number 2023-4, dated 14.04.2023. All participants were warned that they could leave the study at any time of the study. The study was conducted in accordance with the principles stated in the Declaration of Helsinki. The analysis of the scientific study was the only purpose for which the research group's data were employed. The researchers only store the data in the cabinet containing the data. These data will be shredded in a paper shredder after five years.

2.2. Data Collection Tools

Personal Information Form: This form includes the variables of age, gender, marital status and educational status of the participants.

Digital Game Playing Attitude Scale (DGAS): In the scale developed by Demir and Bozkurt (2019), a three-subdimensional structure consisting of 18 items was obtained as a result of Exploratory Factor Analysis (EFA). The scale consists of Cognitive (first 5 items), Affective (5 items) and Behavioural (last 8 items) sub-dimensions. After the Exploratory Factor Analysis, Confirmatory Factor Analysis (CFA) was performed and according to the CFA, evidence was provided that the fit indices of the structure of the scale obtained were within the acceptable range. Then, item and reliability analyses of the scale were conducted. In this context, the variance explained by Cognitive is 42,68 and Cronbach Alpha is ,90. The variance explained by Affective is 16,83 and Cronbach Alpha is ,81. The variance explained by Behavioural is 5,59 and Cronbach Alpha is ,91. The total variance explained by the scale is 65,11% and Cronbach's Alpha value is ,82. The rating was made by taking the lowest score that the participants could get from the scale and its multiples. In this context, the scores of the participants indicate that they have "1-18 very low; 19-37 low; 38- 54 medium; 55- 72 high; 73- 90 very high" digital game playing attitude.

Digital Game Addiction Scale in Children (DGASC): Scale, Hazar and Hazar (2017). It consists of 24 items and 4 sub-dimensions. These sub-factors are; "excessive focus on playing digital games and conflict", "development of tolerance during play time and the value attributed to play", "postponement of individual and social duties/assignments",

"deprivation psychological-physiological reflection and immersion in the game". In the evaluation of the statements in the scale, a 5-point Likert-type scale was used. (1=Strongly Disagree, 2=Disagree, 3=Disagree, 4=Agree, 5=Strongly Agree). The lowest score that can be obtained from the scale is "24" and the highest score is "120". In the scoring of the scale; "1-24: Normal group, 25-48: Less risky group, 49-72 Risky group, 73-96 Dependent group, 97-120 High level dependent group".

Statistical Analysis

IBM SPSS Statistics 26 software package (IBM Corp., Chicago, IL, USA) was used for statistical analysis. Because of its excellent validity and reliability as well as its usefulness in the study of quantitative research in the literature, this software package was chosen. Normality distribution of the data were conducted using the Kolmogorov-Smirnov test. The homogeneity of variances was assessed using the Levene's test. The data were found to follow a normal distribution and parametric tests were applied. Descriptive statistics were reported as mean (M) and standard deviation (SD). Repeated Measures Anova test was used to analyze the Groups*Time interaction for the analysis of smoking, alcohol use, income and chronic disease status of the participants. The results of the ANOVA test were determined based on the Mauchly's Test of Sphericity. If Mauchly's Test of Sphericity yielded a value greater than 0.05, sphericity assumptions were considered met; otherwise, the Greenhouse-Geisser correction was applied. Effect sizes were calculated using Cohen's d formula to determine the magnitude of the findings. The effect size for ANOVA was determined based on partial eta squared (η^2p) values, with η^2p values indicating the effect size as follows: $\eta^2p \leq 0.01$ indicating a small effect size, $0.01 \leq \eta^2p \leq 0.06$ indicating a medium effect size, and $\eta^2p \geq 0.14$ indicating a large effect size [19]. The significance level for the study was set at 0.05.

3. Results

Table 1. Analysis of participants' DGAS total scores, sub-dimensions and DGASC results according to gender

Parameters	Gender	N	mean±S.D.	Cohen's d	t	p
DGAS-Total	Male	417	55.89±12.35	0.79	11.843	p<.001
	Female	480	46.11±12.30			
DGAS-Cognitive	Male	417	15.29±3.10	0.44	6.611	p<.001
	Female	480	13.98±2.84			
DGAS-Affective	Male	417	16.72±4.08	0.75	11.295	p<.001
	Female	480	13.47±4.48			
DGAS-Behavioural	Male	417	23.86±7.11	0.74	11.150	p<.001
	Female	480	18.66±6.84			
DGASC	Male	417	56.68±18.30	0.57	8.542	p<.001
	Female	480	46.74±16.51			
DGAS: Digital Gaming Attitude Scale; DGASC: digital game addiction scale for children						

In Table 1, statistical analyses of the participants' DGAS and DGASC results and the changes of DGAS sub-dimensions according to gender are presented. Accordingly, the results of DGAS-total score ($t=11.843$, $d=0.79$, $p<.001$), DGAS-cognitive ($t=6.611$, $d=0.44$, $p<.001$), DGAS-Affective ($t=11.295$, $d=0.75$, $p<.001$), DGAS-Behavioural ($t=11.150$, $d=0.74$, $p<.001$) and DGASC total scores ($t=8.542$, $d=0.57$, $p<.001$) were significantly higher than female participants (Figure 1).

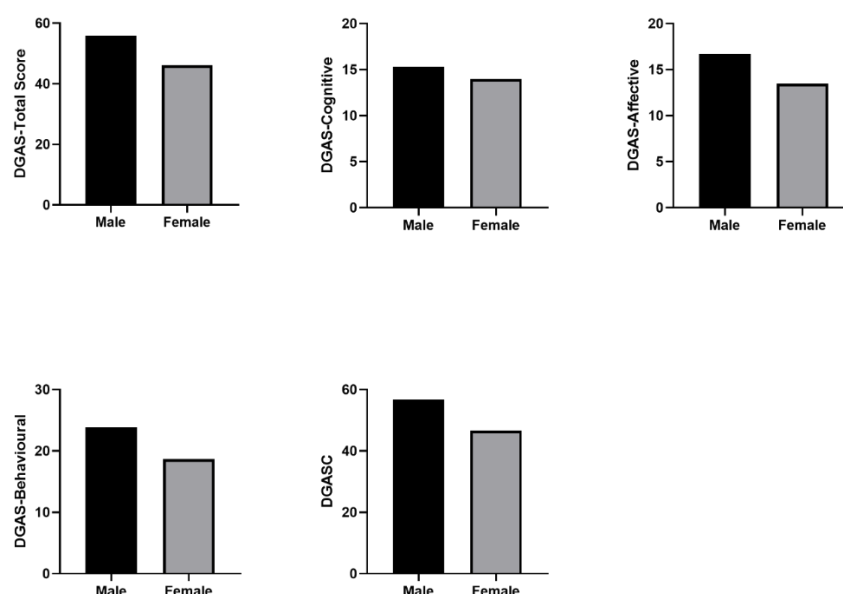


Figure 1. Analysis of participants' DGAS total scores, sub-dimensions and DGASC results according to gender

Table 2. Analysis of participants' DGAS total scores, sub-dimensions and DGASC results according to grade level

Parameters	Grade	N	mean±S.D.	F	p
DGAS-Total	5	309	50.82±12.80	1.663	.173
	6	226	50.98±12.50		
	7	248	49.31±13.76		
	8	114	52.51±14.56		
DGAS-Cognitive	5	309	14.28±3.04	2.309	.075
	6	226	14.66±3.04		
	7	248	14.67±3.06		
	8	114	15.11±2.88		
DGAS-Affective	5	309	15.01±4.41	0.880	.451
	6	226	15.00±4.36		
	7	248	14.69±4.84		
	8	114	15.53±4.97		
DGAS-Behavioural	5	309	21.53±7.13	2.816	.038
	6	226	21.31±6.92		
	7	248	19.94±7.81		
	8	114	21.86±8.16		
DGASC	5	309	50.42±17.60	0.696	.555
	6	226	51.84±17.53		
	7	248	51.29±18.49		
	8	114	53.12±18.05		

DGAS: Digital Gaming Attitude Scale; DGASC: digital game addiction scale for children

In Table 2, the DGAS-Total scores and sub-dimensions and DGASC total scores of the participants were analysed according to the grade level. According to this, the results of the 7th grade participants were lower in the DGAS-Behavioural sub-dimension [$F_{(3, 893)}=2.816$, $p=.038$]. There was no difference in terms of other parameters ($p>.05$) (Figure 2).

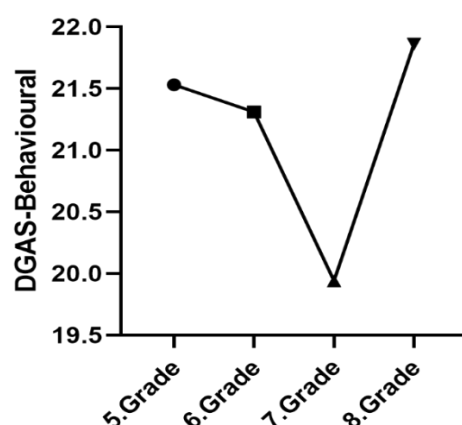


Figure 2. DGAS-Behavioural Levels of Participants According to Grade Level

Table 3. Analysis of participants' DGAS total scores, sub-dimensions and DGASC results according to game type

Parameters	Game Type	N	mean±S.D.	F	p
DGAS-Total	Fight	133	60.36±11.90	79.120	p<.001
	Word Game	75	43.62±10.82		
	Sport	203	52.26±11.42		
	Strategy	253	54.48±11.72		
	No Game	233	40.51±10.89		
DGAS-Cognitive	Fight	133	16.08±3.08	27.119	p<.001
	Word Game	75	13.24±2.74		
	Sport	203	14.42±2.95		
	Strategy	253	15.41±2.75		
	No Game	233	13.37±2.81		
DGAS-Affective	Fight	133	18.19±3.82	72.963	p<.001
	Word Game	75	12.85±4.01		
	Sport	203	15.52±3.65		
	Strategy	253	16.30±4.22		
	No Game	233	11.49±4.24		
DGAS-Behavioural	Fight	133	26.08±6.93	66.069	p<.001
	Word Game	75	17.53±5.88		
	Sport	203	22.32±6.98		
	Strategy	253	22.76±6.60		
	No Game	233	15.64±5.86		
DGASC	Fight	133	62.55±19.67	38.321	p<.001
	Word Game	75	43.54±15.45		
	Sport	203	53.14±16.25		
	Strategy	253	54.02±17.14		
	No Game	233	41.65±15.04		
DGAS: Digital Gaming Attitude Scale; DGASC: digital game addiction scale for children					

In Table 3, the participants' EGAS total scores, sub-dimensions and EGASC results were analysed according to the game type. Accordingly, the participants' DGAS-Total scores [$F_{(3, 893)}=79.129$, $p<.001$], DGAS-Cognitive [$F_{(3, 893)}=27.119$, $p<.001$], DGAS-Affective [$F_{(3,$

$_{893}=72.963$, $p<.001$], DGAS-Behavioural [$F_{(3, 893)}=66.069$, $p<.001$], and DGASC scores [$F_{(3, 893)}=38.321$, $p<.001$]. Accordingly, all values of the non-gamers were found to be significantly lower than the gamers. According to the results of the post-hoc test, it was determined that those who played sports and strategy games were high in all parameters, while those who played word games were as low in all parameters as those who never played games (Figure 3).

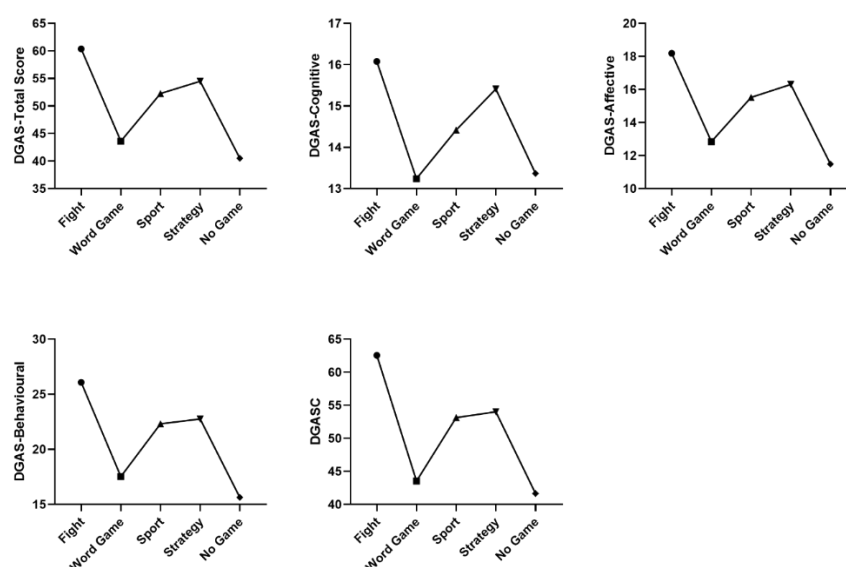


Figure 3. Analysis of participants' DGAS total scores, sub-dimensions and DGASC results according to game type

Table 3. Analysis of participants' DGAS total scores, sub-dimensions and DGASC results according to game platform

Parameters	Game Platform	N	mean±S.D.	F	p
DGAS-Total	Console Games	38	61.21±11.40	77.757	p<.001
	Computer Games	120	54.60±14.09		
	Mobile Games	509	53.42±11.63		
	No Game	239	40.74±10.95		
DGAS-Cognitive	Console Games	38	16.00±2.58	21.155	p<.001
	Computer Games	120	15.58±3.22		
	Mobile Games	509	14.79±2.97		
	No Game	239	13.38±2.76		
DGAS-Affective	Console Games	38	18.18±3.97	73.396	p<.001
	Computer Games	120	16.60±4.91		
	Mobile Games	509	15.89±3.86		
	No Game	239	11.60±4.24		
DGAS-Behavioural	Console Games	38	27.02±6.75	70.353	p<.001
	Computer Games	120	22.41±7.60		
	Mobile Games	509	22.73±6.78		
	No Game	239	15.75±5.97		
DGASC	Console Games	38	58.39±18.81	31.976	p<.001
	Computer Games	120	52.36±16.00		
	Mobile Games	509	54.83±17.95		
	No Game	239	41.99±15.70		
DGAS: Digital Gaming Attitude Scale; DGASC: digital game addiction scale for children					

In Table 3, the participants' EGAS total scores, sub-dimensions and EGASC results were analysed according to the game platform. Accordingly, the DGAS-Total scores [$F_{(3, 893)}=77.757, p<.001$], DGAS-Cognitive [$F_{(3, 893)}=21.155, p<.001$], DGAS-Affective [$F_{(3, 893)}=73.396, p<.001$], DGAS-Behavioural [$F_{(3, 893)}=70.353, p<.001$], and DGASC scores [$F_{(3, 893)}=31.976, p<.001$] were significantly higher. Those who never played games had lower scores in all parameters (Figure 4).

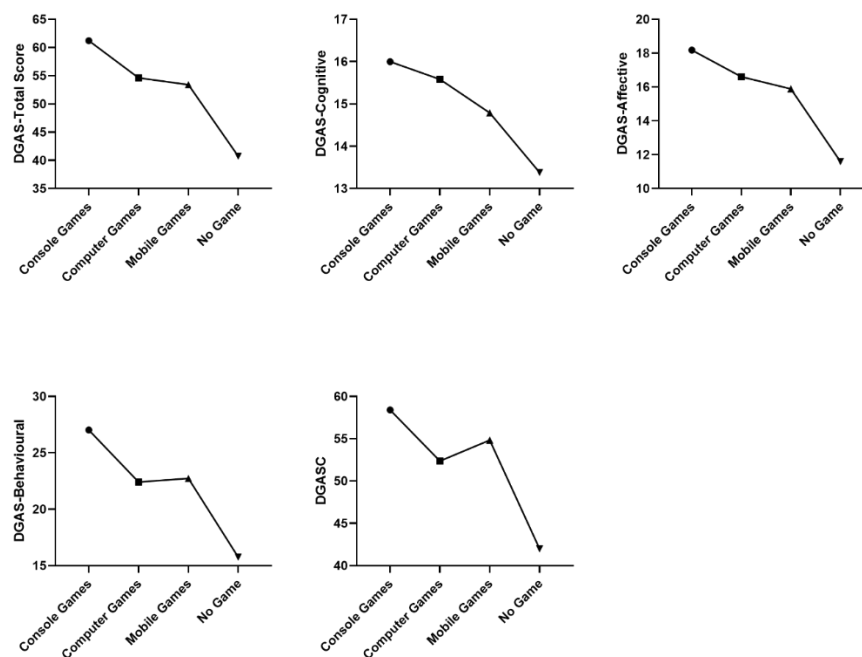


Figure 4. Analysis of participants' DGAS total scores, sub-dimensions and DGASC results according to game platform

4. Discussion

A total of 897 secondary school students participated in this study, which aimed to examine the relationship between the attitudes towards digital games and addiction levels of secondary school students in terms of some demographic information. When the literature was examined, it was found that digital games cause physical inactivity especially in secondary school students, reduce interpersonal interaction [19], limit individuals' self-regulation competencies, damage family relationships [20], and arouse feelings of depression, aggression and loneliness [21]. In addition, in the analyses, it has been determined that technological products such as computers, tablets and phones are effective in addiction to digital games and cause overweight and obesity problems in individuals [22].

In the first finding of the research, it was determined that there was no statistically significant difference according to the mean scores of attitude and addiction towards digital games when the gender variable of secondary school students was examined. Given that digital technologies are equally accessible to male and female students, play a significant role in daily life, and are incorporated into education, it may be concluded that there is no statistically significant difference. However, when the mean scores between male and female students are examined, it is seen that male students' attitudes and addictions towards digital games are higher. From this point of view, it can be thought that boys are a little more comfortable in the Turkish family structure and that girls helping their mothers more may be effective in this regard. There is a significant difference in the research on digital game addiction of secondary school students according to

gender [23]. It was found that male students' digital game addiction has a higher average than female students [24–27] but in the awareness study on digital game addiction, it was determined that girls differed by scoring higher than boys [28].

When the other finding of our research was examined, it was determined that there was a statistically significant difference according to the class variable of secondary school students' attitudes towards digital games and addiction averages. According to this, it was determined that the average score of 8 grade students in the behavioural dimension, which is the sub-factor of the attitude towards digital gaming, was higher than 7 grade students. In studies conducted on secondary school students, in parallel with our study, it was found that fifth grade students had higher attitudes and addictions towards digital games than eighth grade students [28]; in another study, it was determined that eighth grade students scored higher than fifth grade students [29].

In our study, when the game type variable of secondary school students was examined, it was determined that there was a statistically significant difference according to the averages of attitude and addiction towards digital games. As a result of the analyses, it was determined that strategy and sports games had higher scores than other game types, while word games and those who never played games had lower scores. When various digital game addictions and attitudes of individuals were examined in the near future, it was seen that their addiction to strategy games, which are also described as war games, was also included in international studies [30]. Encouraging individuals to play active video games, especially for physical activity, about which type of games they can play can increase motivation for physical activity and encourage physical activity [31].

In our study, when the game platform variable of secondary school students was examined, it was determined that there was a statistically significant difference according to the averages of attitude towards digital games and addiction. As a result of the analyses, it was determined that those who play console games have high scores, while those who never play games have lower scores. It can be said that the reason why console games are high in secondary school students may be the effect of e-sports being officially included in sports organisations [32]. In particular, carrying out activities to support individuals at this level of education with active video games encourages a healthy lifestyle, saves from sedentary life and can ensure physical activity at an early age [33].

One limitation of the present study is its reliance on the convenient sampling method for participant selection, which may not fully represent the entire population of secondary school students in the Keçiören district or other regions. This non-probability-based sampling technique, while practical, limits the generalizability of the findings to wider populations due to potential sampling biases. Additionally, the study's cross-sectional design does not allow for the establishment of causality between physical inactivity, digital gaming attitudes, and addiction. Future research could benefit from employing longitudinal designs to better understand the directionality of these relationships. Moreover, the self-reported nature of the data collection could introduce bias, as participants may underreport or overreport their gaming habits and physical activity levels. Lastly, the study did not control for external variables such as socioeconomic status, parental guidance, or educational achievements, which could influence both digital gaming behaviors and physical activity levels.

5. Conclusions

As a result of our research, it was determined that attitudes and addictions towards digital games were high. Since our age is closely related to technology, technological products are actively or passively used by people from the prenatal period to later periods. From the first years of their infancy, students inevitably use digital games or platforms while eating, when they have any discomfort. In the Covid 19 process, it is seen that education is online and this education has taken its place as additional education today.

When all these situations are examined, it is seen that it is no coincidence that secondary school students' attitudes and addictions towards digital games are high.

The participants in this study were only middle schoolers. Students at various high schools and universities can use the study. While the qualitative research approach can be used in future studies, the quantitative research method was employed in this one. It is also possible to perform research on students' attitudes, daily physical activity levels, and addictions to digital games.

Author Contributions: Conceptualization, B.Ç., A.K., Ö.E., G.P; methodology, B.Ç., C.K., A.K., Ö.E.; formal analysis, B.Ç., C.K., A.K., Ö.E.; data curation, B.Ç., C.K., A.K., Ö.E.; writing—original draft preparation, S.A., B.Ç., C.K., A.K., Ö.E., G.P; writing—review and editing, S.A., B.Ç., C.K., A.K., Ö.E., G.P; All authors have read and agreed to the published version of the manuscript.

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Informed Consent Statement: No individual or indemnifiable data is being published as part of this manuscript.

Data Availability Statement: Data are available for research purposes upon reasonable request to the corresponding author.

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Conflicts of Interest: The authors declare that there is no conflict of interest.

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