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The relationship between smartphone and computer games and anger in adolescents

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ABSTRACT

Objective: In this study, it was aimed to determine the relationship between the causes and duration of gaming and types of games and levels of anger among Turkish adolescents studying at high schools.

Materials and Methods: The study was conducted using a cross-sectional descriptive design with adolescents enrolled in high schools in an Eastern Turkish province. A total of 819 adolescent students aged 13-18 were included in the study. Data were collected online through Google Forms, utilizing both the "Sociodemographic Form" and the "Adolescent Anger Rating Scale."

Results: The mean age of the adolescents was 15.52±1.29. Gender, academic performance, daily sleep duration, and daily walking distance were not found to be associated with anger levels. Additionally, there was no significant correlation between anger scores and the status of computer and smartphone usage. However, individuals who used smartphones for 3 hours or more for purposes such as gaming, entertainment, chatting, messaging, and socializing exhibited higher anger scores.

Conclusion: Academic grades, the duration of smartphone usage, computer and smartphone use for gaming/entertainment, chatting, messaging, and socializing were found to be associated with anger. Specifically, extended periods of playing war, fighting, and similar games on both computers and smartphones were correlated with higher levels of anger. It would be advantageous for parents to monitor and regulate the content of the games their adolescents play, observe any behavioral differences, and take necessary precautions.

Keywords: Adolescent, Anger, Computers, Smartphone

1. INTRODUCTION

Adolescence is an important stage of rapid physical growth and mental development [1]. Feelings and thoughts can change rapidly during this period. The adolescent's effort to accept their selves and the problems they experience with their family or environment can cause stress, anger, fear, and anxiety [2]. Adolescents sometimes are engaged in activities that they believe will make them feel happy to reduce their increased stress level. Games, which are among these activities, have shown an increasing trend in recent years [3]. Studies have reported that the highest number of game users worldwide are in Asia. Only 17% of adolescents in China [4] and 19.9% of adolescents in England [5] play games at an addictive level.

Although, games are a popular recreational activity for adolescents, their uncontrolled and prolonged use may lead to physical and mental problems. Various studies have produced different results when examining the effects of gaming on adolescents. Adolescents' addiction to games can lead to confusion between the real and virtual worlds, a decline in problem-solving abilities [6], and increased distraction [7]. A cross-sectional study found a correlation between excessive gaming during adolescence and certain psychiatric disorders, such as depression [8]. Another study reported that excessive gaming is associated with reduced sleep quality and duration, increased suicidal ideation and suicide attempts, compromised academic performance, and behavioral problems [9].

In a study conducted in Norway, it was determined that adolescents who play games have high levels of anger, depression, loneliness and aggression [10]. In another study conducted with Turkish adolescents, it was found that increased playtime is associated with impulsive behaviors, aggression

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and psychological disorders [11]. On the other hand, recent studies emphasize the positive effects of games [12]. For example, Annetta et al., argued that some game-based education programs make the theoretical knowledge permanent in adolescents. Games are effective in motivating learners [13]. In addition, reports were published that games are beneficial for cognitive functions [1]. The results of some studies showed that gamers have faster response times in processes that require rapid response [14]. The results of a meta-analysis study showed that games positively support visual perception [15].

Anger and aggression are among the most widely discussed topics in relation to gaming. According to Anderson and Bushman, "an individual directs anger and aggression to another person, often with the intent to harm" [16]. Previous studies have established a connection between anger, aggression, and playing games [17]. Kim et al., reported that anger and aggression were associated with game addiction [18]. Another study indicated a significant relationship between game addiction and anger and aggressiveness [19]. A study examined the relationship between anger behavior and game preference [20]. Lemmens et al., reported that adolescent males prefered to play games involving anger and violence [21]. Similarly, Griffiths stated that children with anger issues are interested in violent games [22]. The mechanism underlying this relationship is based on the assumption that anger and aggression lead to excessive gaming. This situation has been explained in different ways: According to the first perspective, players select a specific type of game that aligns with their pre-existing characteristics, such as anger and aggression [23]. The second viewpoint suggests that as individuals play games and earn high points and rewards, their anger behavior intensifies. During this process, anger and aggressive behaviors may become more "purposeful." [24].

This study was designed to fill some gaps in the literature. In this study, it was aimed to determine the relationship between the causes of gaming, time spend playing games, and game types and anger levels of Turkish adolescents studying in high schools.

2. MATERIALS and METHODS

Type of Study

The study was designed as a cross-sectional-descriptive type.

Population and Sample

The study was conducted with adolescents attending high school in a province in Eastern Turkey. There are a total of 22 high schools and 11652 students aged 13-18 years in the province where the study was conducted. A total of 628 individuals would be sufficient with a 99% confidence interval and a 5 percent margin of error in the sample calculation made with OpenEPI. However, the research initially involved 628 participants; data collection continued beyond this number with additional volunteers who expressed interest in participating in the survey, ultimately reaching a total of 819 individuals.

Inclusion Criteria

-Being between the ages of 13-18,

-Agreeing to participate in the study voluntarily.

Exclusion Criteria

-Having a physical disability that cannot answer the questions,

-Not playing games.

Application Data Collection

Data were collected online with Google Forms. The prepared questionnaire link was sent to the adolescents via WhatsApp. Confidentiality of the survey data is ensured. The forms are standardized to be answered only once from each phone/tablet/computer. The responses to the questionnaire were reviewed daily. A sociodemographic form and "Adolescent Anger Rating Scale" were used to collect data from adolescents.

Data Collection Tools

Sociodemographic Form

It consists of questions prepared to determine the characteristics such as age, gender, family income, family type, academic degree and success, presence of chronic disease, psychiatric disease, average sleep time in the last month, games played and playing time [1,3,13].

Adolescent Anger Rating Scale

The Adolescent Anger Rating Scale was developed by McKinnie Burney and Kromrey in 2001 for adolescents aged 11-19 years [25]. Aslan and Sevinçler-Togan conducted a validity and reliability study of the scale in an adolescent population in Turkey [26]. The scale, which is a four-point Likert type, consists of 41 questions. 4-point response scale ranges from hardly ever to very often. Scores are reported for total anger and for three subscales measuring aspects of the adolescent's typical anger response pattern: "reactive anger", "instrumental anger", "anger control" sub-dimensions and total anger scores are calculated in the scale:

Reactive anger (20 items) is an angry, sudden reaction to an event that creates fear, threat, or a negative emotion.

Instrumental anger (8 items) is a negative emotion that triggers a delayed response that results in a planned, willing revenge behavior.

Anger control (13 items) is a cognitive and behavioral method used to resolve the anger response.

Statistical Analysis

While the data were reported as percentage, arithmetic mean, standard deviation, minimum and maximum values, independent groups t-test, one-way analysis of variance and Pearson's correlation analysis were performed. SPSS 23 software was used in the analysis. The normality distribution of the data

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Marmara Med J 2023;36(3): 303-311

was checked with the Shapiro-Wilk's test. A significance level of "P<0.05" was considered statistically significant in the study.

Ethical Statement

Ethical approval was obtained from Bingöl University Non-Interventional Research Ethics Committee before starting the study (approval number: 28.11.2022-E.86417). After ethical approval was obtained, institutional permissions were obtained through the governorship for the research to be conducted in educational institutions (10.01.2023-92001). Adolescents were informed about the purpose of the study and their consent was obtained.

3. RESULTS

Among the adolescents, 52.02% were female, 32.47% were in their second year, 55.43% reported good academic achievement, 86.69% slept for 6-9 hours a day, and 49.08% walked between 0-2000 meters daily.

In the study, the relationship between demographic results and anger was determined. The mean age of the adolescents participating in the study was 15.52±1.29. The gender, academic achievement, daily sleep duration, and daily walking distance of the adolescents were not related to the anger scores of the adolescent (Table I). Our study found that the academic grades of the adolescents were associated with anger reactive (P=.036), anger control (P=.019) and anger total scores (P=.033), and the anger mean scores of the adolescents who were in the last year of high school were found to be high (Table I).

In the study, the relationship between the duration and purpose of computer and smartphone usage by adolescents and their levels of anger was evaluated. Factors such as "Computer and smartphone usage status", "Duration of computer usage", and "Duration of computer and smartphone usage for information purposes" were assessed, but no associations were found with the anger scores of adolescents, as indicated in Table II.

Higher scores in the "anger reactive", "anger control", and "anger total" categories were observed among adolescents who used their smartphones for 3 hours or more, and these differences were found to be statistically significant, as demonstrated in Table II. Furthermore, higher scores in the anger sub-dimensions and total scores were also noted among adolescents who used phones and computers for 3 hours or more for activities such as gaming, entertainment, chatting, messaging, and socializing, and these differences were similarly found to be statistically significant (Table II).

In the study, an examination was conducted on the relationship between the type and duration of video game usage and the anger scores of adolescents who played games on computers and smartphones. It was observed that all anger sub-dimensions and the total anger scores of adolescents who played war, fighting, racing, and competitive games on their computer or smartphone for 3 hours or more were found to be significantly higher (Table III). On the other hand, the "anger reactive", "anger control", and "total anger" scores of adolescents who played sports games on the computer or smartphone for 0-2 hours were lower compared to those who either did not play this game at all or played it for 3 hours or more, and this difference was found to be statistically significant (Table III). Additionally, it was noted that there was no significant change in the anger scores of adolescents who played games such as puzzles and calm games, even as their playing time was increased (Table III).

Table I. *Relationship between adolescent demographic features and AARS (n=819)*

	Reactive Anger		Instrumental Anger		Anger Control		Anger Total	
	Mean±SD	**Test(p)**	**Mean±SD**	**Test(p)**	**Mean±SD**	**Test(p)**	**Mean±SD**	**Test(p)**
Gender*								
Male (n=393)	41.92±7.86	.277(.782)	17.16±3.57	.741(.459)	25.95±4.91	.068(.945)	85.04±16.02	.281(.779)
Female (n=426)	41.77±7.05		16.98±3.26		25.97±4.49		84.74±14.39	
Age: Mean±SD: 15.52±1.29, Range: 13-18, N=819								
Psychiatric Disorders*								
No (n=779)	41.90±7.40	.956(.339)	17.08±3.39	.613(.540)	26.00±4.67	1.122(.262)	85.00±15.09	.954(.340)
Yes (n=40)	40.75±8.39		16.75±3.81		25.15±5.11		82.65±17.01	
Family Type**								
Nuclear family (n=717)	42.09±7.37	5.032(.081)	17.17±3.37	3.868(.145)	26.10±4.69	5.032(.081)	85.37±15.05	4.939(.085)
Extended family (grandmother, grandfather, etc.) (n=78)	40.15±8.27		16.35±3.85		24.98±4.92		81.50±16.69	
Fragmented of the family (parents divorced) (n=24)	40.00±6.26		16.33±2.98		24.79±3.69		81.12±12.54	
Family Income***								
Low (n=253)	41.61±7.59	1.283(.278)	16.98±3.43	1.058(.348)	25.81±4.83	1.519(.220)	84.41±15.47	1.365(.256)
Medium (n=465)	41.73±7.48		17.01±3.42		25.87±4.66		84.63±15.21	
High (n=101)	42.95±6.89		17.53±3.31		26.72±4.46		87.20±14.24	
Academic Grade (High School)***								
1st year (n=160)	41.61±6.59	**2.865(.036)**	16.91±3.07	2.154(.092)	25.83±4.06	**3.35(.019)**	84.36±13.35	**2.92(.033)**
2nd year (n=266)	41.48±7.46		16.86±3.37		25.80±4.74		84.15±15.20	
3rd year (n=213)	41.28±6.71		16.97±3.28		25.46±4.02		83.72±13.60	
4th year (n=180)	43.26±8.75		17.63±3.84		26.90±5.70		87.80±17.97	
Academic Success***								
Bad (n=47)	39.95±8.61	1.741(.176)	16.12±3.86	1.950(.143)	25.06±5.52	1.438(.238)	81.14±17.55	1.641(.194)
Moderate (n=318)	41.79±6.98		17.16±3.24		25.81±4.39		84.77±14.21	
Good (n=454)	42.07±7.63		17.10±3.47		26.16±4.80		85.34±15.56	
Duration of Sleep (per Day)***								
2-5 hours (n=36)	42.52±9.26	.335(.715)	17.11±3.78	.338(.714)	25.80±5.52	.628(.534)	86.45±19.07	.429(.651)
6-9 hours (n=710)	41.79±7.18		17.38±3.98		25.91±4.49		84.74±14.62	
10 hours or more (n=73)	41.61±8.56		17.03±3.33		26.54±6.07		84.52±17.54	
Daily Walking Distance *								
0-2000 mt (n=402)	41.96±8.02	.041(.960)	17.19±3.59	.297(.743)	25.98±4.66	.089(.915)	85.20±16.37	.057(.945)
2001-5000 mt (n=235)	41.87±7.28		17.13±3.40		25.85±4.54		84.86±14.75	
5000 mt or more (n=182)	41.78±7.30		16.98±3.34		26.04±5.09		84.75±14.91	

**t test, **Kruskal Wallis Test, ***One-Way ANOVA, AARS: Adolescent Anger Rating Scale.*

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Table II. *The relationship of the duration and purpose of computer and smartphone use with AARS*

	Reactive Anger		Instrumental Anger		Anger Control		Anger Total	
	Mean±SD	Test(p)	Mean±SD	Test(p)	Mean±SD	Test(p)	Mean±SD	Test(P)
Do You Use a Computer?*								
Yes (n=251)	42.31±7.33	1.096(.273)	17.25±3.41	.931(.352)	26.23±4.63	1.016(.310)	85.81±14.97	1.062(.289)
No (n=558)	41.69±7.55		17.01±3.44		25.87±4.75		84.58±15.37	
How Long Do You Use the Computer per Day?***								
Never or very little (n=529)	41.58±7.51	2.736(.065)	16.93±3.46	2.344(.097)	25.83±4.69	2.540(.079)	84.34±15.29	2.681(.069)
0-2 hours (n=123)	41.38±7.56		17.00±3.32		25.56±4.93		83.95±15.47	
3 hours or more (n=167)	43.04±7.07		17.58±3.28		26.67±4.51		87.29±14.46	
Do You Use a Smartphone?*								
Yes (n=656)	41.78±7.33	.477(.633)	17.02±3.34	.821(.412)	25.96±4.67	.075(.940)	84.78±14.95	.396(.692)
No (n=163)	42.09±7.92		17.26±3.69		25.93±4.80		85.30±16.11	
How Long Do You Use the Smartphone per Day?***								
Never or very little (n=163)	41.73±6.77	**5.788(.003)**	17.04±3.17	2.887(.056)	25.81±4.25	**9.767(.000)**	84.59±13.79	**6.368(.002)**
0-2 hours (n=451)	41.40±8.14		16.90±3.67		25.71±5.03		84.02±16.53	
3 hours or more (n=205)	45.21±9.42		18.15±4.16		28.74±6.26		92.11±19.49	
I Use a Computer for Gaming and Entertainment (per Day)***								
Never (n=689)	41.63±7.46	**4.737(.009)**	16.97±3.44	**3.263(.039)**	25.81±4.64	**6.057(.002)**	84.42±15.18	**4.986(.007)**
0-2 hours (n=86)	41.88±6.16		17.19±2.84		25.95±4.11		85.03±12.61	
3 hours or more (n=44)	45.18±8.81		18.31±3.82		28.34±5.96		91.84±18.24	
I Use a Computer for Chatting, Messaging and Socializing (per Day)***								
Never (n=710)	41.60±7.37	**5.036(.007)**	16.95±3.39	**5.795(.003)**	25.80±4.60	**4.311(.014)**	84.36±15.00	**5.176(.006)**
0-2 hours (n=66)	42.27±6.71		17.19±2.92		26.50±4.63		85.96±13.76	
3 hours or more (n=43)	45.25±8.95		18.76±4.01		27.83±5.90		91.86±18.48	
I Use a Computer for Information and Research Purposes (per Day)***								
Never (n=524)	42.00±7.75	.355(.701)	17.19±3.56	.979(.376)	25.99±4.89	.177(.838)	85.19±15.82	.345(.708)
0-2 hours (n=159)	41.45±6.80		16.86±3.17		25.77±4.23		84.09±13.84	
3 hours or more (n=136)	41.70±7.01		16.83±3.08		26.07±4.47		84.61±14.20	
I Use a Smartphone for Gaming and Entertainment (per Day)***								
Never (n=501)	41.26±7.22	**11.888(.000)**	16.79±3.35	**12.295(.000)**	25.60±4.43	**10.504(.000)**	83.66±14.63	**12.150(.000)**
0-2 hours (n=175)	41.29±7.47		16.82±3.42		25.66±4.75		83.78±15.29	
3 hours or more (n=143)	44.57±7.65		18.34±3.37		27.58±5.19		90.49±15.79	
I Use a Smartphone for Chatting, Messaging and Socializing (per Day)***								
Never (n=384)	41.20±8.00	**11.643(.000)**	16.67±3.58	**15.306(.000)**	25.30±3.80	**8.312(.000)**	83.59±16.28	**11.778(.000)**
0-2 hours (n=212)	40.88±6.35		16.67±3.02		25.71±5.04		82.87±12.80	
3 hours or more (n=223)	43.86±7.07		18.13±3.25		27.01±4.69		89.01±14.59	
I Use the Smartphone for Information and Research Purposes (per Day)***								
Never (n=336)	42.35±8.30	1.458(.233)	17.36±3.78	2.094(.124)	26.25±5.25	1.205(.300)	85.96±16.96	1.576(.207)
0-2 hours (n=238)	41.31±6.51		16.81±2.97		25.64±4.11		83.77±13.22	
3 hours or more (n=245)	41.66±7.05		16.93±3.27		25.87±4.41		84.47±14.33	

**t test, ***One-Way ANOVA, AARS: Adolescent Anger Rating Scale.*

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Table III. *Relationship of gaming purposes on computer and smartphone with AARS*

	Reactive Anger		Instrumental Anger		Anger Control		Anger Total	
	Mean±SD	Test(p)	Mean±SD	Test(p)	Mean±SD	Test(p)	Mean±SD	Test(p)
I Play War, Fight etc. Games on My Smartphone or Computer (per Day)* **								
Never (n=325)	41.41±7.16	**7.690(.000)**	16.80±3.38	**9.820(.000)**	25.73±4.38	**5.767(.000)**	83.95±14.57	**7.880(.000)**
0-2 hours (n=240)	40.87±7.68		16.62±3.46		25.42±4.80		82.92±15.55	
3 hours or more (n=254)	43.32±7.39		17.84±3.30		26.76±4.89		87.93±15.20	
I Play Sports Games on My Smartphone or Computer (per Day)* **								
Never (n=474)	42.05±7.10	**3.063(.047)**	17.20±3.33	**3.429(.033)**	25.97±4.40	2.535(.080)	85.23±14.44	**3.021(.049)**
0-2 hours (n=226)	40.90±7.92		16.58±3.41		25.53±5.14		83.02±16.14	
3 hours or more (n=119)	42.84±7.75		17.46±3.65		26.73±4.88		87.03±15.92	
I Play Racing and Competitive Games on My Smartphone or Computer (per Day)* **								
Never (n=491)	41.73±6.90	**4.377(.013)**	17.05±3.28	**3.362(.035)**	25.80±4.23	**5.940(.003)**	84.59±14.02	**4.754(.009)**
0-2 hours (n=223)	41.19±7.65		16.76±3.33		25.63±4.88		83.59±15.54	
3 hours or more (n=105)	43.75±9.08		17.80±4.07		27.41±5.98		88.98±18.72	
I Play Puzzles and Calm Games on My Smartphone or Computer (per Day)* **								
Never (n=415)	42.27±7.25	1.706(.182)	17.29±3.39	1.891(.152)	26.13±4.57	1.134(.322)	85.70±14.79	1.568(.209)
0-2 hours (n=278)	41.20±7.72		16.79±3.47		25.61±4.86		83.62±15.73	
3 hours or more (n=126)	41.85±7.44		16.95±3.34		26.16±4.75		84.97±15.18	

****One-Way ANOVA, AARS: Adolescent Anger Rating Scale.*

4. DISCUSSION

The results of the study conducted to determine the relationship between reasons of playing games, the duration of playing games and the types of games and anger levels of adolescents were discussed in this section.

The causes of anger in adolescence are usually of social origin. These are reasons such as problems with parents, criticism, academic failure. In a study conducted with Indian adolescents, the prevalence of anger was determined to vary between 17.7-66.5%. It was reported in the study that, as the academic degree increases, physical and passive aggression also increase [27]. Furthermore, the "anger reactive," "instrumental anger," and "anger total" mean scores of high school senior students were found to be high. Additionally, the mean scores for "anger reactive," "anger instrumental," and "anger total" in males were observed to be higher. Studies conducted by Sharma and Marimuthu, Mohammad Hossein et al., reported that physical aggression is more common in boys, while verbal aggression is more common in girls [28,29]. Gudlaugsdottir et al. stated that boys express their anger by fighting and shouting, whereas girls express their anger by crying and shouting [30]. In this study, although the "anger reactive", "instrumental anger" and "anger total" mean scores of males were higher, this difference was not statistically significant. In addition, the higher level of anger related to academic degree in this study was found to be consistent with the literature [27-30].

Sleep problems are commonly encountered in adolescents. When left untreated, they can give rise to various psychological and somatic problems in the future [31]. Negative behaviors like anger have been observed in adolescents with sleep disorders. It has been found that sleep quality is more closely associated with feelings of anger than the average amount of sleep. Mood can be affected, and anger can be provoked in adolescents due to poor sleep quality [32]. Donoghue and Meltzer stated that insomnia or reduced sleep duration cause behavioral problems such as irritability and anger [33]. In this study, although, the mean scores of "anger reactive", "anger instrumental" and "anger total" were lower in adolescents who slept 10 hours or more per day, this difference was not statistically significant. It is well-established that sleep patterns influence factors such as circadian rhythm and mood regulation. It is thought that prolonged sleep duration may reduce irritability and anger.

The most common form of exercise is considered to be walking. Many bodily and spiritual processes are improved by walking [34]. Beneficial psychological effects have been indicated by numerous studies when it comes to walking and exercise [35,36]. Nevertheless, there is no clarity regarding the optimum duration for these exercises [37]. A significant reduction in negative emotions was reported by Sakuragi and Sugiyama after walking for one hour daily over a four-week period [38]. In this study, although, the mean scores of "anger reactive", "anger instrumental" and "anger total" were found to be lower in adolescents whose daily walking distance was 5000 meters or more, this difference was not statistically significant. These results suggest that walking may induce relaxation, which in turn may contribute to the potential reduction of anger.

Studies have reported that the using smartphones in stressful times make it easier for individuals to cope with difficult situations. However, the beneficial effect only occurs when this interaction is minimal [39]. Excessive and uncontrolled use can cause many harmful mental problems, especially addiction. Long-term and excessive smartphone use was reported to be associated with depressive symptoms, high anxiety, anger, and

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stress. In this study, "anger reactive", "anger control" and "anger total" mean scores were found to be higher in those with a smartphone usage time of 3 hours or more.

According to a study conducted in the USA, phone or computer games are used by 8% of children and adolescents between the ages of 8-18 [40]. It is stated that an average weekly playing time of 16.4 hours on the computer is reported for males, while females spend 9.2 hours [41]. In the Netherlands, a cross-sectional study reported that online games are played by 3% of school-age children aged 13-16 [42]. In this study, it was found that the "anger total" and all sub-dimension averages were higher in those who used computers and phones extensively for games and entertainment. This finding suggests that users see games as an escape to make up for the lack in their real lives or to get away from their problems. In addition, it is thought that excessive use, which continues with the increase in the time spent in the virtual environment, may cause an increase in anger [39].

The internet, computers, and mobile phones are used by adolescents almost everywhere [43]. Widespread use is caused by activities such as chatting and messaging in social networks. On the other hand, sometimes arguments, anger, and negative behaviors may be encountered during conversations with other people or through social networks. [44]. This study showed that "anger total" and all sub-dimension averages were higher in those who used computers and phones for a long time for chatting, messaging, and socializing. It is easier to express anger on online platforms, and it is possible to receive more likes through other interactions. This is believed to be the reason why adolescents with long-term computer or smartphone use tend to have higher anger scores.

Gaming has become a popular activity in recent years, especially among adolescents. Violent games can increase anger and increase the tendency to engage in aggressive behavior towards others [45]. Some adolescents may play such games because their anger levels are high. Result of a study on violent games have shown that children may be at higher risk [46]. It is known that many children use games for emotional regulation to relax, forget problems or feel less alone [47]. Playing violent games to deal with anger can have positive or negative consequences for children. This study detected that adolescents who play war, fighting, etc. games on the phone or computer for a long time have higher mean scores of anger. It is believed that the violent content in games exacerbates the anger among adolescents.

Not all games have the same content, but most games contain competitive elements. Therefore, aggressive behavior and anger may occur in players. Jerabeck and Ferguson reported that the content of the games and the style of playing games such as cooperative or solo play are effective on anger [48]. This study indicated that adolescents who play racing and competitive games on the phone or computer for a long time have higher "anger reactive", "anger instrumental" and "anger total" averages. The competitive environment in racing games is believed to provoke anger in adolescents.

Limitations

The study possesses several limitations that warrant consideration. Firstly, the participants were exclusively limited to high school adolescents within a specific province in Eastern Turkey. Consequently, it is crucial to conduct studies encompassing samples from various regions of Turkey and different age groups to ensure broader generalizability. Furthermore, it was not feasible to establish baseline anger levels prior to the introduction of computer and mobile phone usage. All assessments relied on self-reported data, thus precluding the establishment of a definitive cause-effect relationship. Additionally, a significant limitation stems from the collection of phone and computer usage information solely from a single source. The lack of access to parents' perspectives represents a notable constraint on the study's comprehensiveness. Moreover, the use of self-filled forms instead of face-to-face interviews introduces an element that may undermine the reliability of the gathered information. Finally, it is important to acknowledge that while there may exist other variables that influence anger levels, the assessment conducted through the questionnaire did not account for these potential psychopathologies.

Conclusion

This study determined that the increase in the academic degree, the increase in the duration of smartphone use, the use of computers and phones for gaming/entertainment, chat, messaging, and socializing increase anger. In addition, playing violent war, fighting, etc. games for a long time on the computer and phone increases anger, was found. It is known that aggressive behaviors occur during childhood and adolescence and do not change much after they occur. Such feelings of anger can lead to increased aggressive behavior. For this reason, attitudes and behaviors that may lead to various mismatches or crimes in adulthood should be prevented in adolescents. Adolescents playing games that may cause anger may increase their tendency to violence. Long-term use of technology can lead to problems such as addiction, poor problem-solving skills, or difficulty in regulating emotions. Therefore, it may be useful for families to monitor the content, duration and type of games children play.

Compliance with Ethical Standards

Ethical approval: Ethical approval was obtained from Bingöl University Non-Interventional Research Ethics Committee before starting the study (approval number: 28.11.2022-E.86417). After ethical approval was obtained, institutional permissions were obtained through the governorship for the research to be conducted in educational institutions (10.01.2023-92001). Adolescents were informed about the purpose of the study and their consent was obtained.

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