

Analysis of the relationship between digital game playing motivation and physical activity

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ABSTRACT

Participation of children in physical activity has decreased and the interest in digital games has increased in recent years as a result of development of internet and technological devices. This research has been done in order to determine the motivation of elementary school students for participating in physical activity and digital game motivation. The study group of the research consists of 379 students (197 female students, 182 male students). In the research, "Digital Game Playing Motivation Scale (DGPMS)" and "Physical Activity and Leisure Motivation Scale (PALMS)" have been used as data collection tools. Kolmogorov Smirnov Test has been used for normality distribution of data. T-Test and ANOVA test have been used for independent samples. In the study, the total physical activity average of primary school students is 56.98 ± 10.79 . This average indicates that the sample's physical activity level is high (49-64). On the other hand, the level of digital game play is moderate with an average of 56.73 ± 10.90 . Physical activity level has showed significant difference according to age, gender, success, daily digital game play time and daily physical activity level ($p < 0.05$). Daily digital game scores have showed a significant difference according to age and class level ($p < 0.05$). A statistically significant and positive correlation has been found between the individual curiosity factor of physical activity motivation and the social acceptance factor of curiosity and digital game motivation ($r = 0.104$; $p < 0.05$). In conclusions: Results of regression analysis has proved that age, success, daily digital playing time and daily physical activity levels have significantly contribution to the motivation of physical activity ($p < 0.05$). These results display that playing daily digital games significantly affects physical activity motivation.

Keywords: Digital game, physical activity, primary school, motivation.

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INTRODUCTION

Physical activity is often described as the most effective way to be healthy. There are many benefits from lowering blood pressure on the human body, weight loss, cardiovascular development, muscular endurance, immunity to diseases, and prevention of ailments related to old age (Batoulia and Saba, 2017; Bek, 2008). Physical activity is an integral part of normal growth and development for all young people. Physical activity has an important role in an individual's physical, psychological and mental development (Hills et al., 2007). Risks associated with chronic diseases begin in childhood and increase with age. It is known that physical inactivity generates a serious health risk for children and

adolescents (Demirel et al., 2014).

Physical activity is an important component that supports physical, emotional, social, motor and mental development by providing energy balance and healthy life through the activation of the human body (Demir and Cicioğlu, 2018). Sport is one of the activities performed to protect people from disease and stay healthy (Aygün and Ünal, 2020).

Digital games are games that are played on computers, game consoles, and mobile phones (Rideout, et al., 2010) after programming with various technologies, and prepared by visual access and user input (Çetin, 2013).

Digital games have become one of the most important

pursuits of the new generation, called digital native in today's world. So much so that children play these games intensely at home, at school, on trips and in many other living areas, and even hinder many tasks and needs that they have to fulfil in order to play these games. At the beginning of these duties and needs, both primary needs such as nutrition, sleep, toilet and situations such as not fulfilling homework and responsibilities. One of the important issues to be questioned at this point is why children play digital games so intensely. Although this question can be examined under various headings; the important factors can be sorted as such: digital games offer a surreal world to the players and the players have extraordinary power and abilities here, and they can accomplish many things that they cannot achieve in real life in these games

Another important factor is the sense of uncertainty, curiosity and excitement in these games. The game scenarios that are designed to pass the level constantly motivate the players to reach better and better (Demir and Hazar, 2018).

Today, participation in physical activity, which is one of the important supporters of human health, decreases day by day due to various reasons. Some of the reasons are: individuals experience mental fatigue due to the busy working hours, the number of daily steps decreases due to the use of transportation, the widespread means of communication, reaching the necessary places with a single click, abandoning traditional games due to participation in the digital game, preparing for the exams that will guide the future of children and young people, However, such reasons as weight control, healthy life, socialization, coping with stress, protection from diseases, forgetting daily problems, desire to protect from bad habits, getting away from negative thoughts, having fun, developing physical self, evaluating leisure time, developing healthy lifestyle behavior, desire to increase self-confidence cannot break away them from physical activities. In this context, one of the factors that increase the effectiveness of the individual's purpose of participating in physical activity is motivation (Demir and Cicioğlu, 2018).

Motivation which indicates the underlying causes of the behaviour (Guay et al., 2010) is a power that is fed by the internal and external characteristics of the person (Hoy and Miskel, 2010). Motivation is the power that mobilizes the person in line with their goals or objectives, and guides the person to achieve this goal. On the other hand, the motivation that enables the person to perform target behaviours due to their desires or needs also affects the emotional well-being after reaching the goal positively (Demir and Cicioğlu, 2018). Motivation is divided into three categories as intrinsic motivation, extrinsic motivation and amotivation (Deci and Ryan, 1985). Intrinsic motivation is about the goal being interesting and enjoyable for the individual (Deci et al., 2001). Extrinsic motivation is about the individual's

achievement of reward and privilege. On the other hand, amotivation is related to situations where the individual cannot perceive the connection between the results they do and what they do (Reeve, 2004).

Physical activity is possible with an active and conscious lifestyle. Researches show that human beings have been born with certain abilities since their creation. The emergence of these abilities also varies depending on the individual's interests and attitudes. As long as the skills available in the individual are used, they develop and combine the missing elements with the skill factors and form the capacity of the individual. In this direction, it is obvious that environmental factors play a triggering role in the upbringing of the individual. If there are physical activities that provide physical, spiritual and motor raft development that arise with the combination of all abilities and skill factors around the individual, the individual will be interested in turning to physical activity. On the other hand, computer technology, which has a great role in today's technology age and technology society, affects daily life in many ways, especially with the developing internet technology. it causes them to deal with technological tools instead of physical activity. In other words, it pushes the individual away from the active lifestyle and pushes them into a passive life.

It is necessary to turn the behavioural patterns such as physical activity and sports into lifestyles that reveal the necessary abilities and to get away from the passive lifestyle in order for each individual to live a healthy life. In this context, I think that analysing the relationship between the intended digital game play motivation and physical activity will contribute to the literature.

MATERIALS AND METHODS

The survey model which is one of the descriptive research models that questions the existing situation has been used in the research. The scan pattern is a research pattern that describes a condition that exists in the past or still as it exists. This pattern tries to reveal the case, person or object that is the subject of the research in itself and as it exists (Karasar, 2014).

Study group

The study group consists totally of 379 students (199 girls and 182 boys) between the ages of 9 and 15 who study in various regions in 2019-2020.

Data collection tools

Personal information form

An information form has been formed for the participants

to obtain information about their age, gender, class, daily digital game play time and daily physical activity time.

Digital game-playing motivation scale (DGPMS)

The Cronbach Alpha reliability coefficient for the Success and Revival is 0.81; 0.79 for Curiosity and Social Acceptance, and 0.75 for the Uncertainty in Game Request sub-dimension. The Dimension of Uncertainty in the Game Request in the Scale includes the inverse (negative) items.

Physical activity and leisure motivation scale (PALMS)

Cronbach Alpha reliability coefficient of the total score of the scale developed by Demir and Cicioğlu (2018) has been calculated as 0.83. According to Demir and Cicioğlu (2018), the motivation points for participating in physical activity are evaluated as “1-16 very low, 17-32 low, 33-48 medium, 49-64 high, 65-80 very high” (Demir and Cicioğlu, 2018).

Statistical analysis

While nominal and ordinal parameters of the research have been defined by frequency analysis, scale parameters have been described by average and standard deviation values. Cronbach Alpha has been used for reliability analysis. Factor analysis has been used for the Confirmatory Factor analysis of the scales. All scale items have sufficient factor level above 0.40. Kolmogorov Smirnov Test has been used for the normality of the scale parameters. Independent Samples T-Test and One Way ANOVA have been used for difference analysis since total parameters are normally distributed. Pearson correlation has been used for correlation analysis. All analyses were done in SPSS 17.0 for tabs with 95% confidence interval.

FINDINGS

Some demographic characteristics of the participants are given in Table 1.

25.6% of the participants are between the ages of 9-11, 53.6% are between the ages of 12-13 and 20.8% are between the ages of 14-15. 52.0% of the participants are girls, 48% of the participants are boys. 15.3% of the participants are in 5th grade, 22.7% in 6th grade, 39.6% in 7th grade and 22.4% in 8th grade. 4.0% of the participants are in the low, 42.7% are in the middle and 53.3% are in the high success group. 53.3% of the participants stated that they played digital games for 1 hour or less, 39.1% play 61-90 min and 7.7% play 90

Table 1. Demographic characteristics of the participants.

Parameter	Frequency (f)	Percent (%)
Age		
9-11	97	25.6
12-13	203	53.6
14-15	79	20.8
Gender		
Female	197	52.0
Male	182	48.0
Class		
5 th	58	15.3
6 th	86	22.7
7 th	150	39.6
8 th	85	22.4
Achievement		
Low	15	4.0
Moderate	162	42.7
High	202	53.3
Daily digital game playing duration		
1 hour and below	202	53.3
61-90 minutes	148	39.1
90 minutes and over	29	7.7
Daily physical activity level		
Never	53	14.0
Rarely	95	25.1
Sometimes	112	29.6
Always	119	31.4
Mother education		
Non literacy	12	3.2
Primary school	132	34.8
Secondary school	96	25.3
High school	80	21.1
Undergraduate	59	15.6
Father education		
Non literacy	4	1.1
Primary school	78	20.6
Secondary school	93	24.5
High school	107	28.2
Undergraduate	97	25.6

min or more in one day.

Daily physical activity level is distributed as such: 14.0% never; 25.1% rarely, 29.6% sometimes and 31.4% always. The mother of 3.2% of the participants is illiterate, 34.8% of them have primary education, 25.3%

of them have secondary education, 21.1% of high school and 15.6% of them have undergraduate education. 1.1% of the fathers of the participants were illiterate, 20.6% received primary school, 24.5% secondary school, 28.2% high school and 25.6% undergraduate. Scale reliability results, averages, ranges, and standard deviations are given in Table 2.

According to the reliability analysis results, all scale and sub-dimensions have more than 0.600 sufficient Cronbach Alpha value. Total physical activity average is 56.98 ± 10.79 and it indicates that the sample's physical activity level is high (49 to 64). On the other hand, the level of digital game play is moderate with an average of 56.73 ± 10.90 . The differences in physical activity and digital game score by demographic characteristics are given in Table 3.

According to Table 3, physical activity level has showed significant difference according to age, gender, success, daily digital game play time and daily physical activity level ($p < 0.05$). Daily digital game scores have showed a significant difference according to age and class ($p < 0.05$). Correlation analysis results between physical activity and digital game playing subscales are given in Table 4.

Correlation analysis results display that there is no significant correlation between total physical activity and total digital game play ($p > 0.05$). However, a statistically significant and positive correlation has been found between the individual curiosity factor of physical activity motivation and the social acceptance factor of curiosity and digital game motivation ($r = 0.104$; $p < 0.05$). In order to examine the determinants of physical activity motivation, regression analysis has been performed with significant parameters. Regression analysis results are given in Table 5.

Regression analysis results prove that age, success, daily digital game play time and daily physical activity levels has significantly contributed to motivation of physical activity ($p < 0.05$). These results show that daily digital gaming significantly affects the motivation of physical activity; however, the motivation to play digital games has not contributed significantly to the motivation of physical activity. On the other hand, the importance of the correlation between the motivation and curiosity of the physical activity motivation of the individual and the social acceptance factor of the motivation of digital gaming shows that the motivation of digital gaming is generally related to mental and individual reasons.

Table 2. Scale reliability results, average and standard deviation values.

Parameter	Cronbach alpha	Minimum	Maximum	Mean	Std. deviation
PA Individual reasons	0.714	6.00	30.00	23.25	4.76
PA Environmental reasons	0.609	7.00	30.00	20.69	4.57
PA No reason	0.865	4.00	20.00	13.04	5.28
PA Total	0.799	23.00	80.00	56.98	10.79
DGP success and revival	0.606	5.00	25.00	14.41	4.30
DGP Curiosity Social Acceptance	0.837	9.00	45.00	26.94	8.69
DGP Uncertainty Game Request	0.770	5.00	25.00	15.37	5.07
DGP Total	0.711	22.00	95.00	56.73	10.90

Table 3. Physical activity and digital game score differences according to demographic characteristics.

	Physical activity total		Digital game playing total	
	Mean	SD	Mean	SD
Age				
9-11	60.52	12.26	54.75	10.03
12-13	56.15	9.97	56.70	11.25
14-15	54.76	9.95	59.22	10.64
F		7.756		3.702
p		0.001*		0.026*
Gender				
Female	55.88	10.83	56.08	10.92
Male	58.16	10.64	57.43	10.87
t		-2.071		-1.203
p		0.039*		0.230

Table 3. Continues.

Class				
5 th	59.81	12.65	54.22	11.09
6 th	56.86	10.57	55.24	9.57
7 th	56.65	10.47	58.43	11.76
8 th	55.74	10.01	56.93	10.07
F		1.767		2.825
p		0.153		0.039*
Achievement				
Low	56.60	4.85	56.27	9.52
Moderate	54.98	9.90	57.36	11.93
High	58.61	11.52	56.26	10.13
F		5.165 (W)		0.471
p		0.009*		0.625
Daily digital game playing duration				
90 minutes and over	55.93	10.76	57.07	10.93
61-90 minutes	57.03	10.04	56.77	10.73
1 hour and below	64.03	12.32	54.10	11.57
F		7.412		0.943
p		0.001*		0.390
Daily physical activity level				
Never	51.09	11.90	55.26	13.38
Rarely	55.12	10.35	57.57	10.81
Sometimes	56.40	8.86	57.27	9.56
Always	61.62	10.53	56.20	10.99
F		13.110 (W)		0.689
p		0.000*		0.559
Mother education				
Non literacy	59.50	6.50	59.33	8.50
Primary school	56.93	10.55	57.55	10.17
Secondary school	56.67	10.67	57.03	11.68
High school	55.64	11.33	56.21	11.08
Undergraduate	58.88	11.38	54.56	11.31
F		0.952		1.008
p		0.434		0.403
Father education				
Non literacy	60.50	12.34	61.25	5.06
Primary school	55.12	8.77	57.38	10.58
Secondary school	56.16	11.20	56.80	9.80
High school	57.75	10.78	57.30	12.30
Undergraduate	58.26	11.69	55.32	10.71
F		1.303		0.720
p		0.268		0.579

SD: Standard Deviation; W: Robust Welch Test, F: One Way ANOVA Test, t: Independent Samples T-Test, *p<0.05.

Table 4. Correlation analysis results between physical activity and the sub-scales of digital game playing.

	PA Individual reasons	PA Environmental reasons	PA No reason	PA Total	DGP Success and revival	DGP Curiosity social acceptance	DGP Uncertainty game request
PA Env. reasons	0.436**						
PA No reason	0.375**	0.149**					
PA Total	0.809**	0.689**	0.718**				
DGP Suc. Rev.	0.052	0.045	-0.033	0.026			
DGP Cur.Soc. A	0.104*	0.100	-0.040	0.068	0.636**		
DGP Uncertainty GR	-0.011	-0.002	-0.054	-0.032	-0.258**	-0.422**	
DGP Total	0.098	0.097	-0.070	0.050	0.782**	0.852**	0.026

Table 5. Regression analysis results for physical activity motivation and potential predictive parameters.

Dependent variable: Physical activity total	Unstandardized coefficients		Standardized coefficients		t	p
	B	Std. error	Beta			
(Constant)	40.141	4.112			9.761	0.000
DGP Curiosity Social Acceptance	0.103	0.060	0.083		1.724	0.086
Gender	-0.085	1.073	-0.004		-0.079	0.937
Age	-2.145	0.811	-0.135		-2.645	0.009
Achievement	2.350	0.951	0.125		2.472	0.014
Daily digital game playing duration	-2.344	0.822	0.138		2.851	0.005
Daily physical activity level	3.196	0.518	0.308		6.165	0.000

R²: 0.156; F: 12.610; p < 0.01.

DISCUSSION

In this study, the objective is to analyse the relationship between digital game motivation and physical activity. In this framework, a survey has been applied to the participants between the ages of 9-15, whose physical activity levels are above average. In the literature, separate studies on digital game motivation and physical activity have been conducted, and various demographic features have been given in these studies. In these studies, the sample is mostly chosen from the students. Wang et al. (2008) applied 155 secondary school students in their study in which they analysed passion and true motivation with digital game and reported that there were 134 boys, 8 girls and 13 gender-free students in the sample. On the other hand, Wichadee and Pattanapichet (2018) studied the effect of digital games on English education on 31 boys and 46 girls. Chen (2017) studied the relationship between digital play and motivation level of students in their study on 326 students from three universities. As it is generally understood from these samples, the group of students comes to the forefront in digital game research. When the demographic characteristics of the students participating in the research are considered; there is a structure that sees themselves at a high level, playing computer games for an average of 1 hour per day, high physical activity

levels, and their mother's primary school and father education is high school among students who are 7th grade between 12-13 years of age. In general, it has been observed that the physical activity level is high and the digital game attitude level is low when the demographic characteristics of the research sample are taken into consideration.

In the studies analysing the relationship between education with physical activity and digital games, research designs that reveal that digital games can be used as a training material, come to the fore. In their study, Trout and Christie (2007) reported that interactive digital games encourage players to physical activity, in contrast to a sedentary lifestyle. Similarly, Mckeen et al. (2007) stated that digital games can play an important role in influencing physical activity. According to the results obtained in the research, the level of physical activity participation motivation has a total of 56.98 averages, and also there is a high level of physical activity motivation (49-64 = high) in the classification by Demir and Cicioğlu (2018). Physical activity motivation score has showed statistically significant difference according to age, gender, daily digital game play time and daily physical activity level variables.

Sin et al. (2014) reported that factors such as the content of the digital game, challenge, control, actuality and entertainment are associated with the digital game

play motivation in their studies on the effects of digital game on male students. Serrano (2019), on the other hand, analysed 20 studies by conducting meta-analysis in his study, and remarked that digital games are effective on students' motivations and can be used in the field of education. Anyaegbu et al. (2012) suggested that digital games play an important role in influencing students' motivation in primary schools in China. According to the research results, the level of digital game playing motivation has an average of 56.73 in total, and ranges from the smallest 22 to the highest 95 points range. This condition shows that there are participants with all levels of digital game motivation and the sample reflects the digital game motivation enough. Digital game playing motivation has differed only by age and class. It is higher in 14-15-year-old individuals as age group and 7th grade students in class. Actually, it has a similar distribution in a sample taken from the school with age. In addition, digital game playing motivation, which increased in the 7th grade but decreased in the 8th grade, suggests that national assessment and rating exams may have an effect from the 8th grade onwards.

According to the results obtained in the research, there is no significant relationship between digital game-playing motivation and physical activity levels. On the other hand, the significance of the relationships between the total score and sub-scores of each scale shows that the data obtained in the research are reliable. Accordingly, it is not possible to attribute the meaningful relationship between digital game-playing motivation and physical activity to any error that may occur during the collection and evaluation of the data in correlation analysis.

Conclusion

Although the findings obtained in the research did not reveal the relationship between physical activity and digital game motivation significantly, the low level of digital game motivation in the sample with high physical activity indicates that this negative relationship may be significant in the larger sample. However, this requires larger budgeted and centred comparisons. Thusly, larger sampling and cross-comparisons in more centres and different demographic features can be made.

Another important finding obtained in the research is that the level of physical activity depends on more demographic features than the level of digital game play. While the motivation to play digitally differs only by age and class, the level of physical activity varies significantly with respect to age, gender, daily digital game play time and daily physical activity level. Apart from the daily physical activity level, gender and daily digital game play are important here. Since age varies significantly for both research parameters, the level of physical activity varies significantly according to gender. For this reason, it can be stated that today there is not yet sufficient access to

physical activity in individuals of all genders, ages, educational backgrounds or individuals with different demographic characteristics. Studies and field practices in this area can play an effective role in increasing the physical activity levels of individuals and internalizing this process.

When the research results are summarized in general, it shows that the level of digital activity is lower in individuals who play digital games 90 minutes a day or more. However, it should be accepted that digital game is not a phenomenon that should be completely excluded and that prevents physical activity, it is a necessity today. Studies in the literature reveal that digital games can also be used as an educational tool. Therefore, it can be stated that it is beneficial to carry out more comprehensive researches especially on the content of digital game motivation.

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