

## ORIGINAL SCIENTIFIC PAPER

# Correlation between Gaming, Motor Abilities, and Knowledge of English

Ivan Babić<sup>1</sup> and Ana Penjak<sup>1</sup>

<sup>1</sup>University of Split, Faculty of Kinesiology, Split, Croatia

## Abstract

In the last decade, gaming has become one of the activities that many school-aged children have been using daily. As such, gaming has been having a bad effect on children's physical activity but, at the same time, it has helped them in the process of learning English. The goal of the study was: 1) to establish a correlation between the frequency of gaming with motor abilities and grades in English; 2) to establish a correlation between motor abilities and English. Thirty-four 7th- graders ( $m=19$ ,  $f=15$ ; age  $13.24\pm0.55$ ) of a primary school in Split participated in the study. The subjects were tested in 3 motor and 1 functional ability test. Grades in English were collected. The participants also filled out the questionnaire on the frequency and manner of gaming. The questionnaire is reliable. There is no statistically significant correlation between the frequency of gaming and better grades in English. Girls game less than boys (MWU Test), have better grades in English, and achieve less in certain motor abilities (MWU Test trunk lifting; 6-min running). The findings suggest that by gaming we do not improve our knowledge of English but that gaming is statistically negatively correlated with motor abilities.

**Keywords:** digital gaming, English language, physical activity

## Introduction

In recent years, we witness the rapid increase and the overall presence of various sophisticated technologies in our daily life. School-age children, in particular, have been growing up surrounded by electronic gadgets (laptops, cell phones, tablets) that form and create their daily interactions and routines (Šego, 2009). Even more, digital gaming, as a 'system in which players engage in artificial conflict, defined by rules, that results in a quantifiable outcome' (Salen & Zimmerman, 2004) has become one of the activities that many school-age children have been using daily (Dewit, 1993). Until very recently, research in gaming aimed at identifying only its negative effects, such as physical inactivity, increased aggression, social isolation, addiction, etc. (Anderson & Bushman, 2001; Gentile, Lynch, Linder, and Walsh, 2004). Recently, we read about the positive effects of gaming, such as overall wellness enhancement (Przybylski, Rigby, and Ryan, 2010), useful learning and assessment tools in education (Larsen McClarty et al.,

2012), natural, spontaneous, and autonomous aid in learning (Thorne, 2008), etc. Saying this, there are also numerous benefits that contribute positive correlation between gaming and foreign language learning: through gaming, a foreign language is learned and transmitted autonomously, out of the classroom surrounding and in and by the community of gamers (Holec, 1981; Chik, 2014); reading game-related texts or manuals helps develop learner's reading proficiency (Consalvo, 2007; Apperley, & Walsh, 2012); gaming helps learners learn lexis easier and achieve higher scores in vocabulary tests because they connect new words with images in the game and not just as some abstract symbols (Gee, 2012; Sylvén & Sundqvist, 2012); gaming focuses primarily on developing communicative competence (Rama, Black, Van Es, & Warschauer, 2012).

In addition, scholarly studies have extensively documented numerous benefits of physical activity on the individual's health status. For instance, physical activity in adolescence contributes to the development of a healthy in adult lifestyle



Correspondence:

A. Penjak  
University of Split, Faculty of Kinesiology, Teslina 6, 21000 Split, Croatia  
E-mail: apenjak@kifst.hr

(Hallal, Victora, Azevedo, & Wells, 2006; Guthold, Stevens, Riley, & Bull, 2020); physical engagement greatly contributes to the development, not only of motor and functional abilities, but also to the development of brain synapses (Hillman, 2008; Erickson, Hillman, & Kramer, 2015); those who are more physically active will achieve better academic results or will have greater school success (Castelli, 2007; Donnelly, 2016); or simply said, 'benefits of regular physical activity on health, longevity, and wellbeing 'easily surpass the effectiveness of any drugs or other medical treatment' (Kumar, 2015). Therefore, we can agree that physical activity represents a tool to improve not only health status but also cognitive abilities that directly contribute to achieving better results in school. In addition, since we found no studies that have addressed the correlation between gaming, motor abilities, and the knowledge of English, we believe that this study and its results represent an important foreground for future studies on the issue, as well as for the future studies within all three fields of research separately (digital gaming, physical activity, and language learning).

Following these lines of thought, the goal of the study was: 1) to establish a correlation between the frequency of gaming with motor abilities and grades in English; 2) to establish a correlation between motor abilities and English. Based on our goals, we have defined the following hypotheses: H1-There is a correlation between gaming and English language performance (grades); H2-There is a correlation between gaming and physical engagement.

## Methods

### Participants

A total of thirty-four 7th-graders (m=19, f=15; age 13.24±0.55) from a primary school 'Marjan', Split, Croatia participated in the study. Data were collected between April and June 2021.

### Variable Sample

Variable sample consisted of 7 variables: 2 variables on English language usage in gaming, 1 variable on the grades in English at school, and 4 variables on functional motor abilities.

The newly constructed questionnaire was used in collecting data on English language usage in gaming as well as on the amount of gaming. The questionnaire, which was written in Croatian, consisted of four particles: 2 on using English in gaming and 2 on the amount of gaming. The participants completed the questionnaire at the beginning of their regular Physical Education (PE) class. The participants were informed that the questionnaire was anonymous, subject to their will, and with the written parents' consent. The study protocol followed the guidelines stated in the Declaration of Helsinki (2181-205-02-01-21-0011, 23/9/2021).

The participants were also tested in 3 motor abilities tests (chin-up hold, abdominal crunches, and long jump) and 1 functional ability test (6-minute run) during their regular Physical Education (PE) class.

### Statistical Analyses

The data were analyzed using Statistics 13 (Statsoft, USA, 2013). The questionnaire is reliable (Cronbach's alpha=0.69 average inter-item correlation  $r=0.42$ ). All variables were analyzed using descriptive statistics – mean, standard deviation, minimal and maximal result. The Spearman's rank correlation coefficient was used in testing variable correlation. The Mann-Whitney U Test was used in testing gender differences. The change in research data was statistically significant at  $p<0.05$ .

## Results

From Table 1 we see that this is a very homogeneous group and that there are no differences between boys and girls

**Table 1.** Descriptive parameters: arithmetic mean and standard deviation (AS±SD), minimal and maximal results (min/max), difference between boys and girls (T-test)

	All groups		Girls		Boys	
	AS±SD	Min/Max	AS±SD	Min/Max	AS±SD	Min/Max
Age	13.24±0.55	12.00/14.00	13.20±0.56	12.00/14.00	13.26±0.56	12.00/14.00
Hight (m)	1.70±0.08	1.53/1.90	1.69±0.05	1.60/1.77	1.71±0.10	1.53/1.90
Weight (kg)	56.97±9.84	40.00/80.00	57.07±7.10	45.00/72.00	56.89±11.76	40.00/80.00
BMI	19.56±2.37	14.69/24.69	19.95±2.31	15.96/23.78	19.24±2.43	14.69/24.69
Grade	4.18±0.87	2.00/5.00	4.40±0.83	3.00/5.00	4.00±0.88	2.00/5.00

in variables describing the sample.

From Table 2 we see that the results of the correlation analysis did not show an association between the total amount of gaming and English language proficiency in the total sample.

Further analysis of the correlation established a statistically significant correlation between the total amount of gaming and the test for assessing functional abilities, as well as a statistically significant correlation between language assessment

**Table 2.** Correlation between all the analysed variables (Spearman's rank correlation) for all groups together, and for boys and girls separately

		Amount of gaming	Chin-up hold	Abdominal crunches	Long jump	6-min run	Grade
All groups	English in gaming	0.61*	0.01	0.27	0.03	0.29	0.34
	Amount of gaming		0.24	0.12	0.21	0.14	0.41
	Chin-up hold			0.51*	0.86*	0.35	0.23
	Abdominal crunches				0.41	0.65*	0.21

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**Table 2.** Correlation between all the analysed variables (Spearman's rank correlation) for all groups together, and for boys and girls separately

		Amount of gaming	Chin-up hold	Abdominal crunches	Long jump	6-min run	Grade
Girls	Long jump					0.23	0.27
	6-min run						0.01
	English in gaming	0.78*	0.17	0.44*	0.24	0.49*	0.17
	Amount of gaming		0.27	0.33	0.27	0.45*	0.02
	Chin-up hold			0.44*	0.72*	0.47*	0.08
	Abdominal crunches				0.41*	0.64*	0.09
Boys	Long jump					0.43*	0.17
	6-min run						0.08
	English in gaming	0.82*	0.02	0.21	0.10	0.41	0.30
	Amount of gaming		0.01	-0.10	0.12	0.23	-0.07
	Chin-up hold			0.28	0.38	0.30	0.11
	Abdominal crunches				0.20	0.14	0.14
	Long jump					0.38	0.16
	6-min run						0.53*

\*Statistically significant correlation on the level  $p < 0.05$ 

and functional abilities in girls.

Table 3 shows that there are statistically significant differences between boys and girls: in the amount of gaming in

the last 3 months, in the amount of gaming/day, in gaming in total, in the abdominal crunches (repetitions), and in the 6-minute run test.

**Table 3.** Differences between boys and girls in the amount of gaming, physical abilities and grades in English

Variables	U	Z	p
Grade	105.00	1.28	0.20
Amount of gaming in last 3 mths	42.50	-3.45	<0.01*
Amount of gaming/day	37.50	-3.62	<0.01*
Gaming in English?	87.50	-1.89	0.06
Communication in English in gaming?	88.50	-1.86	0.06
Gaming in total	36.50	-3.66	<0.01*
Chin-up hold (sec)	102.50	-1.37	0.17
Abdominal crunches (repetitions)	62.50	-2.76	0.01*
Long jump (cm)	93.50	-1.68	0.09
6-min run (m)	54.00	-3.05	<0.01*

\*Statically significant difference between boys and girls

## Discussion

While there are studies concerning the correlation between motor abilities and learning among children (Milne et al., 2018) or the correlation between motor abilities and cognitive skills among children (Van der Fels et al., 2015), there are no studies that addressed or reviewed the correlation between motor abilities and the grade from English at school, which makes our explanation of the obtained results rather challenging. Namely, based on the results gained by this study, we read that motor abilities do not correlate with the grade from English at school in the total sample nor in girls, separately. In boys, only one test (functional ability) correlates with the grade from English. Saying this, we assume that the obtained results are due to their working habits. Or in other words, if it were a matter of working habits, then the other tests would also have correlated with the grade from English.

Furthermore, in our first hypothesis, we assumed that children who, in general, game more would, consequently, have better knowledge of English which, eventually, would result in them having better grades in English at school. Our results showed that boys who statistically gamed more than girls did not have better grades in English. Or in other words, the fact that boys spent more time gaming did not contribute to the assumption that they would have better grades in English at school. Even more, numerous studies emphasize that girls, in general, achieve higher (better) grades in English and learn a foreign language faster than boys (Özçalışkan & Goldin, Meadow, 2010; Payne & Lynn, 2011; Muñoz, 2020) no matter their exposure or non-exposure to gaming. Therefore, this study proved no significant correlation between gaming and better grades in English at school, which comes as a surprise when compared to the results obtained by other studies con-

ducted on the same topic. Namely, Yang and Hsu (2013) researched the correlation between the extent of the multiplayer online gaming experience and the achievement of English language tests in primary school children. Their results indicated that children who were exposed to excessive online gaming showed better knowledge on English language tests, i.e. obtained better grades. Smits (2019) compared the gaming behaviour of gamers and non-gamers to grades in English based on the results of English language skills tests (reading, writing, and speaking). Namely, it was found that children who gamed had better grades in all three tested language skills than those who did not game at all, i.e. that there is a significant correlation between gaming and better grades in English at school. Therefore, we concluded that the outcome of this study might be due to inadequately created English language tests children take at school. Namely, English language tests at school only test children's general knowledge of English language skills (general vocabulary, standard grammatical constructions, etc.) and, as such, test only broader knowledge of English used in various contexts and topics (e.g. English used in restaurants, vocabulary referred to clothing, etc.). We believe that if English school tests were created in a more targeted way towards the specific, for instance, the vocabulary used in gaming, the results between boys and girls in grades would be significantly different (in favour of boys who game more). Therefore, in some future studies, such tests should be created in a way to access and evaluate knowledge (whether lexical or communicational skills) of English that is learned and gained in and from gaming.

Based on the studies that point out primarily negative outcomes of gaming (Grüsser, Thalemann, and Griffiths, 2007), this study also hypothesized that the intensity of gaming would (negatively) affect the physical status of children (due to their physical inactivity during gaming). Interestingly, the results have not confirmed the hypothesis entirely. Namely, the results have shown that the amount of gaming is statistically significantly related only to functional abilities (6-minute run

test) but only in girls. The results also pointed out that there is no such aforementioned correlation between the overall sample and the boys which might be due to the fact that boys still, at that age, tend to spend more time playing outside or that they are simply more involved in some sport or sports activity in contrast to girls. This fact has also been proven by other scholarly studies conducted on the same topic (Aarnio, 2002; Mota, 2002).

## Conclusion

Firstly, the study showed that grade in English at school and motor abilities are not in correlation. Secondly, the correlation between gaming and English language performance (grades) has also not been confirmed. Namely, due to general English language tests at school, we conclude that the obtained grade in school is not related to the amount of gaming in English. In addition, the research also aimed to investigate the impact of gaming on physical activity. In addition, it was assumed that this impact would be negative. Prolonged sitting at a computer or some gaming platform will not negatively affect motor abilities for the simple reason that boys who spend more time gaming, spend the rest of their free time doing sports or any other form of physical activity. The correlation between the amount of gaming and functional abilities in girls is surprising because, according to the study, they spend very little time gaming. In general, we cannot conclude that gaming will have a negative effect on motor abilities.

Lastly, there was also the restriction in conducting the study: an overall small sample of participants was due to Covid-19 restrictions according to which entrance to school and testing was rather limited and restricted. Therefore, future studies should include the following: a larger sample of participants, adjusted tests for testing specific English language skills that would examine the knowledge adopted by gaming, and a battery of physical fitness tests that would test more specifically possible negative consequences of prolonged sitting due to gaming.

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## Conflict of Interest

The author declares that there is no conflict of interest.

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