Early Adolescent Gender and Multiple Intelligences Profiles as Predictors of Digital Gameplay Preferences

Veljko Aleksić[1] and Mirjana Ivanović[2]
[1]Faculty of Technical Sciences Čačak, University of Kragujevac
[2]Faculty of Sciences, University of Novi Sad

Abstract

The paper explores the relations among early adolescents' digital gaming preferences and habits and their gender and multiple intelligences profiles. The study was conducted in 2015 with an empirical sample of 1,262 students aged 11 to 15. A vast majority of these students (86.9%) played digital games regularly. Early adolescent females spent on average 8.7 h per week playing digital games, while males spent an average of about 17.7 h per week playing digital games. Students with higher scores in Interpersonal intelligence section spent more time playing digital games, while those with higher scores in Visual/spatial and Natural intelligences section played less. Most of the students (41.6%) played digital games longer than five years. Early adolescent males favored Arcade and Sports games, while females preferred Logic, Online and Adventure game genres. Arcade (Action/Shooter/Platform) and Adventure games were preferably played by students with higher scores in Logical/ mathematical intelligence, and Sports (Fighting) games were preferably played by students with higher scores in Bodily/kinesthetic intelligence. Strategy games were a preferred genre for students with lower scores in Musical/rhythmic intelligences. These findings support the notion that individual psychological characteristics lead to media selection and behavioral patterns construction. Vice versa, playing the preferred game genre will probably further motivate players to enhance the specific set of skills, strategies and habits.

Key words: *digital gameplay; early adolescents; gender; multiple intelligences.*

Introduction

The multidimensional impact of technology makes it an indispensable part of living in modern society, so its influence is impossible to be ignored or overlooked. The digital environment directly influences the nature of playing and leisure activities so by early adolescence children have already collected and adopted a broad range of information and experiences. Gender differences can clearly be observed from the period of kindergarten and are relatively rigidly maintained throughout the childhood. By entering early adolescence these differences are becoming flexible, so it is possible that their retention during the period of adolescence is the consequence of stereotypes imposed by the parents and social environment. Olson (2010) explored motivation of early adolescents for video game playing on the sample of 1,254 students aged 12-14. The basic elements were identified: socialization, friendship, and an opportunity to lead other players or learn from them. In conclusion, playing games provided a sense of achievement and pride in winning. Liben and Bigler (2002) stated that boys in the sixth grade of elementary school still mainly identify themselves with stereotypically male characteristics, while the identification of girls with typically female characteristics slightly decreases. Having that in mind, it was expected that the digital gameplay habits and preferences of early adolescents are still polarized.

Related Work

Jenson and de Castell (2010) noted the constant increase of time that children and adolescents spend playing video games, especially in the age group 11-14. Rideout et al. (2010) concluded that males aged 8-18 spend twice the time playing video games than females do. Greenberg et al. (2010) explored the age and gender differences in playing digital games on two student samples: 692 fifth-, eight-, and eleven-graders, and 550 university students. They reported that early adolescent males preferred physical games, followed by imaginative and traditional games, while the females preferred traditional games, followed by imaginative and physical games. Male students spent twice the time playing than females did, and the average gameplay time increased up to the eight-grade, after which it decreased during adolescence. Hamlen (2011) studied the relationship between learning strategies and preferred game genre on the sample of 118 fourth- and fifth-grade elementary school students in the US. The results indicated that male students favored action games, followed by simulations and adventures, while female students mostly preferred simulations, followed by action and educational games. Homer et al. (2012) studied the preferred genre and game playtime on the sample of 213 US students, aged 10-15. They found out that the majority of preadolescent boys preferred First Person Shooter games, and somewhat less Fighting and Sport genres, while the girls favored Virtual Life and Virtual World games. The male students spent approximately 40% more time playing video games than did the females.

A digital game genre is identified within the established entertaining games classification, which provides a useful way of identifying similarities between them. Although there is no generally accepted game genre taxonomy, Herz (1997) created one of the first systematizations similar to those used in the video game industry: Action games (based on the reaction, typical shooter and platform games), Adventures (solving logic problems in order to progress through the virtual world), Fighting games, Puzzles (e.g. Tetris), Role-Playing Games (RPGs), Simulations, Sports, and Strategies. Greenberg et al. (2010) identified 14 game genres: Strategy, Fantasy/Role Play (FRP), Adventure, Shooter, Fighting, Simulation, Arcade, Card/Dice, Quiz/ Trivia, Board Games, Kids Games, Sports, Racing/Speed, and Puzzles. All of these are further grouped into three categories: Imaginative (Strategy, Fantasy, and Adventure), Traditional (Arcade, Card/Dice, Quiz/Trivia, Board games, Puzzles), and Physical (Sports, Fighters, Shooters, and Racing/Speed). Hamlen (2011) also highlighted 14 game genres in his study: Action, Sports, Racing, Platform, Music, Adventure, Role-play, Survival horror, Simulation, Massively Multiplayer Online (MMO), Strategy, Puzzle, Traditional, and Educational. These genres are further grouped into four categories: Action (Action, Sports, Racing, Platform, Music), Adventure (Adventure, Role-play, Survival horror), Simulation (Simulation, MMO), and Educational/ Traditional (Strategy, Puzzle, Traditional, Educational). For the purpose of this research, eight genre categories of digital games were defined, based on the original Herz's systematization that was expanded in accordance with the modern technologies such as mobile and online games, virtual worlds, etc.: Arcade (Action/Shooter/ Platform), Adventure, Sports (Fighting), Simulations (driving/flight), Strategy, Logic (Puzzle), Online (Social), and RPG.

The commercialization of video games and their worldwide introduction to affordable personal computers and gaming consoles during the last two decades of the twentieth century induced a tectonic shift in the multibillion-dollar home entertainment industry. There is no doubt that intensive interaction with these advanced multimedia products influences the perceptive, cognitive and psychomotor characteristics of players. Even though the first widely accepted intelligence models emerged in the first half of the twentieth century, the research of this psychological theory intensified in the late 80s, with a growing attitude that the specific individual characteristics could be conceptualized by multiple personal capacities and traits. Based on this stance, Gardner (1993) introduced the Theory of multiple intelligences, and defined eight basic identifiers of the multiple intelligences profile: Verbal/linguistic, Logical/mathematical, Visual/spatial, Bodily/kinesthetic, Musical/rhythmic, Natural, Interpersonal and Intrapersonal. As the Gardner's theory became widely accepted in recent years, a group of researchers focused their studies on the psychometric analysis of instruments for multiple intelligences assessment (Al-Kalbani & Al-Wahaibi, 2015; Al-Onizad, 2014; Almeida et al., 2011; Bowles, 2008; Hajhashemi & Eng, 2009; Jailani et al., 2011; Jamaris, 2014; Martin, 2003; McClellan & Conti, 2008; Piaw & Don, 2014;

Rodrigues, 2013; Saban et al., 2012; Sánchez et al., 2002; Shearer, 1997, 2004, 2010, 2012; Tai, 2014; Tirri & Nokelainen, 2008). For the purpose of this research, the authors used psychometrically evaluated IPVIS-OS multiple intelligences profile assessment instrument (Aleksić & Ivanović, 2016).

Method

The research is aimed at examining the presumption that an early adolescent's preferred digital game genre can be predicted based on the assessed scores in multiple intelligences profile. The model presumes that students already had the opportunity to play digital games, and that they can independently create gaming preferences and habits. As Olson (2010) suggested, in applying the Uses and Gratifications approach (Katz et al., 1973) it can be expected that the psychological profile of game players would predict the types of games they play. The approach presupposes that the individual psychological characteristics induce the needs that lead to constructing the behavioral patterns, preferences and media selection in order to fulfill them.

Bearing in mind the previous research on gameplay preferences and habits of early adolescents, the study explores gender and multiple intelligences profiles as predictors of digital gameplay on the population of students 11-15 years of age. Kim and Kwon (2014) analyzed the guidelines for effective use of digital games in education and noticed that adolescents with a higher level of logical/mathematical intelligence preferred strategies, while those with emphasized visual/spatial intelligence often chose action (shooting) games. These findings are in accordance with the extensive meta-analysis carried out by Uttal et al. (2013). The authors predict the existence of correlation between the multiple intelligences profile and the preferred digital game genre and define the following research hypothesis: "The gender and multiple intelligences profiles are predictors of the preferred digital game genre".

In accordance with the hypothesis, the *multiple intelligence profile* was defined as an independent variable representing the assessed level of eight intelligences, which was operationalized by the IPVIS-OS. Furthermore, dependent variables were defined: *the preferred game genre* (determined out of eight genre categories of digital games and operationalized by the digital gameplay preferences and habits survey) and *gender* (male or female category, operationalized by the demographic characteristics questionnaire).

The aim of the study was to examine the level on which sociodemographic differences and the assessed multiple intelligences profile reflect on gameplay preferences of early adolescents. The specific aim was to examine whether the intelligence modalities could be observed as valid predictors of preferred digital game genre.

The survey was conducted in the first half of 2015, on the sample of 1,262 students aged 11-15. A total of 22 Serbian schools were selected for the research, representing various geographical, socio-economic and cultural environments, hence 14 of the selected schools ($N_{students}$=703; 60.4%) were located in urban areas with a total of

N=337 (47.9%) female participants. Students participated anonymously, voluntarily and individually.

A total of 1,164 questionnaires (92.2%) were answered in accordance with the instructions, while 98 (7.8%) were rejected as incomplete or incorrectly answered. The valid sample consisted of N=598 (51.4%) male students.

The questionnaire consisted of three parts (demographic characteristics, digital gameplay preferences and habits, and multiple intelligences profile). The demographic characteristics and the digital gameplay preferences and habits questionnaires were used to gather basic information about the participants and their digital gameplay. The IPVIS-OS scale was selected for assessing multiple intelligences profile as a reasonably reliable instrument (Aleksić & Ivanović, 2016). The factor analysis and construct validity of the scale are further evaluated.

The average age of the participants was M=13.0 (SD=1.32) years. The basic demographic characteristics of the sample are presented in Table 1.

Table 1

Students' demographic characteristics

Gender			Environment		Total	
			Urban	Rural	N	Percent
Male	Age	11	55	31	86	14.4%
		12	69	46	115	19.2%
		13	80	72	152	25.4%
		14	60	58	118	19.7%
		15	102	25	127	21.2%
	Total		366	232	598	51.4%
Female	Age	11	56	39	95	16.8%
		12	80	52	132	23.3%
		13	77	57	134	23.7%
		14	63	67	130	23.0%
		15	61	14	75	13.3%
	Total		337	229	566	48.6%
Total	Age	11	111	70	181	15.5%
		12	149	98	247	21.2%
		13	157	129	286	24.6%
		14	123	125	248	21.3%
		15	163	39	202	17.4%
	Total		703	461	1164	100%

Digital gameplay preferences and habits survey consisted of 14 multiple-choice questions. The participants were questioned about how long they had been playing digital games, on which device, whether they were playing online, with friends, and if they considered themselves good players. Next, they were asked to self-assess how often they played games, what time of day, and if they lost sense of time while playing. In the third subpart the participants were asked to express their attitudes towards

educational games, creation games, and whether they considered that games could teach them something useful for school or career. Finally, they were asked to choose one preferred digital game genre from the following categories: Arcade (Action/Shooter/Platform), Adventure, Sports (Fighting), Simulation (driving/flight), Strategy, Logic (Puzzle), Online (Social), and RPG. Each category was described in detail with the appropriate example.

The third part of the questionnaire was IPVIS-OS multiple intelligences assessment scale. It was assumed that students' strengths and weaknesses self-assessment reflects personal general and academic concepts. Moran (2011) states that self-assessment is easy to implement as it does not require significant economic or personal investment. The IPVIS-OS instrument consists of 93 items in the form of a six-point Likert-type scale divided into eight parts analogue to the assessed intelligences: Verbal/linguistic (15 items), Logical/mathematical (9 items), Visual/spatial (10 items), Bodily/kinesthetic (10 items), Musical/rhythmic (10 items), Natural (13 items), Interpersonal (13 items), and Intrapersonal (14 items).

Data processing and result analysis was performed using IBM SPSS Statistics v22.

Results

The overview of the results - means, standard deviations, reliability coefficients (α), and inter-item correlation means for each intelligence scale and in total is presented in Table 2. The common parameter was the valid sample size (*N*=1,164).

Table 2
Descriptive statistics, reliability and inter item correlation mean of IPVIS-OS

Intelligence scale	Items	*M*	*SD*	α	IICM
Verbal/linguistic	13	66.1	14.2	.83	0.28
Logical/mathematical	9	68.9	15.6	.82	0.34
Visual/spatial	10	63.1	16.7	.82	0.31
Bodily/kinesthetic	10	64.8	15.6	.80	0.29
Musical/rhythmic	11	61.9	16.2	.83	0.32
Natural	13	66.2	16.1	.87	0.35
Interpersonal	13	71.2	14.2	.84	0.29
Intrapersonal	14	69.8	14.4	.85	0.30
Average	**93**	**66.6**	**11.3**	**.96**	**0.22**

M=Mean, *SD*=Standard Deviation, α=Cronbach's Alpha, IICM=Inter item correlation mean

Based on the results, it was concluded that the IPVIS-OS is generally very reliable.

The factor analysis reliability was tested with the Kaiser-Meyer-Olkin (i.e. KMO) measure of sampling adequacy and Bartlett's test of sphericity. As the KMO index value (0.908) was greater than 0.5 and the Bartlett's test result (χ^2 (4278)=15430.6; *p*<.001) was statistically significant, it was confirmed that the factor analysis could be performed and that the sample was adequate.

The data were initially examined by the exploratory factor analysis. The factors and items were isolated by the maximum likelihood method with promax rotation, as is

usual when establishing the scale structure (Johnson & Wichern, 2014). Eight factors had characteristic value greater than 1.00 (19.9; 3.81; 3.14; 2.61; 1.99; 1.70; 1.56 and 1.09) and in total explained 38.5% of the variance. The IPVIS-OS correlation factor values were greater than 0.1, which confirmed that this approach is adequate for the model of assessing eight intelligences (Carmines & Zeller, 1979). The value of correlation coefficient greater than 0.30 determined the relation between items and appropriate factors (Meyers et al., 2013).

The established eight-factor solution was checked by confirmatory factor analysis (i.e. CFA) with the maximum likelihood method. The model adequacy was assessed with three absolute indicators (χ^2, Root mean square error of approximation (i.e. RMSEA) and Standardized root mean square residual (i.e. SRMR)) and two relative indicators (Comparative fit index (i.e. CFI) and Goodness-of-fit index (i.e. GFI)). The satisfactory values of model indicators are: (χ^2/df<3) (RMSEA<0.08) (SRMR<0.05) (CFI>0.90) (GFI>0.90) (Garver & Mentzer, 1999; Marsh et al., 1988). Lei and Lomax (2005) pointed that in the interpretation the CFA results of large sample size (*N*>500) (which is the case here) only the model indicators that are not sensitive in normal distribution should be checked, not χ^2 values. In order to confirm the validity of the presumed theoretical eight independent factor models, CFA was performed for each of them. The results are presented in Table 3.

Table 3
The fit indicators of IPVIS-OS models

Factor	χ^2	df	χ^2/df	RMSEA [90% CI]	SRMR	CFI	GFI
1	13768.8***	3610	3.81	**.049 [.048-.050]**	.061	.732	.717
2	12840.7***	3621	3.55	.047 [.046-.048]	.059	.760	.746
3	9098.6***	2827	3.22	.044 [.043-.045]	.054	.810	.799
4	8602.4***	2682	3.21	.044 [.043-.045]	.054	.813	.802
5	7585.1***	2465	3.08	.042 [.041-.043]	.053	.831	.819
6	6740.2***	2377	**2.83**	.040 [.039-.041]	.052	.856	.843
7	6526.4***	2912	2.24	.033 [.032-.034]	**.046**	.898	.871
8	4113.2***	1911	2.15	.031 [.030-.033]	.042	**.921**	**.900**

*** *p*<.001

The initial 93-item eight-factor model that was tested with CFA was further reduced by eliminating items that had no significant factorial loadings. The correlations of

reduced scale are in range from 0.32 to 0.92. Indicator values ($\chi^2_{(1911)}$=4113.2; p<.001; χ^2/df=2.15; RMSEA=.031 [90% CI (.030-.033)]; SRMR=.042; CFI=.921; GFI=.900) were satisfactory.

The convergent validity was confirmed by moderate positive statistically significant correlations for each intelligence scale. The lowest correlation was between Musical/ rhythmic and Logical/mathematical intelligences ($r_{s\ (1161)}$=.23; p<.001), while the highest was identified between Interpersonal and Intrapersonal intelligences ($r_{s\ (1157)}$=.72; p<.001). The existence of statistically significant correlations confirmed the construct validity of IPVIS-OS, as presented in Table 4.

Table 4

IPVIS-OS convergent validity

Scale	Musical/ rhythmic	Bodily/ kinesthetic	Logical/ mathematical	Visual/spatial	Verbal/ linguistic	Interpersonal	Intrapersonal	Natural
Musical/rhythmic	-	-	-	-	-	-	-	-
Bodily/kinesthetic	.42**	-	-	-	-	-	-	-
Logical/mathematical	.23**	.50**	-	-	-	-	-	-
Visual/spatial	.46**	.52**	.39**	-	-	-	-	-
Verbal/linguistic	.45**	.55**	.57**	.60**	-	-	-	-
Interpersonal	.34**	.49**	.45**	.45**	.62**	-	-	-
Intrapersonal	.27**	.47**	.52**	.39**	.59**	**.71****	-	-
Natural	.24**	.42**	.39**	.46**	.48**	.45**	.54**	-

General Gameplay Preferences

In order to make a valid estimate of the average weekly gameplay time, information was acquired about which days of the week and what part of the day students usually played digital games. This method is considered far more precise than self-evaluation of the average everyday gameplay time, because it activates autobiographical memory more precisely (Schwarz & Sudman, 2012). In total, N=153; 13.1% students did not play digital games. Average weekly gameplay time of the other students (N=1,011; 86.9%) was 13.7 hours (SD=13.7). The answers were in the range between 0 and 42 hours per week. The overview of the results is presented in Table 5.

The average weekly gameplay time of 567 (56.1%) male students that played digital games was 17.7 hours (SD=14.5), while the average time for 444 (43.9%) females was 8.7 hours (SD=10.7). The analysis of the results ($t_{(1005)}$=11.4; p<.001; d=0.72) indicates that early adolescent males played digital games significantly more.

In order to determine the relation between multiple intelligences profile and the average weekly gameplay time nonparametric correlation was applied and Spearman's

correlation coefficient was calculated. The results indicated that early adolescents with the higher scores in Interpersonal intelligence played games more ($r_{s\ (1009)}$=.075; p=.018), while those with higher scores in Visual/spatial and Natural intelligences played less ($r_{s\ (1009)}$=-.095; p=.003 and $r_{s\ (1004)}$=-.082; p=.010, respectively). Participants played digital games M=150.8 (*SD*=107.6) minutes per day on average. Most of them (*N*=173; 17.1%) played on average about 60 minutes per day.

Table 5

Average weekly gameplay time

Hours	N	Percent
Does not play	153	13.1%
≤ 1	190	16.3%
2 - 6	261	22.4%
7 - 12	178	15.3%
13 - 24	147	12.6%
25 - 32	124	10.6%
33 ≥	111	9.5%

Interpersonal intelligence had low positive correlation with the average daily digital gameplay time ($r_{s\ (1009)}$=.080; p=.011), while Visual/spatial, Verbal/linguistic and Natural intelligences negatively correlated ($r_{s\ (1009)}$=-.12; p<.001; $r_{s\ (1007)}$=-.082; p=.009 and $r_{s\ (1004)}$=-.086; p=.007, respectively), which leads to the conclusion that early adolescents with higher levels of these intelligences played digital games less often.

When students were asked at what time of day they usually play games, *N*=241 (20.7%) answered in the morning or during the day, *N*=208 (17.9%) played in the evening or during the night, while *N*=264 (22.7%) did not have a pattern. In total, *N*=263 (22.6%) of the students played only during weekends, mostly females (*N*=160; 35.5%).

Most of the students (*N*=484; 41.6%) played digital games for more than five years, while *N*=224 (19.2%) played between two and five years. Bodily/kinesthetic, Interpersonal, Intrapersonal and Logical/mathematical intelligences had low positive correlations with the length of the period of playing digital games ($r_{s\ (939)}$=.10; p=.002; $r_{s\ (937)}$=.069; p=.034; $r_{s\ (934)}$=.097; p=.003 and $r_{s\ (938)}$=.071; p=.031, respectively), which indicates that early adolescents with higher levels of these intelligences started playing digital games earlier in their lives.

There were statistically significant differences in gender concerning the length of the period they played digital games ($t_{(762)}$=4.10; p<.001; d=0.30). Male students played longer than five years in greater percent (*N*=318; 57.2%) than females (*N*=166; 43.3%). Comparative results are presented in Figure 1.

Students mostly played digital games on their home computer/laptop (*N*=564; 48.5%) and smartphone (*N*=396; 34.0%). Male students played mostly on their home computer/laptop (*N*=382, 65.4%) while females played mostly on their smartphones (*N*=281; 52.8%). Gaming consoles were significantly less popular (*N*=55; 4.7%),

which could be the consequence of the generally difficult economic situation, so parents could hardly afford a gaming console besides a PC and a smartphone for their children.
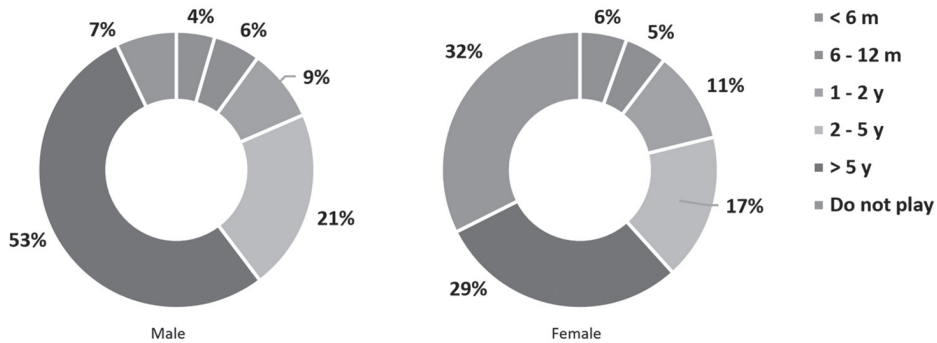

Figure 1. Average period of playing digital games by gender

The participants mostly preferred gaming online, and there was only a small number of students that did not practice it (*N*=154; 13.2%). All of the intelligences but Intrapersonal had a positive and significantly low correlation with this gameplay practice: Musical/rhythmic ($r_{s\ (1141)}$=.095; *p*=.001), Bodily/kinesthetic ($r_{s\ (1143)}$=.11; *p*<.001), Logical/mathematical ($r_{s\ (1142)}$=.075; *p*=.011), Visual/spatial ($r_{s\ (1141)}$=.090; *p*=.002), Verbal/linguistic ($r_{s\ (1139)}$=.083; *p*=.005), Interpersonal ($r_{s\ (1140)}$=.086; *p*=.004) and Natural ($r_{s\ (1135)}$=.083; *p*=.005). There were no statistically significant gender differences in playing games online ($t_{(1141)}$=2.59; *p*=.010; *d*=0.15).

The correlation analysis indicated that the average weekly gameplay time significantly positively correlated with the average daily gameplay time ($r_{s\ (1011)}$=.86; *p*<.001), the length of the period that students play digital games ($r_{s\ (902)}$=.29; *p*<.001) and the preferred playing online ($r_{s\ (1004)=}$.31; *p*<.001). The length of the period that students played digital games significantly positively correlated with the preferred playing online ($r_{s\ (932)}$=.12; *p*<.001).

Early Adolescent's Gender as a Predictor of Preferred Digital Games Genre

The evaluation of gender as a predictor of game genre preference was performed by the multinomial logistic regression (Hosmer et al., 2013). The Wald test confirmed gender game genre preferences, with the exception of Logic (Puzzles) and Online (Social) games, as presented in Table 6.

The test of gender as a predictor of Arcade (Action/Shooter/Platform) genre category was significant, χ^2 (1, *N*=1,164)=99.88, *p*<.001; the odds ratio of 26.42 indicates that the model predicts that far more early adolescent males (15.6%) favor games in this genre category, compared to only 2.9% of females.

Table 6

The Wald test results for genre categories by early adolescent's gender

Genre	Total (N=1164)	Male (N=598)	Female (N=566)	B	Std. Error	χ^2	df	p	Exp(B)
Arcade	216 (18.6%)	182 (15.6%)	34 (2.9%)	3.27	.33	99.88	1	<.001	26.42
Adventure	145 (12.5%)	52 (4.5%)	93 (8.0%)	1.03	.32	10.45	1	.001	2.81
Sports	173 (14.9%)	134 (11.5%)	39 (3.3%)	2.83	.33	75.76	1	<.001	16.91
Simulation	83 (7.1%)	50 (4.3%)	33 (2.8%)	1.92	.35	30.39	1	<.001	6.85
Strategy	74 (6.4%)	55 (4.7%)	19 (1.6%)	2.59	.38	46.72	1	<.001	13.26
Logic	188 (16.2%)	21 (1.8%)	167 (14.3%)	-.52	.35	2.18	1	.14	.60
Online	126 (10.8%)	31 (2.7%)	95 (8.2%)	.44	.34	1.72	1	.19	1.56
RPG	63 (5.4%)	55 (4.7%)	8 (0.7%)	3.49	.47	56.42	1	<.001	32.78

The overall model predicting preferred Adventure genre was also significant - χ^2 (1, N=1,164)=10.45, p=.001; the odds ratio of 2.81 indicates that the model predicts that 8.0% of early adolescent females favor Adventures, compared to 4.5% of males.

The test of the model predicting Sports (Fighting) genre from gender was significant - χ^2 (1, N=1,164)=75.76, p<.001; the odds ratio of 16.91 indicates that more males (11.5%) preferred sports video games, compared to females (3.3%).

The test of gender as a predictor of Simulation games genre (driving/flight) was significant - χ^2 (1, N=1,164)=30.39, p<.001; the odds ratio of 6.85 indicates that model predicts that 4.3% of male students prefer these games, compared to 2.8% of females.

The model predicting preferred Strategy genre was significant - χ^2 (1, N=1,164)=46.72, p<.001; the odds ratio of 13.26 indicates that the model predicts that 6.4% of early adolescent males favor Strategies, compared to 4.7% of females.
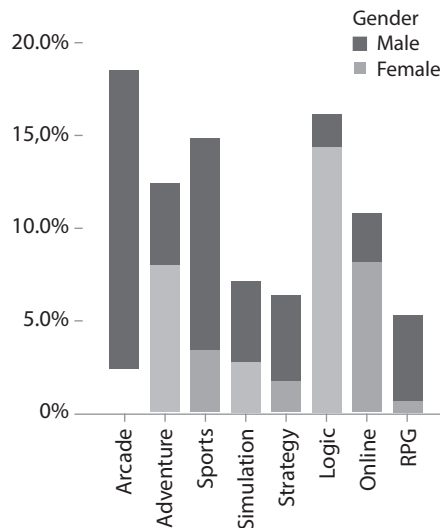

Figure 2. Cumulative percentages of preferred game genre of early adolescents

The overall test of gender as a predictor of Logic (Puzzle) game preference was not significant - χ^2 (1, N=1,164)=2.18, p=.14; indicating that gender does not reliably predict a preferred game genre. Also, the test of gender as a predictor of preferred Online (Social) games was not significant - χ^2 (1, N=1,164)=1.72, p=.19; indicating that gender does not reliably discriminate between early adolescents who prefer Online games and those who do not.

Finally, the overall model predicting RPG from gender was significant - χ^2 (1, N=1,164)=56.42, p<.001; the odds ratio of 32.78 indicates that RPGs were preferred far more by male (4.7%) than by female (0.7%) students.

Graphical representation of the observed percentages is presented in Figure 2.

Multiple Intelligences Profile as a Predictor of Preferred Digital Games Genre

Multinomial logistic regressions predicting preferred game genre from the eight scores of the multiple intelligences profile were conducted.

The test of the full model predicting Arcade genre preference from the eight scales was significant - χ^2 (8, N=1,164)=33.35, p<.001, indicating that the multiple intelligences profile reliably distinguished between early adolescents who preferred Arcades, and those who did not. According to the Wald criterion, Musical/rhythmic (χ^2 (1, N=1,164)=15.16, p<.001), Logical/mathematical (χ^2 (1, N=1,164)=12.03, p=.001), Verbal/linguistic (χ^2 (1, N=1,164)=9.80, p=.002) and Natural (χ^2 (1, N=1,164)=6.44, p=.011) intelligences reliably predicted preference for Arcade games; with the odds ratios of .71, 1.41, .66 and 1.25, respectively.

The test of the full model for Adventure games was also significant - χ^2 (8, N=1,164)=45.72, p<.001, indicating that the predictors as a set reliably distinguished between early adolescents who preferred Adventures, and those who did not. According to the Wald criterion, Logical/mathematical (χ^2 (1, N=1,164)=10.48, p=.001), Visual/spatial (χ^2 (1, N=1,164)=8.60, p=.003), Verbal/linguistic (χ^2 (1, N=1,164)=6.38, p=.012) and Natural (χ^2 (1, N=1,164)=3.98, p=.046) intelligences reliably predicted Adventure games preference; with the odds ratios of 1.42, 1.36, .71 and .05 respectively.

The test of the full model predicting Sports game genre preference was significant - χ^2 (8, N=1,164)=19.26, p=.014, indicating that the multiple intelligences reliably distinguished between early adolescent Sports genre preference. According to the Wald criterion, Musical/rhythmic (χ^2 (1, N=1,164)=7.82, p=.005), Bodily/kinesthetic (χ^2 (1, N=1,164)=5.17, p=.023), Logical/mathematical (χ^2 (1, N=1,164)=12.19, p<.001), Visual/spatial (χ^2 (1, N=1,164)=6.92, p=.009) and Verbal/linguistic (χ^2 (1, N=1,164)=6.67, p=.010) intelligences reliably predicted Sports games preference; with the odds ratios of .77, 1.28, 1.43, 0.76 and 0.71, respectively.

The test of the full model predicting Simulation games preference was significant - χ^2 (8, N=1,164)=84.74, p<.001. According to the Wald criterion, only Logical/mathematical intelligence was marginally significant in predicting whether early

adolescents prefer Simulations - χ^2 (1, N=1,164)=3.56, p=.059. The odds ratio of 1.26 indicates that for every 1-point increase in assessed Logical/mathematical intelligence, the odds of preferring Simulation games increases by 26%.

The test of the full model predicting Strategy genre preference from the eight scales was significant - χ^2 (8, N=1,164)=20.93, p=.007, indicating that the multiple intelligences profile reliably distinguished between early adolescents who preferred Strategies, and those who did not. According to the Wald criterion, Musical/rhythmic (χ^2 (1, N=1,164)=5.37, p=.021) and Logical/mathematical (χ^2 (1, N=1,164)=10.01, p=.002) intelligences reliably predicted preference for Strategy games; with the odds ratios of .78 and 1.49, respectively.

The test of the full model for all participants predicting Logic game preference from the eight scales was not significant - χ^2 (8, N=1,164)=4.50, p=.809, indicating that this set of predictors did not reliably distinguish between individuals who preferred Logic games and those who did not. The test of the full model for Online games and RPGs preferences was also not significant - χ^2 (8, N=1,164)=5.58, p=.694 and χ^2 (8, N=1,164)=11.38, p=.181, respectively. This indicates that the set of predictors did not reliably distinguish between early adolescents who preferred Online games or RPGs and those who did not.

Discussion

The results confirmed that early adolescents spend significant amount of time playing digital games. Early adolescent females spend about 5 hours per week playing, while males spend about twice as much (over 1 hour per day). These observations are in accordance with the results of previous research (Greenberg et al., 2010; Rideout et al., 2010). Olson (2010) stated that the thrill-seeking behavior on the one hand and the feeling of relaxation and positive mood on the other, motivate preadolescents in playing games. Hamlen (2010) stated that male preadolescents demonstrated a greater sense of relating award with success in gaming, which can be the reason that they spend far more time playing than girls. Bearing these results in mind, we confirm that digital games have become an indispensable part of early adolescents' lives.

Early adolescent males reported somewhat greater preference in playing games online than females did. This can be the consequence of the fact that increased social pressure in the period of preadolescence often leads boys to the feelings of loss and isolation (Way, 2011). The safety of incognito interaction in virtual online environments provides them with the alternative, and is often preferred as such.

Early adolescent males and females differed in favorite digital game genres, and present clear gender polarization in their preferences. Males favored Arcade (Action/Shooter/Platform) and Sports (Fighting) games, while females preferred Logic (Puzzle), Online (Social) and Adventure game genres. Females seem to have very little interest in RPGs. These results are in line with other research findings (Greenberg et al., 2010; Homer et al., 2012). It should be noted that females favored stereotypically male genres

(Arcade and Sports) in greater percentage than males favored stereotypically female genres (Puzzle and Social). Olson (2010) explained this fact as a consequence of the increasing popularity of games with mature content which preadolescent males are more inclined to, and that gender differences are gradually fading as early adolescents are becoming more and more part of the mainstream gaming consumer population.

Research results supported the presumption that the multiple intelligences profile can be observed as predictive of preferred digital games genre. Arcade (Action/Shooter/Platform) games were preferably played by students with higher scores in Logical/mathematical and Natural intelligences, and lower scores in Musical/rhythmic and Verbal/linguistic intelligences. Patterns are the common feature of these virtual environments, so it was not surprising that the composition of listed intelligences predicted its preference. The Adventure games were preferred genre for early adolescents with higher assessed scores in Logical/mathematical and Visual/spatial intelligences, lower scores in Verbal/linguistic intelligence and very low scores in Natural intelligence. Adventure games contain a variety of puzzles, such as decoding messages, finding and using items, opening locked doors, or finding and exploring new locations (Chandler & Chandler, 2011), traits that the emphasized intelligences best provide. Sports (Fighting) games were preferably played by students with higher scores in Bodily/kinesthetic and Logical/mathematical intelligences, and lower scores in Musical/rhythmic, Visual/spatial and Verbal/linguistic intelligences. Simulation (driving/flight) games were found to be a marginally preferred genre for early adolescents with high Logical/mathematical intelligence. Strategy games were a preferred genre for students with higher scores in Logical/mathematical and lower scores in Musical/rhythmic intelligences. These findings support the notion that individual psychological characteristics lead to media selection and behavioral patterns construction. Vice versa, playing the preferred game genre will probably further motivate players to enhance the specific set of skills, strategies and habits.

As a note, gaming culture certainly influences the emotional and cognitive development of early adolescents, and will subsequently lead to the adaptation of psychological characteristics of adolescents to some extent. This should influence a more efficient utilization of specific intelligences, thus improving the players' performance. Consequently, playing certain digital game genre may lead to the enhancement of specific intelligences.

Armstrong (2003) points out the dominance of Verbal/linguistic intelligence in the traditional teaching environment. However, when the multiple intelligences profiles were used as predictors of preferred digital game genre, the Verbal/linguistic intelligence was marginally represented and even observed as undesirable trait. This may be identified as one of the obstacles for faster Game-based learning implementation. In order to fulfill the needs of modern "digital" student populations, teachers must begin using the alternative methods in content presentation to a far greater extent (Pociask, 2007).

Limitations

The current study was performed with certain limitations. The conclusions about causality between multiple intelligences profile and preferred game genre are impossible to confirm due to the correlation nature of the research, so directionality of this relationships should be further clarified by the longitudinal research.

Conclusions

Some important implications of the current findings should be emphasized. Firstly, the research confirms previous results regarding gender differences in the time that early adolescents spend playing digital games and the genre they prefer. However, this amount of average weekly gameplay time is significantly shorter than reported in other studies (Homer et al., 2012), probably due to the cultural and socio-economic factors. Secondly, the fact that early adolescents spend significant time playing digital games should not necessarily be negative. Playing games in the period of early adolescence can induce various positive psychological effects and fulfill social needs in the virtual environment. Game developers can use these effects in creating educational games, for example. Thirdly, the early adolescents' multiple intelligences profile can be used as a valid predictor of the preferred digital game genre. Theoretically, playing the preferred genre of digital games could lead to specific intelligences enhancement. This correlation should be further explored.

The results of the research confirmed the presumption and pointed that early adolescent females have somewhat less rigid preference of stereotypically female digital game genres. Males preferred playing games online.

In summary, the current findings provide novel insight into otherwise under-studied correlation between multiple intelligences profile and digital gameplay preferences.

References

Al-Kalbani, M. S., & Al-Wahaibi, S. (2015). Testing the Multiple Intelligences Theory in Oman. *Procedia-Social and Behavioral Sciences, 190*, 106-112. https://doi.org/10.1016/j.sbspro.2015.04.923

Aleksić, V., & Ivanović, M. (2016). Psychometric evaluation of the reliability of IPVIS-OS multiple intelligences assessment instrument for early adolescents. *Journal of Educational Sciences and Psychology, VI(LXVIII)*1, 21-34.

Aleksić, V., & Ivanović, M. (in press). A Literature Review of Empirical Research on the Effects of Digital Games on Learning Styles and Multiple Intelligences. *Croatian Journal of Education, 19*(2).

Almeida, L. S., Prieto, M. D., Ferreira, A., Ferrando, M., Ferrandiz, C., Bermejo, R., & Hernández, D. (2011). Structural invariance of multiple intelligences, based on the level of execution. *Psicothema, 23*(4), 832-838.

Armstrong, T. (2003). *The Multiple Intelligences of Reading and Writing: Making the Words*

Come Alive. Alexandria, VA: Association for Supervision and Curriculum Development.

Bowles, T. (2008). Self-rated Estimates of Multiple Intelligences Based on Approaches to Learning. *Australian Journal of Educational* & *Developmental Psychology, 8*, 15-26.

Carmines, E. G., & Zeller, R. A. (1979). *Reliability and validity assessment*. London, UK: Sage. https://doi.org/10.4135/9781412985642

Chandler, H., & Chandler, R. (2011). *Fundamentals of game development*. Burlington, MA: Jones & Bartlett Learning.

Gardner, H. (1993). *Multiple intelligences: The theory in practice*. New York, NY: Basic books.

Garver, M. S., & Mentzer, J. T. (1999). Logistics research methods: employing structural equation modeling to test for construct validity. *Journal of Business Logistics, 20*(1), 33-58.

Greenberg, B. S., Sherry, J., Lachlan, K., Lucas, K., & Holmstrom, A. (2008). Orientations to Video Games among Gender and Age Groups. *Simulation* & *Gaming, 41*(2), 238–259. https://doi.org/10.1177/1046878108319930

Hajhashemi, K., & Eng, W. B. (2009). A Validation Study of the Persian Version of McKenzie's Multiple Intelligences Inventory to Measure Profiles of Pre-University Students. *Pertanika Journal of Social Sciences* & *Humanities, 18*(2), 343-355.

Hamlen, K. R. (2010). Re-Examining Gender Differences in Video Game Play: Time Spent and Feelings of Success. *Journal of Educational Computing Research, 43*(3), 293–308. https://doi.org/10.2190/ec.43.3.b

Hamlen, K. R. (2011). Children's choices and strategies in video games. *Computers in Human Behavior, 27*(1), 532–539. https://doi.org/10.1016/j.chb.2010.10.001

Herz, J. C. (1997). *Joystick nation: How videogames ate our quarters, won our hearts, and rewired our minds*. Boston, MA: Little, Brown & Co.

Homer, B. D., Hayward, E. O., Frye, J., & Plass, J. L. (2012). Gender and player characteristics in video game play of preadolescents. *Computers in Human Behavior, 28*(5), 1782–1789. https://doi.org/10.1016/j.chb.2012.04.018

Hosmer Jr, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied logistic regression (Vol. 398)*. Hoboken, NJ: John Wiley & Sons. https://doi.org/10.1002/9781118548387

Iqbal, T., Hammermüller, K., & Tjoa, A. M. (2010). Second life for illiterates: a 3D virtual world platform for adult basic education. In *Proceedings of the 12th International Conference on Information Integration and Web-based Applications* & *Services* (pp. 373-380). Paris, France: ACM. https://doi.org/10.1145/1967486.1967545

Jailani, M. K. M., Din, R., Ariffin, S. R., Mokhtar, S., & Embi, M. A. (2011). Innovation using Rasch model approach in measuring multiple intelligences. In *Proceedings of the 10th WSEAS international conference on E-Activities* (pp. 202-207). Jakarta, Indonesia: World Scientific and Engineering Academy and Society.

Jamaris, M. (2014). Formal Multiple Intelligences Assessment Instruments for 4-6 Years Old Children. *American Journal of Educational Research, 2*(12), 1164-1174. https://doi.org/10.12691/education-2-12-6

Jenson, J., & de Castell, S. (2010). Gender, Simulation, and Gaming: Research Review and Redirections. *Simulation* & *Gaming, 41*(1), 51–71. https://doi.org/10.1177/1046878109353473

Johnson, R. A., & Wichern, D. W. (2014). *Applied multivariate statistical analysis*. Cambridge, UK: Pearson Publishing.

Katz, E., Blumler, J. G., & Gurevitch, M. (1973). Uses and gratification research. *Public Opinion Quarterly, 37*, 509–523. https://doi.org/10.1086/268109

Kim, E. K., & Kwon, D. W. (2014). Study on Guidelines for Selecting Traditional Games in Relation to Multiple Intelligence Development. *Journal of Korean Child Care and Education, 10*(5), 229–248. https://doi.org/10.14698/jkcce.2014.10.5.229

Lei, M., & Lomax, R. G. (2005). The Effect of Varying Degrees of Nonnormality in Structural Equation Modeling. *Structural Equation Modeling: A Multidisciplinary Journal, 12*(1), 1–27. https://doi.org/10.1207/s15328007sem1201_1

Li, J., Ma, S., & Ma, L. (2012). The study on the effect of educational games for the development of students' logic-mathematics of multiple intelligence. *Physics Procedia, 33*, 1749-1752. https://doi.org/10.1016/j.phpro.2012.05.280

Liben, L. S., & Bigler, R. S. (2002). *Abstract. Monographs of the Society for Research in Child Development, 67*(2), vii–viii. https://doi.org/10.1111/1540-5834.t01-1-00187

Marsh, H. W., Balla, J. R., & McDonald, R. P. (1988). Goodness-of-fit indexes in confirmatory factor analysis: The effect of sample size. *Psychological Bulletin, 103*(3), 391–410. https://doi.org/10.1037//0033-2909.103.3.391

Martin, J. (2003). Multiple intelligences and business diversity. *Journal of Career Assessment, 11*(2), 187-204. https://doi.org/10.1177/1069072703011002005

McClellan, J. A., & Conti, G. J. (2008). Identifying the Multiple Intelligences of Your Students. *Journal of Adult Education, 37*(1), 13-32.

Meyers, L. S., Gamst, G., & Guarino, A. J. (2013). *Applied multivariate research: Design and interpretation (2nd ed.)*. Thousand Oaks, CA: Sage.

Moran, S. (2011). Assessing and developing multiple intelligences purposefully. In *Measuring Multiple Intelligences and Moral Sensitivities in Education* (pp. 121-133). Rotterdam, The Netherlands: Sense Publishers. https://doi.org/10.1007/978-94-6091-758-5_7

Olson, C. K. (2010). Children's motivations for video game play in the context of normal development. *Review of General Psychology, 14*(2), 180–187. https://doi.org/10.1037/a0018984

Piaw, C. Y., & Don, Z. M. (2014). Predictors of multiple intelligence abilities for Malaysian school leaders. *Procedia-Social and Behavioral Sciences, 116*, 5164-5168. https://doi.org/10.1016/j.sbspro.2014.01.1093

Pociask, A. (2007). *Increasing student achievement through brain-based strategies* (Doctoral dissertation). Chicago, IL: Saint Xavier University.

Rideout, V. J., Foehr, U. G., & Roberts, D. F. (2010). *Generation M [superscript 2]: Media in the Lives of 8-18 Year-Olds.* Washington, DC: Henry J. Kaiser Family Foundation.

Rodrigues, C. V. V. (2013). *As inteligências múltiplas em contexto de aconselhamento de carreira: tradução portuguesa do Multiple Intelligences Developmental Assessment Scales (MIDAS)*. (Tese de mestrado). Lisbon, Portugal: Universidade de Lisboa.

Saban, A. İ., Kayıran, B. K., Işık, D., & Shearer, B. (2012). The validity and reliability study of Turkish version of the multiple intelligences developmental assessment scales. *International Journal of Human Sciences, 9*(2), 651-666.

Sánchez, R. P., Troncoso, P. C., Silva, L. M., Zamora, F. D., Castillo, M. M., & Casanova, I. W. (2002). Análisis Psicométrico de las Escalas de Inteligencias Multiples MIDAS-kids. *Revista de Psicologia, 11*(2), 111-124. https://doi.org/10.5354/0719-0581.2002.17290

Schwarz, N., & Sudman, S. (Eds.). (2012). *Autobiographical memory and the validity of retrospective reports.* New York, NY: Springer-Verlag New York. https://doi.org/10.1007/978-1-4612-2624-6

Shearer, C. B. (1997). Development and Validation of a Multiple Intelligences Assessment Scale for Children. In *105th Annual Convention of the American Psychological Association*. Chicago, IL: APA.

Shearer, C. B. (2004). Using a multiple intelligences assessment to promote teacher development and student achievement. *Teachers College Record, 106*(1), 147-162. https://doi.org/10.1111/j.1467-9620.2004.00325.x

Shearer, C. B. (2010). Large scale factor analysis of the Multiple Intelligences Developmental Assessment Scales. In *Annual meeting of the American Educational Research Association*. Montreal, Canada: AERA.

Shearer, C. B. (2012). Cross cultural factor analytic studies of a multiple intelligences self-assessment. *International Journal of Educational and Psychological Assessment, 12*(1), 1-19.

Tirri, K., & Nokelainen, P. (2008). Identification of multiple intelligences with the Multiple Intelligence Profiling Questionnaire III. *Psychology Science Quarterly, 50*(2), 206-221.

Uttal, D. H., Meadow, N. G., Tipton, E., Hand, L. L., Alden, A. R., Warren, C., & Newcombe, N. S. (2013). The malleability of spatial skills: A meta-analysis of training studies. *Psychological Bulletin, 139*(2), 352–402. https://doi.org/10.1037/a0028446

Way, N. (2011). *Deep secrets: Boys' friendships and the crisis of connection*. Cambridge, MA: Harvard University Press. https://doi.org/10.4159/harvard.9780674061361

Veljko Aleksić
Faculty of Technical Sciences Čačak, University of Kragujevac
Svetog Save 65, 32000 Čačak, Serbia
aleksicveljko@gmail.com

Mirjana Ivanović
Faculty of Sciences, University of Novi Sad
Trg Dositeja Obradovića 3, 21000 Novi Sad, Serbia
mira@dmi.uns.ac.rs

Spol i profil višestrukih inteligencija mlađih adolescenata kao prediktori preferenci igranja digitalnih igara

Sažetak

U radu se istražuju veze između preferencija i navika mlađih adolescenata u području digitalnih igara i njihovi profili s obzirom na spol i višestruke inteligencije. Istraživanje je provedeno 2015. godine na empirijskom uzorku od 1262 učenika u dobi između 11 i 15 godina. Velika većina tih učenika (86,9%) redovno je igrala digitalne igre. Mlađe adolescentice provode prosječno 8,7 sati tjedno igrajući digitalne igre, a mlađi adolescenti u prosjeku tjedno provedu 17,7 sati igrajući digitalne igre. Učenici koji su ostvarili viši rezultat u dijelu upitnika koji se odnosi na interpersonalnu inteligenciju proveli su više vremena igrajući digitalne igre, a oni koji su ostvarili viši rezultat u vizualnoj/prostornoj i naturalističkoj inteligenciji igrali su digitalne igre u manjoj mjeri. Većina učenika (41,6%) igrala je digitalne igre duže od pet godina. Mlađi adolescenti više su voljeli arkadne i sportske igre, a djevojke su više voljele logičke, online i avanturističke žanrove. Arkadne (akcijske/igre pucanja/platformske) i avanturističke igre pretežno su igrali učenici koji su ostvarili veći broj bodova u području logičko-matematičke inteligencije, a sportske (igre borbe) su pretežno igrali učenici koji su ostvarili veći broj bodova u tjelesno-kinestetičkoj inteligenciji. Strategijske igre bile su omiljeni žanr učenika koji su ostvarili niži rezultat u području glazbene/ritmičke inteligencije. Ti rezultati idu u prilog tvrdnji da individualna psihološka obilježja vode medijskoj selekciji i izgradnji obrazaca ponašanja. Suprotno tome, igranje igrice omiljenog žanra vjerojatno će dalje motivirati igrače za razvijanje specifične skupine vještina, strategija i navika.

Ključne riječi: *igranje digitalnih igara; mlađi adolescenti; spol; višestruke inteligencije.*

Uvod

Višedimenzionalni utjecaj tehnologije čini je neophodnim dijelom života u modernom društvu, pa je njezin utjecaj nemoguće ignorirati ili previdjeti. Digitalno okruženje izravno utječe na prirodu igranja i aktivnosti koje se odvijaju u slobodno vrijeme, pa su tako djeca do ulaska u doba adolescencije već prikupila i usvojila širok

spektar informacija i iskustava. Razlike s obzirom na spol mogu se jasno uočiti još od vrtićke dobi pa one ostaju prilično nepromijenjene tijekom djetinjstva. Ulaskom u ranu adolescenciju te razlike postaju fleksibilne, pa je tako moguće da je njihovo zadržavanje tijekom adolescencije posljedica stereotipa koje su nametnuli roditelji i društvena sredina. Olson (2010) je istraživao motivaciju mlađih adolescenata za igranje video igara na uzorku od 1254 učenika u dobi između 12 i 14 godina. Utvrđeni su osnovni elementi: socijalizacija, prijateljstvo, prilika za vođenje drugih igrača ili prilika za učenje od njih. Zaključak je bio da igranje igara pruža osjećaj postignuća i ponosa zbog pobjede. Liben i Bigler (2002) su naveli da se dječaci u šestom razredu osnovne škole još uvijek uglavnom poistovjećuju sa stereotipno muškim karakteristikama, a poistovjećivanje se djevojčica s tipično ženskim karakteristikama postupno smanjuje. Imajući to na umu, očekivalo se da su navike i preferencije mlađih adolescenata, kada se radi o digitalnim igrama, još uvijek polarizirane.

Povezani radovi

Jenson i de Castell (2010) su zabilježili konstantan porast vremena koje djeca i adolescenti provode igrajući videoigre, pogotovo u dobnoj skupini od 11 do 14 godina. Rideout i sur. (2010) su zaključili da dječaci u dobi između 8 i 18 godina provode dvostruko više vremena igrajući videoigre od djevojčica. Greenberg i sur. (2010) su istraživali razlike u igranju digitalnih igara s obzirom na dob i spol na dva uzorka učenika: 692 učenika petog, osmog i jedanaestog razreda i 550 sveučilišnih studenata. Njihove spoznaje pokazale su da mlađi adolescenti preferiraju fizičke igre, a odmah za njima slijede igre fantazije i tradicionalne igre, a da su mlađe adolescentice preferirale tradicionalne igre, zatim igre fantazije i fizičke igre. Ispitanici muškog spola provodili su dva puta više vremena igrajući digitalne igre nego što je to bio slučaj kod ispitanica, a prosječno vrijeme koje su provodili u igranju povećavalo se do osmog razreda, nakon čega se smanjivalo tijekom adolescencije. Hamlen (2011) je proučavao vezu između strategija učenja i preferiranog žanra igara na uzorku od 118 osnovnoškolaca iz četvrtog i petog razreda u SAD-u. Rezultati upućuju na to da su učenici muškog spola više voljeli akcijske igre, a zatim igre simulacije i avanturističke igre, dok su učenice više voljele igre simulacije, zatim akcijske i edukativne igre. Homer i sur. (2012) su proučavali preferirani žanr i vrijeme provedeno u igranju na uzorku od 213 učenika u Americi, u dobi od 10 do 15 godina. Došli su do spoznaje da je većina dječaka u predadolescentskoj dobi više voljela igre pucanja u prvom licu, a u nešto manjoj mjeri borbene i sportske žanrove. Djevojčice su preferirale igre virtualnog života i virtualnog svijeta. Dječaci su provodili otprilike 40% više vremena igrajući videoigrice nego što je to bio slučaj kod djevojčica.

Žanr digitalne igre određuje se u sklopu već utemeljene klasifikacije zabavnih igara, što omogućava koristan način utvrđivanja sličnosti među njima. Iako ne postoji općeprihvaćena taksonomija žanrova digitalnih igara, Herz (1997) je izradio jednu od prvih sistematizacija sličnu onima koje se koriste u industriji videoigara: akcijske igre

(temelje se na reagiranju, a tipične su igre pucanja i platformske igre), avanturističke (rješavanje logičkih problema kako bi se napredovalo kroz virtualni svijet), borbene igre, slagalice (npr. Tetris), igre igranja uloga (RPG), simulacije, sportske igre i igre strategije. Greenberg i sur. (2010) odredili su 14 žanrova igara: strateške igre, igre fantazije/igranja uloga (FRP), avanturističke igre, igre pucanja, borbene igre, igre simulacije, arkadne igre, igre s kartama/kockicom, kvizovi, društvene igre, dječje igre, sportske igre, igre utrke/brzine i slagalice. Sve njih zatim su svrstali u tri kategorije: igre fantazije (strateške igre, igre fantazije i avanturističke igre), tradicionalne (arkadne igre, igre s kartama/kockicom, kvizovi, društvene igre, slagalice) i fizičke igre (sportske igre, borbene igre, igre pucanja i igre utrke/brzine). Hamlen (2011) je također istaknuo 14 žanrova igara u svom istraživanju: akcijske igre, sportske igre, igre utrkivanja, platformske igre, glazbene igre, avanturističke igre, igre igranja uloga, igre preživljavanja/strave, igre simulacije, masovne *online* igre za više igrača (MMO), strateške igre, slagalice, tradicionalne i edukativne. Ti žanrovi zatim su svrstani u četiri kategorije: akcijske igre (akcijske igre, sportske igre, igre utrkivanja, platformske igre, glazbene igre), avanturističke igre (avanturističke igre, igre igranja uloga, igre preživljavanja/strave), igre simulacije (simulacije, masovne *online* igre za više igrača) i edukativne/tradicionalne igre (strateške igre, slagalice, tradicionalne igre, edukativne igre). Za potrebe ovog istraživanja definirano je osam kategorija žanrova digitalnih igara, na temelju originalne Herzove sistematizacije koja je proširena u skladu s modernim tehnologijama poput igara za igranje na mobilima i *online* igara, virtualnih svjetova itd. Tih osam žanrova su: arkadne igre (akcijske igre, igre pucanja, platformske igre), avanturističke igre, sportske igre (borbene), simulacije (vožnja automobila/aviona), strateške igre, logičke igre (slagalice), *online* igre (društvene) i igre igranja uloga.

Komercijalizacija videoigara i njihovo globalno uvođenje u dostupna osobna računala i konzole za igranje tijekom posljednja dva desetljeća dvadesetog stoljeća uzrokovalo je golemu promjenu u industriji kućne zabave vrijednoj milijarde dolara. Nema sumnje da intenzivna interakcija s tim naprednim multimedijskim proizvodima utječe na perceptivne, kognitivne i psihomotoričke osobine igrača. Iako su se prvi uvelike prihvaćeni modeli inteligencija pojavili u prvoj polovini dvadesetog stoljeća, istraživanja te psihološke teorije postala su intenzivnija u kasnim 1980-ima, sa sve više prihvaćenim stavom da se specifične karakteristike pojedinca mogu koncipirati s pomoću njegovih višestrukih sposobnosti i osobina. Na temelju tog gledišta Gardner (1993) je objavio Teoriju višestrukih inteligencija te definirao osam osnovnih pokazatelja profila višestrukih inteligencija: verbalno-lingvistički, logičko-matematički, vizualno-prostorni, tjelesno-kinestetički, glazbeno-ritmički, naturalistički, interpersonalni i intrapersonalni. Kako je posljednjih godina Gardnerova teorija postala sve prihvaćenija, skupina istraživača usmjerila je svoja istraživanja na psihometrijsku analizu instrumenata za procjenu višestrukih inteligencija (Al-Kalbani i Al-Wahaibi, 2015; Al-Onizad, 2014; Almeida i sur., 2011;

Bowles, 2008; Hajhashemi i Eng, 2009; Jailani i sur., 2011; Jamaris, 2014; Martin, 2003; McClellan i Conti, 2008; Piaw i Don, 2014; Rodrigues, 2013; Saban i sur., 2012; Sánchez i sur., 2002; Shearer, 1997, 2004, 2010, 2012; Tai, 2014; Tirri i Nokelainen, 2008). Za potrebe ovog istraživanja autori su se koristili psihometrijski procijenjenim IPVIS-OS instrumentom za procjenu profila višestrukih inteligencija (Aleksić i Ivanović, 2016).

Metodologija istraživanja

Istraživanje je usmjereno na preispitivanje pretpostavke da se žanr digitalnih igara koji preferiraju mlađi adolescenti može predvidjeti na temelju ostvarenih rezultata u profilu višestrukih inteligencija. Model kao polazište ima pretpostavku da su učenici već imali priliku igrati digitalne igre i da mogu samostalno stvarati preferencije i navike u tom području. Kako je naveo Olson (2010), primjenom pristupa koristi i nagrade (Katz i sur., 1973) može se očekivati da će psihološki profil igrača predvidjeti i vrste igara koje igraju. Pristup pretpostavlja da individualne psihološke karakteristike uzrokuju potrebe koje vode izgradnji obrazaca ponašanja, preferencija i odabira medija kako bi se te potrebe zadovoljile.

Imajući na umu prijašnja istraživanja koja su provedena o preferencijama i navikama igranja mlađih adolescenata, istraživanje ispituje profile s obzirom na spol i višestruke inteligencije kao prediktore igranja digitalnih igara na populaciji učenika u dobi između 11 i 15 godina. Kim i Kwon (2014) su analizirali smjernice za učinkovitu primjenu digitalnih igara u obrazovanju i uočili su da adolescenti s višim stupnjem razvijene logičko-matematičke inteligencije više vole strateške igre, a da oni s naglašenom vizualno-prostornom inteligencijom obično odabiru akcijske igre (igre pucanja). Ti rezultati u skladu su s opsežnom meta-analizom koju su proveli Uttal i sur. (2013). Autori predviđaju da postoji korelacija između profila višestrukih inteligencija i preferiranog žanra digitalnih igara, pa definiraju sljedeću hipotezu istraživanja: „Profili učenika s obzirom na spol i višestruke inteligencije prediktori su preferiranog žanra digitalnih igara."

U skladu s hipotezom, *profil višestrukih inteligencija* definiran je kao nezavisna varijabla koja predstavlja procijenjeni stupanj osam inteligencija, a do kojega se došlo primjenom sustava IPVIS-OS-a. Nadalje, određene su i zavisne varijable: *preferirani žanr igara* (određen između osam kategorija žanrova digitalnih igara i dobiven provedenom anketom o preferencijama i navikama igranja digitalnih igara) i *spol* (muški ili ženski, dobiven s pomoću upitnika o demografskim karakteristikama).

Cilj istraživanja bio je ispitati stupanj u kojem socio-demografske razlike i procijenjeni profil višestrukih inteligencija utječu na igranje preferiranih digitalnih igara kod mlađih adolescenata. Specifični je cilj bio ispitati mogu li se vrste inteligencija smatrati pouzdanim prediktorima preferiranog žanra digitalnih igara.

Istraživanje je provedeno u prvoj polovini 2015. godine, na uzorku od 1260 (N) učenika u dobi od 11 do 15 godina. Za istraživanje su odabrane ukupno 22 škole

u Srbiji, koje su predstavljale različita geografska, socio-ekonomska i kulturološka okružja, pa je tako 14 od odabranih škola (N$_{ispitanici}$=703; 60,4%) bilo smješteno u urbanim sredinama s ukupno 337 (N) ženskih ispitanika (47,9%). Učenici su u istraživanju sudjelovali anonimno, dobrovoljno i pojedinačno.

Ukupno je odgovoreno na 1164 (92,2%) upitnika u skladu s uputama, a 98 (7,8%) ih je bilo odbačeno kao nepotpuno ili zbog netočno popunjenih upitnika. Valjani uzorak sastojao se od 598 (N) učenika, muškog spola (51,4%).

Upitnik je obuhvaćao tri dijela (demografske karakteristike, preferirane digitalne igre i navike igranja te profil višestrukih inteligencija). Upitnici o demografskim karakteristikama i preferiranim digitalnim igrama i navikama igranja koristili su se kako bi se prikupile osnovne informacije o ispitanicima i digitalnim igrama koje igraju. Za određivanje profila višestrukih inteligencija odabrana je IPVIS-OS skala kao prilično pouzdan instrument (Aleksić i Ivanović, 2016). Faktorska analiza i konstruktna valjanost skale procjenjivat će se poslije.

Prosječna dob ispitanika izražena je ovako: (M=13,0; SD=1,32). Osnovne demografske karakteristike uzorka prikazane su u Tablici 1.

Tablica 1

Anketa o preferiranim digitalnim igrama i navikama igranja sastojala se od 14 pitanja višestrukog izbora. Ispitanici su odgovarali na pitanja o tome koliko dugo igraju digitalne igre, na kojim uređajima, igraju li igre na internetu, s prijateljima, te smatraju li sami sebe dobrim igračima. Zatim se od njih tražilo da sami procijene koliko često igraju igre, u koje doba dana te izgube li osjećaj za vrijeme tijekom igranja. U trećem dijelu ispitanike se tražilo da iskažu svoje stavove o edukativnim igrama, igrama u kojima se nešto stvara te smatraju li da ih igre mogu naučiti nečemu korisnome za školu ili karijeru. Na kraju se od njih tražilo da odaberu jedan preferirani žanr digitalnih igara iz sljedećih ponuđenih kategorija: arkadne igre (akcijske igre/igre pucanja/platformske igre), avanturističke, sportske (igre borbe), simulacije (vožnja/ letenje), strateške igre, logičke igre (slagalice), *online* (društvene igre) i igre igranja uloga. Svaka kategorija bila je detaljno opisana i svaka je ilustrirana primjerom.

Treći dio upitnika bio je IPVIS-OS skala za procjenu višestrukih inteligencija. Pretpostavljalo se da samoprocjena učenika o njihovim jakim stranama i slabostima odražava osobne opće i akademske pojmove. Moran (2011) navodi da je samoprocjenu lako provesti jer ona ne zahtijeva značajna ekonomska ili osobna ulaganja. IPVIS-OS instrument sastoji se od 93 tvrdnje u obliku skale Likertova tipa, a koja je podijeljena na osam dijelova analogno inteligencijama koje se procjenjuju: verbalno-lingvistička (15 tvrdnji), logičko-matematička (9 tvrdnji), vizualno-prostorna (10 tvrdnji), tjelesno-kinestetička (10 tvrdnji), glazbeno-ritmička (10 tvrdnji), naturalistička (13 tvrdnji), interpersonalna (13 tvrdnji) i intrapersonalna (14 tvrdnji).

Obrada podataka i analiza rezultata provedena je s pomoću IBM SPSS Statistics v22 softvera.

Rezultati

Pregled rezultata – srednje vrijednosti, standardnih devijacija, koeficijenata pouzdanosti (α) i srednje vrijednosti međučestične korelacije za skalu svake inteligencije pojedinačno i ukupno prikazan je u Tablici 2. Zajednički parametar je valjana veličina uzorka (N=1164).

Tablica 2

Na temelju rezultata zaključeno je da je IPVIS-OS općenito jako pouzdan.

Pouzdanost faktorske analize testirana je s pomoću Kaiser-Meyer-Olkin (tj. KMO) mjere adekvatnosti uzorkovanja i Bartlettova testa sferičnosti. Kako je vrijednost KMO indeksa (0.908) bila viša od 0,5, a rezultat Bartlettova testa (χ2 (4278)=15430.6; p<,001) bio je statistički značajan, potvrđeno je da se može provesti faktorska analiza i da je uzorak adekvatan.

Podaci su najprije provjereni eksplorativnom faktorskom analizom. Faktori i tvrdnje bili su izolirani s pomoću metode najveće vjerojatnosti s promax rotacijom, što je uobičajeno kada se utvrđuje struktura skale (Johnson i Wichern, 2014). Osam faktora imalo je karakterističnu vrijednost višu od 1,00 (19,9; 3,81; 3,14; 2,61; 1,99; 1,70; 1,56 i 1,09) i ukupno je objasnilo 38,5% varijance. Vrijednosti IPVIS-OS faktora korelacije bili su viši od 0,1, što potvrđuje da je taj pristup prikladan za model procjene osam inteligencija (Carmines i Zeller, 1979). Vrijednost koeficijenta korelacije viša od 0,30 određivala je odnos između tvrdnji i odgovarajućih faktora (Meyers i sur., 2013).

Postavljeno rješenje od osam faktora provjereno je konfirmatornom faktorskom analizom (tj. CFA) s metodom najveće vjerojatnosti. Adekvatnost modela procijenjena je s tri apsolutna indikatora (χ2, korijena srednje kvadratne pogreške aproksimacije (tj. RMSEA), standardiziranog korijena rezidualne sredine kvadrata (tj. SRMR) i dva relativna indikatora (Comparative fit index (tj. CFI) i Goodness-of-fit index (tj. GFI)). Zadovoljavajuće vrijednosti indikatora modela su: (χ2/df<3) (RMSEA<0,08) (SRMR<0,05) (CFI>0,90) (GFI>0,90) (Garver i Mentzer, 1999; Marsh i sur., 1988). Lei i Lomax (2005) su naglasili da se u interpretaciji rezultata konfirmatorne faktorske analize na velikom uzorku (N>500), što je ovdje slučaj, trebaju provjeriti samo oni indikatori modela koji nisu osjetljivi u normalnoj distribuciji, a ne i χ2 vrijednosti. Kako bi se potvrdila valjanost osam pretpostavljenih teorijski neovisnih faktorskih modela, provedena je konfirmatorna faktorska analiza za svakog od njih. Rezultati su prikazani u Tablici 3.

Tablica 3

Prvobitni model od osam faktora koji je sadržavao 93 tvrdnje bio je testiran konfirmatornom faktorskom analizom te je dalje reduciran tako što su eliminirane tvrdnje koje nisu imale značajna faktorska opterećenja. Korelacije reducirane skale su u rasponu (0,32 ÷ 0,92). Vrijednosti indikatora ($\chi^2_{(1911)}$=4113. 2; *p*<,001; χ^2/df=2,15; RMSEA=,031 [90% CI (,030-,033)]; SRMR=,042; CFI=,921; GFI=,900) bile su zadovoljavajuće.

Konvergentna valjanost potvrđena je umjerenim pozitivnim statistički značajnim korelacijama za svaku skalu inteligencije. Najniža korelacija uočena je između glazbeno-ritmičke i logičko-matematike inteligencije ($r_{s\ (1161)}$=,23; p<,001), a najveća je korelacija uočena između interpersonalne i intrapersonalne inteligencije ($r_{s\ (1157)}$=,72; p<,001). Postojanje statistički značajnih korelacija potvrdilo je konstruktnu valjanosti IPVIS-OS-a, kako je prikazano u Tablici 4.

Tablica 4

Opće preferencije igranja igara

Kako bi se valjano procijenilo prosječno vrijeme koje učenici tjedno provedu igrajući digitalne igre, dobivene su informacije o tome kojim danima u tjednu i u koje doba dana učenici obično igraju digitalne igre. Ta metoda smatra se daleko preciznijom nego što je samoprocjena prosječnog vremena koje učenici dnevno provedu igrajući digitalne igre, jer ona preciznije aktivira autobiografsko pamćenje (Schwarz i Sudman, 2012). Ukupno (*N*=153; 13,1%) učenika nije igralo digitalne igre. Prosječno vrijeme koje ostali učenici (*N*=1011; 86,9%) tjedno provedu igrajući digitalne igre bilo je 13,7 sati (SD=13,7). Odgovori su bili u rasponu između 0 i 42 sata tjedno. Pregled rezultata prikazan je u Tablici 5.

Tablica 5

Prosječno vrijeme koje je 567 (56,1%) učenika muškog spola tjedno provelo igrajući digitalne igre bilo je 17,7 sati (SD=14,5), a prosječno vrijeme koje je 444 (43,9%) učenica tjedno provelo igrajući igre iznosilo je 8,7 sati (SD=10,7). Analiza rezultata ($t_{(1005)}$=11,4; p<,001; d=0,72) upućuje na to da mlađi adolescenti muškog spola znatno više vremena provedu igrajući digitalne igre.

Kako bi se odredila veza između profila višestrukih inteligencija i prosječnog vremena koje učenici tjedno provedu igrajući digitalne igre, primijenjena je neparametrijska korelacija te je izračunat Spearmanov koeficijent korelacije. Rezultati upućuju na činjenicu da mlađi adolescenti s višim rezultatima u interpersonalnoj inteligenciji igraju digitalne igre u većoj mjeri ($r_{s\ (1009)}$=,075; p=,018), a da oni s višim rezultatom u vizualno-prostornoj ($r_{s\ (1009)}$=-,095; p=,003) i naturalističkoj inteligenciji ($r_{s\ (1004)}$=-,082; p=,010) manje igraju digitalne igre. Ispitanici su prosječno igrali digitalne igre (M=150,8; SD=107,6) minuta dnevno. Većina njih (N=173; 17,1%) prosječno je igrala 60 minuta dnevno.

Interpersonalna inteligencija imala je nisku pozitivnu korelaciju s prosječnim dnevnim vremenom provedenim u igranju digitalnih igara ($_{(1009)}$=,080; p=,011), a vizualno-prostorna, verbalno-lingvistička i naturalistička inteligencija s njom su negativno korelirale - ($r_{s\ (1009)}$=-,12; p<,001) ($r_{s\ (1007)}$=-,082; p=,009) i ($r_{s\ (1004)}$=-,086; p=,007) za svaku od njih pojedinačno, što dovodi do zaključka da mlađi adolescenti koji imaju viši stupanj tih inteligencija rjeđe igraju digitalne igre.

Kada se učenike pitalo o tome u koje doba dana obično igraju igre, (N=241; 20,7%) učenika odgovorilo je da ih igra ujutro ili tijekom dana, (N=208; 17,9%) ih je igralo navečer ili tijekom noći, a (N=264; 22,7%) nije imalo obrazac. Ukupno, (N=263; 22,6%) učenika igralo je digitalne igre samo tijekom vikenda, a to su uglavnom bile učenice (N=160; 35,5%).

Većina učenika (N=484; 41,6%) igrala je digitalne igre već više od pet godina, a njih (N=224; 19,2%) igralo je digitalne igre između dvije i pet godina. Tjelesno-kinestetička, interpersonalna, intrapersonalna i logičko-matematička inteligencija imale su niske pozitivne korelacije s duljinom razdoblja u kojem učenici igraju digitalne igre - ($r_{s\ (939)}$=,10; p=,002) ($r_{s\ (937)}$=,069; p=,034) ($r_{s\ (934)}$=,097; p=,003) i ($r_{s\ (938)}$=,071; p=,031) za svaku od njih pojedinačno, što upućuje na zaključak da su mlađi adolescenti s razvijenim spomenutim inteligencijama počeli igrati digitalne igre u ranijem razdoblju svojega života.

Uočene su statistički značajne razlike s obzirom na spol kada se radi o duljini razdoblja igranja digitalnih igara ($t_{(762)}$=4,10; p<,001; d=0,30). Učenici su u većem postotku igrali duže od pet godina (*N*=318; 57,2%) od učenica (*N*=166; 43,3%). Komparativni rezultati mogu se vidjeti u Prikazu 1.

Prikaz 1

Učenici su uglavnom igrali digitalne igre na svom kućnom računalu/laptopu (*N*=564; 48,5%) i pametnom telefonu (*N*=396; 34,0%). Ispitanici muškog spola uglavnom su igrali na svom kućnom računalu/laptopu (*N*=382, 65,4%), a djevojčice su uglavnom igrale digitalne igre na pametnim telefonima (*N*=281; 52,8%). Igraće konzole bile su znatno manje popularne (*N*=55; 4,7%), što bi moglo biti posljedica općenito teške ekonomske situacije, pa roditelji uz računalo i pametni telefon jedva svojoj djeci mogu priuštiti i igraću konzolu.

Ispitanici su uglavnom preferirali igranje igara *online*, a samo malen broj njih nije igrao takve igre (*N*=154; 13,2%). Sve inteligencije, osim intrapersonalne, imale su pozitivnu i značajno nisku korelaciju s takvom praksom: glazbeno-ritmička ($r_{s\ (1141)}$=,095; p=,001), tjelesno-kinestetička ($r_{s\ (1143)}$=,11; p<,001), logičko-matematička ($r_{s\ (1142)}$=,075; p=,011), vizualno-prostorna ($r_{s\ (1141)}$=,090; p=,002), verbalno-lingvistička ($r_{s\ (1139)}$=,083; p=,005), interpersonalna ($r_{s\ (1140)}$=,086; p=,004) i naturalistička ($r_{s\ (1135)}$=,083; p=,005). Nisu uočene statistički značajne razlike s obzirom na spol kada se radilo o igranju igara na internetu ($t_{(1141)}$=2,59; p=,010; d=0,15).

Korelacijska analiza pokazala je da prosječno tjedno vrijeme provedeno u igranju digitalnih igara pozitivno korelira s prosječnim dnevnim vremenom provedenim u igranju digitalnih igara ($r_{s\ (1011)}$=,86; p<,001), duljinom razdoblja u kojem učenici igraju digitalne igre ($r_{s\ (902)}$=,29; p<,001) i preferiranom igranju igara na internetu ($r_{s\ (1004)=}$,31; p<,001). Duljina razdoblja u kojem učenici igraju digitalne igre u značajnoj je pozitivnoj korelaciji s preferiranim načinom igranja – na internetu ($r_{s\ (932)=}$,12; p<,001).

**Spol mlađih adolescenata kao prediktor
preferiranog žanra digitalnih igara**

Procjena važnosti spola kao prediktora omiljenog žanra digitalnih igara provedena je multinomijalnom logističkom regresijom (Hosmer i sur., 2013). Waldovim testom potvrđeni su preferirani žanrovi igara s obzirom na spol, a iznimke su bile logičke (slagalice) i internetske (društvene) igre, kako je prikazano u Tablici 6.

Tablica 6

Testiranje provedeno kako bi se potvrdio spol kao prediktor kategorije arkadnog žanra (akcijske igre/igre pucanja/platformske igre) bilo je značajno - χ^2 (1, N=1,164)=99.88, p<,001; omjer vjerojatnosti od 26,42 upućuje na to da model predviđa da daleko veći broj mlađih adolescenata muškog spola (15,6%) preferira igre u toj žanrovskoj kategoriji, u usporedbi sa samo 2,9% djevojaka.

Cjelokupni model koji predviđa avanturistički žanr kao preferirani žanr također je bio značajan - χ^2 (1, N=1164)=99,88, p<,001; omjer vjerojatnosti od 2,81 upućuje na to da model predviđa da 8% mlađih adolescentica preferira avanturističke igre, u usporedbi s 4,5% kolega muškog spola.

Test modela koji na temelju spola predviđa žanr sportskih igara (borbenih) bio je značajan - χ^2 (1, N=1164)=75,76, p<,001; omjer vjerojatnosti od 16,91 upućuje na činjenicu da više ispitanika muškog spola (11,5%) preferira videoigre sportskog žanra, u usporedbi s djevojkama (3,3%).

Testiranje provedeno kako bi se potvrdio spol kao prediktor žanra igara simulacije (vožnja, letenje) bio je značajan - χ^2 (1, N=1164)=30,39, p<,001; omjer vjerojatnosti od 6,85 upućuje na to da 4,3% mlađih adolescenata muškog spola preferira takve igre, u usporedbi s 2,8% djevojaka.

Model koji predviđa strateške igre kao preferirani žanr također je bio značajan - χ^2 (1, N=1164)=46,72, p<,001; omjer vjerojatnosti od 13,26 upućuje na to da model predviđa 6,4% mlađih adolescenata muškog spola više voli strateške igre, u usporedbi s 4,7% mlađih adolescentica.

Općenito, test kojim se provjerava spol kao prediktor logičkih igara (slagalica) kao preferiranog žanra nije bio točan, tj. one nisu bile preferirani žanr igara. Također, test kojim se provjerava spol kao prediktor internetskih (društvenih) igara kao preferiranog žanra igara nije bio značajan - χ^2 (1, N=1164)=1,72, p=,19, što upućuje na činjenicu da spol ne može pouzdano razlikovati mlađe adolescente koji preferiraju internetske igre i one koji ih ne preferiraju.

U konačnici, cjelokupni model koji na temelju spola predviđa žanr igara igranja uloga kao preferirani žanr bio je značajan - χ^2 (1, N=1164)=56,42, p<,001; omjer vjerojatnosti od 32,78 ukazuje na to da igre igranja uloga uvelike više preferiraju mlađi adolescenti muškog spola (4,7%) nego adolescentice (0,7%).

Grafička reprezentacija promatranih postotaka dana je u Prikazu 2.

Prikaz 2

Profil višestrukih inteligencija kao prediktor preferiranog žanra digitalnih igara

Provedene su multinomijalne logističke regresije koje su predviđale preferirani žanr igara na temelju osam rezultata postignutih u profilu višestrukih inteligencija.

Test punog modela koji je na temelju osam skala predviđao arkadne igre kao preferirani žanr bio je značajan - χ^2 (8, N=1164)=33,35, p<,001, ukazujući na to da profil višestrukih inteligencija pouzdano razlikuje mlađe adolescente koji preferiraju arkadne igre od onih kod kojih to nije slučaj. Prema Waldovu kriteriju, glazbeno-ritmička (χ^2 (1, N=1164)=15,16, p<,001), logičko-matematička (χ^2 (1, N=1164)=12,03, p=,001), verbalno-lingvistička (χ^2 (1, N=1164)=9,80, p=,002) i naturalistička (χ^2 (1, N=1164)=6,44, p=,011) inteligencija pouzdano su predvidjele sklonost arkadnim igrama; omjeri vjerojatnosti bili su 0,71, 1,41, 0,66 i 1,25, za svaku od njih pojedinačno.

Test punog modela koji je predviđao avanturističke igre kao omiljeni žanr također je bio značajan - χ^2 (8, N=1164)=45,72, p<,001, upućujući na to da su svi ti prediktori skupno pouzdano razlikovali mlađe adolescente koji su preferirali avanturističke igre od onih koji nisu. Prema Waldovu kriteriju, logičko-matematička (χ^2 (1, N=1164)=10,48, p=,001), vizualno-prostorna (χ^2 (1, N=1164)=8,60, p=,003), verbalno-lingvistička (χ^2 (1, N=1164)=6,38, p=,012) i naturalistička (χ^2 (1, N=1164)=3,98, p=,046) inteligencija pouzdano su predvidjele avanturistički žanr kao preferirani žanr; omjeri vjerojatnosti bili su 1,42, 1,36, 0,71 i 0,05 za svaku od njih pojedinačno.

Test punog modela koji je predvidio žanr sportskih igara kao omiljeni žanr bio je značajan - χ^2 (8, N=1164)=19,26, p=,014, upućujući na to da su višestruke inteligencije pouzdano mogle razlikovati one mlađe adolescente koji su preferirali sportske igre. Prema Waldovu kriteriju, glazbeno-ritmička (χ^2 (1, N=1164)=7,82, p=,005), tjelesno-kinestetička (χ^2 (1, N=1164)=5,17, p=,023), logičko-matematička (χ^2 (1, N=1164)=12,19, p<,001), vizualno-prostorna (χ^2 (1, N=1164)=6,92, p=,009) i verbalno-lingvistička (χ^2 (1, N=1,164)=6,67, p=,010) inteligencija pouzdano su predvidjele žanr sportskih igara kao preferirani žanr; omjer vjerojatnosti bio je 0,77, 1,28, 1,43, 0,76 i 0,71, za svaku od njih pojedinačno.

Test punog modela koji je predvidio igre simulacije kao preferirani žanr bio je značajan - χ^2 (8, N=1164)=84,74, p<,001. Prema Waldovu kriteriju, samo je logičko-matematička inteligencija bila marginalno značajna pri predviđanju igara simulacije kao preferiranog žanra kod mlađih adolescenata - χ^2 (1, N=1164)=3,56, p=,059. Omjer vjerojatnosti od 1,26 ukazuje na to da se svakim bodom više u procjeni logičko-matematičke inteligencije za 26% povećava i vjerojatnost da će igre simulacije biti preferirani žanr igara.

Test punog modela koji predviđa da će strateške igre biti preferirani žanr igara na temelju osam skala također je bio značajan - χ^2 (8, N=1164)=20,93, p=,007, upućujući na to da je profil višestrukih inteligencija pouzdano prepoznao one mlađe adolescente koji su preferirali strateške igre, kao i one koji nisu. Prema Waldovu kriteriju, glazbeno-ritmička (χ^2 (1, N=1164)=5,37, p=,021) i logičko-matematička (χ^2 (1, N=1,164)=10,01,

p=,002) inteligencija pouzdano su predvidjele sklonost strateškim igrama, s omjerom vjerojatnosti od 0,78 i 1,49, za svaku pojedinačno.

Test punog modela za sve sudionike koji je predviđao logičke igre kao preferirani žanr na temelju osam skala nije bio značajan - χ^2 (8, *N*=1164)=4,50, *p*=,809 i upućivao je na to da taj skup prediktora nije pouzdano razlikovao one pojedince koji su preferirali logičke igre i one koji to nisu. Ni test punog modela za internetske igre i igre igranja uloga kao preferirane žanrove nije bio značajan - χ^2 (8, *N*=1164)=5,58, *p*=,694 i χ^2 (8, *N*=1164)=11,38, *p*=,181, za svaku pojedinačno. To pokazuje da skup prediktora nije pouzdano razlikovao mlađe adolescente koji su preferirali internetske igre ili igre igranja uloga od onih koji to nisu.

Rasprava

Rezultati su potvrdili da mlađi adolescenti provode prilično puno vremena igrajući digitalne igre. Mlađe adolescentice provode oko 5 sati tjedno igrajući digitalne igre, a mlađi adolescenti provode dvostruko više vremena igrajući digitalne igre (više od jednog sata dnevno). Te su spoznaje u skladu s rezultatima prije provedenih istraživanja (Greenberg i sur., 2010; Rideout i sur., 2010). Olson (2010) tvrdi da mlađe adolescente na igranje potiče uzbuđenje s jedne strane te osjećaj opuštenosti i dobro raspoloženje s druge strane. Hamlen (2010) je naveo da su mlađi adolescenti muškog spola pokazali veći osjećaj povezanosti nagrade s uspjehom u igranju, što može biti razlog tomu što provode puno više vremena igrajući digitalne igre nego što ga provode djevojke. Imajući te rezultate na umu, potvrđujemo da su digitalne igre postale neizbježan dio života mlađih adolescenata.

Mlađi adolescenti muškog spola pokazali su nešto veću sklonost igranju igara na internetu, nego što je to bio slučaj kod djevojaka. To može biti posljedica toga što sve veći pritisak društva u razdoblju rane adolescencije često u dječacima stvara osjećaj gubitka i izoliranosti (Way, 2011). Sigurnost anonimne interakcije u virtualnom internetskom okruženju pruža im alternativu pa je zbog toga omiljena.

Mlađi adolescenti oba spola razlikovali su se s obzirom na preferirane žanrove digitalnih igara, kao i postojećom jasnom polarizacijom u njihovim preferencijama. Dječacima su bile draže arkadne igre (akcijske igre/igre pucanja/platformske igre) i sportske igre (borbene), a djevojkama su se više sviđali logički (slagalice), internetski (društvene igre) i avanturistički žanrovi igara. Djevojke su imale malo interesa za igre igranja uloga. Ti rezultati u skladu su s rezultatima ostalih istraživanja (Greenberg i sur., 2010; Homer i sur., 2012). Trebalo bi spomenuti da su se djevojkama sviđali stereotipno muški žanrovi (arkadne i sportske igre) u većem postotku nego što su se dječacima sviđali stereotipno ženski žanrovi (slagalice i društvene igre). Olson (2010) je objasnio da je ta činjenicu posljedica rastuće popularnosti igara sa sadržajima za odrasle, čemu su mlađi adolescenti skloniji, kao i da razlike s obzirom na spol postupno nestaju kako mlađi adolescenti u sve većoj mjeri postaju dijelom većinske populacije potrošača digitalnih igara.

Rezultati istraživanja potvrđuju i pretpostavku da se profil višestrukih inteligencija može promatrati kao prediktor preferiranog žanra digitalnih igara. Arkadne igre (akcijske igre/igre pucanja/platformske igre) pretežno su igrali učenici s većim brojem bodova u logičko-matematičkoj i naturalističkoj inteligenciji, a s nižim brojem bodova u glazbeno-ritmičkoj i verbalno-lingvističkoj inteligenciji. Obrasci su zajednička pojava u tim virtualnim okruženjima, pa stoga ne iznenađuje činjenica da je sastav nabrojenih inteligencija poslužio u predviđanju preferiranih igara. Avanturističke igre bile su omiljeni žanr mlađih adolescenata koji su ostvarili veći broj bodova u logičko-matematičkoj i vizualno-prostornoj inteligenciji, a niži broj bodova u verbalno-lingvističkoj inteligenciji, kao i vrlo nizak broj bodova u naturalističkoj inteligenciji. Avanturističke igre sadrže različite zagonetke, poput dekodiranja poruka, pronalaženja i upotrebe predmeta, otključavanja zaključanih vrata ili pronalaženja i istraživanja novih lokacija (Chandler i Chandler, 2011), što su sve karakteristike koje spomenute inteligencije najbolje omogućavaju. Sportske (borbene) igre više su igrali učenici s većim brojem bodova u tjelesno-kinestetičkoj i logičko-matematičkoj inteligenciji, a s nižim brojem bodova u glazbeno-ritmičkoj, vizualno-prostornoj i verbalno-lingvističkoj inteligenciji. Igre simulacije (vožnje/letenja) bile su u jako maloj mjeri preferirani žanr kod mlađih adolescenata s visoko razvijenom logičko-matematičkom inteligencijom. Strateške igre bile su omiljeni žanr učenika s velikim brojem bodova u logičko-matematičkoj i s nižim brojem bodova u glazbeno-ritmičkoj inteligenciji. Rezultati idu u prilog tvrdnji da individualne psihološke karakteristike vode odabiru vrsta medija i izgradnji obrazaca ponašanja. Suprotno tomu, igranje igara preferiranog žanra vjerojatno će dalje motivirati igrače za razvijanje svog specifičnog skupa vještina, strategija i navika.

Kao dodatni komentar, kultura igranja digitalnih igara zasigurno utječe na emocionalni i kognitivni razvoj mlađih adolescenata, te će poslije u određenoj mjeri dovesti do prilagodbe psiholoških karakteristika adolescenata. To bi trebalo utjecati na učinkovitiju primjenu specifičnih inteligencija, čime bi se poboljšao uspjeh igrača. Zbog toga možemo reći da igranje digitalnih igara određenog žanra može dovesti do razvijanja specifičnih inteligencija.

Armstrong (2003) je istaknuo dominaciju verbalno-lingvističke inteligencije u tradicionalnom nastavnom okruženju. Međutim, kada su se profili višestrukih inteligencija koristili kao prediktori preferiranog žanra digitalnih igara, verbalno-lingvistička inteligencija bila je marginalno zastupljena i čak se smatrala nepoželjnom karakteristikom. To se može smatrati jednom od prepreka za brže provođenje učenja uz pomoć igara. Kako bi se zadovoljile potrebe moderne „digitalne" učeničke populacije, nastavnici se moraju u puno većoj mjeri početi koristiti alternativnim metodama u prezentaciji sadržaja (Pociask, 2007).

Ograničenja

Ovo istraživanje provedeno je uz određena ograničenja. Zaključci o uzročno-posljedičnoj vezi između profila višestrukih inteligencija i preferiranog žanra igara ne

mogu se potvrditi zbog korelacijske prirode istraživanja, pa je tako smjer veza moguće daljnje objasniti provedbom longitudinalnog istraživanja.

Zaključci

Trebalo bi naglasiti neke važne implikacije dobivenih rezultata. Kao prvo, istraživanje potvrđuje rezultate prijašnjih istraživanja o razlikama s obzirom na spol u količini vremena koje mlađi adolescenti provode igrajući digitalne igre i o žanru koji preferiraju. Međutim, prosječno vrijeme koje mlađi adolescenti tjedno provode u igranju značajno je kraće nego što je navedeno u ostalim istraživanjima (Homer i sur., 2012). To je vjerojatno posljedica kulturoloških i socioekonomskih čimbenika. Kao drugo, činjenica da mlađi adolescenti provode značajnu količinu vremena igrajući digitalne igre ne mora se nužno smatrati negativnom. Igranje igara u razdoblju rane adolescencije može dovesti do različitih pozitivnih psiholoških učinaka i zadovoljiti društvene potrebe u internetskom okruženju. Dizajneri digitalnih igara mogu te učinke iskoristiti kada osmišljavaju edukativne igre, na primjer. Kao treće, profil višestrukih inteligencija mlađih adolescenata može se koristiti kao valjani prediktor preferiranog žanra digitalnih igara. Teorijski, igranje digitalne igre omiljenog žanra moglo bi dovesti do razvoja specifičnih inteligencija. Tu korelaciju trebalo bi ispitati u budućnosti.

Rezultati istraživanja potvrdili su pretpostavku i naglasili da mlađi adolescenti ženskog spola imaju nešto manje stroge preferencije stereotipno ženskih žanrova digitalnih igara. Dječaci su više voljeli igrati digitalne igre na internetu.

Ukratko, rezultati prikazani u ovom radu pružaju novi pogled na do sada nedovoljno proučavanu korelaciju između profila višestrukih inteligencija i preferencija digitalnih igara.