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CAN ACTIVE VIDEO GAMES MAKE A DIFFERENCE? DIFFERENCES AND SIMILARITIES BETWEEN ACTIVE AND PASSIVE VIDEO GAMERS REGARDING MOTIVATIONS, PROBLEMATIC GAMING, AND MENTAL HEALTH AMONG HUNGARIAN SECONDARY SCHOOL STUDENTS

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Abstract

Objective: This study explored the perceptions of video game players on the potential benefits of these games and on the factors associated with these perceptions.
Materials and Methods: a sample of 2346 video game user secondary school students were surveyed (15.3 ± 1.1 years old, n = 187 females) and separated in two groups: passive (n=2222) and active-mixed video game players (n=124). The passive group consists of gamers using classic, sedentary video games, and for the active-mixed group members where real life motions needed during gameplay (e. g. Xbox Kinect). Extended sociodemographic data (e. g. questions regarding amount of friends and their video-game usage), video game usage habits (e. g. time, type of games), Problematic Online Gaming Questionnaire (Demetrovics et al., 2012), General Health Questionnaire (Goldberg, 1972) were assessed.
Results: Through the group comparison analyses, the overall differences between the active-mixed and the passive gamers are not as great as we supposed. Despite, in case of a few special aspects, such as life aspirations, extracurricular activities, being involved in sports, we found significant differences between the two groups.
Conclusion: Our study shows slight but significant psychosocial differences between the use of these two kinds of gameplay. These information can be used by parents, educators and other professionals for promoting active video games instead of the passive ones.

INTRODUCTION

Video game playing may have negative impact on youngsters. The potential negative effects of gaming have raised concerns in the scientific community and in the public life as well. Gaming is often related to aggressive thoughts, hostility and decreased pro-social helping (Anderson & Bushman, 2001), violent behavior (Anderson & Dill, 2000; Gentile, Lynch, Linder & Walsh, 2004). It also can be associated with negative social consequences, such as decreased interest in offline relationships (Young, 2007), poor performance in school because of the

gaming time (Anderson & Dill, 2000; Gentile et al., 2004), attention problems (Chan & Rabinowitz, 2006; Swing, Gentile, Anderson, & Walsh, 2010) and various negative health effects, including addiction (Grüsser, Thalemann & Griffiths, 2007; Ng & Weimer-Hastings, 2005; Wan & Chiou, 2006).

However, the consequences related to video game usage widely vary according to the type and content of the certain game. Recently, a new generation of video games has become popular that require interactive physical activity (active games) beyond those where the player operates traditional handheld controller video games (passive games). These games can help children and young people increase their physical activity by integrating play and exercise. Playing an active video game, for example a dancing game can help youth lose weight (Epstein, Beecher, Graf, & Roemmich, 2007; O'Hanlon, 2007) by increasing heart rate, oxygen usage and energy expenditure. It can considered as light to moderate physical activity (Biddis & Irwin, 2010).

Can active video games contribute to improve people's mental health and emotional, social and psychological well-being through their exercise-like effects? The present study focuses on the differences and similarities between passive gamers and gamers who regularly play with active video games. In order to gain a better understanding of the pattern of gaming habits and motivations of active and passive gamers, the current study explored the following:

(1) Aspiration

The relationship between motivation style and gaming behavior is subject of extensive research in the context of problematic gaming and video game addiction (Grusser et al., 2007; Kuss, Louws & Wiers, 2012; Wan & Chiou, 2006). A study identified 10 motivation factors for playing online games, that author grouped into 3 main components by an additional factor analysis: achievement (advancement, mechanics and competition), social motivations (socializing, relationships, and teamwork), and immersion (discovery, role-playing, customization, and escapism) (Yee, 2006).

Certain motivation factors appear to be in connection with problematic gaming behaviors. Kuss et al. (2012) found that two of Yee's motivational factors, escapism (a sub-factor of immersion) and mechanics (a sub-factor of achievement, i. e. using imminent game structure) are significant predictors of gaming-related problems such as overuse, social isolation, interpersonal conflicts, and neglect of offline activities.

Self-Determination Theory (Deci & Ryan, 1985) distinguishes several types of motivations. The two broad types that have been studied extensively are intrinsic and extrinsic motivations. Intrinsic motivation refers to motivation to engage in an activity merely for its own sake, regardless to external pressures

and rewards. While extrinsic motivation comes from external sources and involves motivations to perform an activity in order to obtain a reward or a desired outcome, even if that activity is not motivated by intrinsic desire. High intrinsic motivation style plays a crucial role in gaming addiction, opposed to extrinsic motivation. Wan and Chiou (2007) found that players who were classified as online game addicts show high level of intrinsic motivation, while non-addicts' extrinsic motivation was significantly higher than their intrinsic motivation. Intrinsic motivations imply a great driving force for engaging in a certain activity and such as represent a risk factor for the development of obsessive behaviors, but also mean the road to successful and enjoyable engagement in any activity, such as learning or doing sports.

The different types of video games might provide different motivations for the gamers due to their different structural characteristics. Although a number of studies have assessed the motivational factors of online gamers, the underlying motivations of engaging in active video games are still need to be explored. Osorio, Moffet, and Sykes (2012) in their study investigated the motivations that encourage participation in exercise, computer games, and exergaming. Exergaming means the use of video games that involve physical exertion and are thought of as a form of exercise. They found that computer games and exergaming share similar motivations, notably intrinsic motivation is the most important factor to play both types of game. Speaking of active-games, we should not forget about augmented reality (AR), of which its essence is to make a digital interface to the real world, for example filters, via cell-phones figures; and virtual reality (VR) which creates an entirely different reality (Mohn, 2017). To be more specific, both AR and VR technology can be mentioned of its entertainment factor, especially the AR which is nowadays used, to make games or applications for smart-phones like Pokemon-Go. The point of Pokemon-Go is used to be a hunt for pokemons on the streets. In a 2017 study published by a Hungarian group, despite the motivational factor of gaming, found 3 specific factors of playing Pokemon-Go. The factors were outdoor-activity, nostalgia and boredom (Zsila et al., 2018). A Polish group found that Pokemon-Go users actually spent more time outdoor (Kaczmarek, Misiak, Behnke, Dziekan & Przemysław, 2017). Although it might have a positive effect on health conditions, but even this is the case the fact that competition refers to problematic use, cannot be negligible (Zsila et al., 2018).

(2) Problematic gaming

Although a large number of studies have been published about video gaming addiction, their results, regarding to the prevalence of obsessive or problematic gaming behavior, are fairly inconsistent, varying from 0.5% to 10% (Batthyany,

Müller, Benker & Wölfling, 2009; Choo, Sim, Gentile, Li & Khoo, 2010; Grusser et al., 2007; Yang, Choe, Baity, Lee & Cho, 2005; Yoo, et al., 2004). This is due to the fact that neither standard practice of measuring pathological video game usage, nor clearly defined, official diagnostical criteria of video game addiction exist. Yet, studies have consistently shown that certain players do show symptoms of pathological behavior such as withdrawal, preoccupation, loss of control, and interpersonal or intrapersonal conflicts (Gentile, 2009; Grusser et al., 2007). The addictive potential of video games is closely linked to their types. Online game users are found to be more likely to develop addictive gaming behaviors than offline players, because online games generally require a higher degree of commitment and time investment from the players. It often implies neglect of occupational, social, and other recreational activities and offline relationships (Kuss & Griffiths, 2011).

According to the displacement hypothesis (Ogletree & Drake, 2007), which proposes that young people who practice any offline activity regularly are less susceptible to develop pathological video gaming habits than those who don't take part in such activities. So extracurricular activities presumably mean a protective factor against obsessive gaming.

The current study aims to explore if playing with active games exclusively or next to online games makes significant difference in the development of problematic gaming. For the assessment we used the Problematic Online Gaming Questionnaire (Demetrovics et al., 2012).

(3) Mental health

Numerous researches have proved that regular physical activity is part of a healthy lifestyle and linked to better health out-comes in all age groups (Bouchard, Shephard & Stephens, 1994; Haskell et al., 2007). Physical activity appears to be an effective alternative to traditional forms of treatment for mild-to-moderate mental health diseases, especially unipolar depression, chronic fatigue syndrome and anxiety (Paluska & Schwenk, 2000). In addition, an adequate level of physical activity, which for young people means about 60 minutes of moderate-to-vigorous physical activity every day (Simons, Bernaards, & Slinger, 2012), seems to be in positive association with cognition (assessed primarily by reaction time tests), school performance (Sibley & Etnier, 2003), improvement of physical self-perceptions, self-esteem, general psychological well-being (Fox, 1999) and lack of drug addiction problems (Grezsa & Surányi, 2014). These facts can be confirmed via gamification. It seems cognitive skills, such as the forementioned reaction time is developed among those players who usually play FPS games (First-Person-Shooter) (Deleuze, Christiaens, Nuyens & Billieux, 2017). Furthermore, as it was mentioned among the motivational

factors (Zsila et al., 2018), gamers who used the first geo-located AR game, actually spent more time outside, and also were physically more active (Kaczmarek et al., 2017). According to a Spanish study (Ruiz-Ariza, Casuso, Suarez-Manzano & Martínez-López, 2018), in 8 weeks people walked 54 km on average while playing. During the measured period, their social interactions had also increased (Ruiz-Ariza et al., 2018). While children and youngsters spend a considerable amount of their free-time on sedentary activities, such as watching television and playing video games, active gamers spend an important amount of time on playing active games which they otherwise would have spent with less active pursuits (Simons et al., 2012). Beside, not only younger ones, but also elderly people tend to like the new technology of active video gaming, which can inspire them to stand up from the couch and play again (Witherspoon & Manning, 2012). In the present study we assessed the potential difference between young people who only play with passive games and who regularly play with active games in terms of the relationship with mental health.

SUBJECTS AND METHODS

Participants

The data was collected during a broader research by Smohai and Vargha (2014). The participants were comprised of Hungarian secondary school students. Although the research team received 3652 correctly completed questionnaires, for the present study we have only used those 2346 questionnaires that came from students who claimed to play with video games at least occasionally.

The video game players were divided into different groups. Those players who play video games on all kinds of PCs, XBOXs (except Kinect), Play Stations, Nintendos (except Wii), Tablets, Smart phones, Handhelders were coded as Passive gamers. Those players who play video games on XBOX Kinect, Nintendo Wii, and play Guitar Hero (In spite of the fact that Guitar Hero has more or less static movements) games were coded as Active gamers. Those players who play games that were classified as active and passive as well were coded as Mixed gamers. We constructed 2 categories. The first one contains Passive gamers and the second one contains Active and Mixed gamers. The research team received questionnaires from 33 Hungarian cities: 25% from Budapest, 75% from various country towns. Table 1 shows the participants' characteristics.

Table 1. Participants' characteristics

	Number of participants	Gender	Mean age (SD)	Average daily game time (hours/day) (SD)
Active-mixed gamers	124	65 males, 59 females	15,32 (1,10)	3,34 (2,99)
Passive gamers	2222	1583 males, 636 females 3 missing data	16,04 (1,55)	3,79 (3,08)

Procedure

Secondary school students were invited to participate through their computer science teachers. The research team recruited computer science teachers through social networking sites and the homepages of schools. The teachers first distributed research information sheets and informed consent forms to the students. For the students willing to participate, the process took place during the next computer science class. The participants filled the research questionnaire online.

Measures

In this study we used data gained from the following questionnaires:

1. Sociodemographic characteristics (gender, age, regular activities, gaming habits, friend indexes)

2. Shortened Aspiration Index
This 14-item questionnaire was developed to assess people's general aspirations. It distinguishes between extrinsic (wealth, fame, image), intrinsic (meaningful relationships, personal growth, community contributions) and health-related goals. The original 35-item questionnaire was developed by Kasser and Ryan (1996). The shortened version of it has been used in our research (Martos, Szabó & Rózsa, 2006). The internal consistency of the Shortened Aspiration Index reached an acceptable level (Cronbach alpha = [0,44; 0,71]) if the low number of items (2) for each subscale taken into account (Nagybányai Nagy, 2006).

3. Gaming habits
The research questionnaire contained 16 questions on general gaming habits concerning video games. The „General Media Habits Questionnaire – Child Version" was used (Gentile et al., 2004) for this research, translated by the first author and a regular video game user. As this questionnaire is rather an inventory containing separate questions (no scales and factors), psychometrically sound adaptation was not necessary as this measure doesn't have factor structure, reliability and validity.

4. Problematic Online Gaming Questionnaire (POGQ)
This 18-item questionnaire (Demetrovics et al., 2012) aims to measure gaming related problems on 6 subscales: preoccupation, overuse, immersion, social isolation, interpersonal conflicts, and withdrawal. Demetrovics defined a gaming behavior problematic from 66-67 overall scores. The reliability level of the POGQ on this sample was acceptable (Cronbach alpha = [0,74; 0,87]).

5. General Health Questionnaire (GHQ-12)
The 12-item General Health Questionnaire was developed to screen for non-specific psychiatric morbidity (Goldberg, 1972). In the current research we used it as an indicator of mental health. The 12 questions concern affective and behavioral symptoms. The Hungarian translation is published by the National Center for Epidemiology (Örkény, 2005). On the present video game user sample, the internal consistency of the GHQ-12 (Goldberg, 1972) proved to be solid (Cronbach alpha = 0,80).

Statistical Analysis

For the statistical analyses we used IBM SPSS 20 programme.
Normality test (Kolmogorov-Smirnov) was used on the following questionnaires and indexes: The scales of Aspiration Index, the Problematic Online Gaming Questionnaire, the General Mental Health Questionnaire, the average daily game time, the gamer friend index, the non-gamer friend index. Normality could not be assumed on these questionnaires and indexes. That is the reason why we considered it appropriate to analyse the mean ranks by Mann-Whitney U test. In special cases T-tests' means are demonstrated in order to get a better understanding. Chi-square test was used to analyse the relationship between two discrete variables (see: Takács, 2012; 2015).

Hypotheses

- Hypothesis 1: Active-mixed gamers will show higher levels of intrinsic motivations than passive gamers.
- Hypothesis 2: Passive gamers will have a higher score on the Problematic Online Gaming Questionnaire than active-mixed gamers.
- Hypothesis 3: Active-mixed gamers will have better results on General Health Questionnaire than passive gamers.
- Hypothesis 4a: Passive gamers will have a higher score on the gamer friend index than active-mixed gamers.
- Hypothesis 4b: Active-mixed gamers will have a higher score on the non-gamer friend index than passive gamers.
- Hypothesis 5: Active-mixed gamers' average daily game time will be lower than the passive gamers'.
- Hypothesis 6: There will be a relationship between the categories of gamers and the fact that the gamer regularly takes part in any extracurricular activities or not.

RESULTS

Hypothesis 1 predicted that the active-mixed gamers would show higher levels of intrinsic motivations than the passive gamers. 2178 passive and 124 active-mixed gamers responded to the Aspiration Index questionnaire items. Man-Whitney U tests were conducted. The difference in levels of intrinsic motivations were found to be significant between the two groups (z=–2,296, p=0,022). The results of the levels of intrinsic and extrinsic motivations and of Aspiration Index are shown in table 2.

Table 2. The levels of intrinsic and extrinsic motivation subscales (Aspiration Index).

	Means of passive gamers (SD)	**Means of active-mixed gamers (SD)**	**Z score**	**P value**
Wealth	3,81 (0,81)	3,83 (0,84)	–0,399	0,690
Fame	2,80 (0,91)	2,90 (0,95)	–1,096	0,273
Image	3,55 (0,88)	3,66 (0,95)	–1,719	0,086
Extrinsic goals	3,39 (0,69)	3,46 (0,74)	–1,311	0,190
Meaningful relationships	4,35 (0,74)	4,48 (0,70)	–2,235	0,025
Personal growth	4,21 (0,65)	4,25 (0,74)	–1,136	0,245

Community contributions	3,58 (0,86)	3,70 (0,86)	–1,487	0,137
Good health	4,16 (0,79)	4,24 (0,75)	–1,089	0,276
Intrinsic goals	4,05 (0,57)	4,14 (0,61)	–2,296	0,022
Aspiration Index	0,66 (0,81)	0,68 (0,93)	–0,611	0,541

Hypothesis 2 predicted that passive gamers would have higher score on the POGQ scale than active-mixed gamers. 2102 passive and 119 active-mixed gamers answered. Man-Whitney U test was performed (z=–0,142, p=0,887) and revealed no significant difference between passive (1,91) and active-mixed (1,95) gamers regarding problematic video game usage.

Hypothesis 3 predicted that active-mixed gamers would have better General Mental Health. 1819 passive and 109 active-mixed gamers responded. Mann-Whitney U test was used (z=–0,399, p=0,690) and it showed no significant difference in General Mental Health scores between the two groups (1,11 vs. 1,16).

Hypothesis 4a predicted that passive gamers would get higher score on the gamer friend index than active-mixed gamers. This gamer friend index was constructed by us. One can easily calculate this index by dividing the number of your gamer friends with the number of your friends. 1892 passive and 99 active-mixed gamers answered this question. Mann-Whitney U test was conducted (z=–0,797, p=0,425). It shows that there is no significant difference in the score of the gamer friend index between the two groups (0,693 vs 0,675).

Hypothesis 4b predicted that active-mixed gamers would get higher score on the non-gamer friend index. This non-gamer friend index was constructed by us. One can count it by dividing the number of non-gamer friends with the number of friends. 1945 passive and 104 active-mixed gamers responded. Mann-Whitney U test was conducted (z=–2,097, p=0,036). The result indicates that passive gamers (0,32) relatively have less non-gamer friends than active-gamers (0,38).

Hypothesis 5 predicted that the active-mixed gamers' average daily game time (hour/day) would be lower than the passive gamers'. Mann-Whitney U test was conducted. 2087 passive gamers and 113 active-mixed players responded. We found no significant difference between the average daily game time and the categories of gamers (z=–1,847, p=0,065, 3,79 vs. 3,34).

Hypothesis 6 predicted that there would be a relationship between the categories of gamers and the fact that the gamer regularly takes part in any extracurricular activities. 2213 passive and 123 active-mixed gamers answered. The result does not indicate significant relationship (Pearson Chi-Square=0,063, p=0,802).

Although we found no significant relationship in Hypothesis 6 we performed more cross-tabulational analyses. 213 passive, and 123 active-mixed gamers responded. The results showed significant relationships when we paired the categories of gamers with:

- The fact that the gamer regularly takes part in any activities (which are not related to school) or not. 17,1% (active-mixed) vs. 8,1% (passive gamers) (Pearson Chi-Square=12,157, p=0,002). The relationship is weak (Cramer's V=0,072).
- The fact that the gamer regularly does any sports activities or not. 76,4 percent of the active-mixed gamers regularly do sport activities while 64,9 percent of the passive gamers do the same (Pearson Chi-Square=7,329, p=0,026). The relationship is weak (Cramer's V=0,056).

DISCUSSION

On the whole, the differences between active-mixed and the passive gamers are not as outstanding as we supposed, but in particular aspects we found significant differences between the two groups.

The results, which support hypothesis 1, revealed a significant difference in the levels of intrinsic motivations between the two groups. This result appears to contradict to a previous study suggesting that the underlying motivations to play computer games and exergaming are similar (Osorio et al., 2012). This inconsistency can be explained by the fact that the only motivational factor that showed significant difference between active-mixed and passive gamers was the motivation to have meaningful relationships. This result suggests that relationships mean more to active-mixed gamers than to passive ones. This finding is familiar with a previous study that suggests that exergamers engage in this type of activities in social context (Osorio et al., 2012). The importance of social interactions is justified by our other result, which indicates that active-mixed gamers significantly have more non-gamer friends than passive gamers (hypothesis 4b).

On the other hand, the results show that passive gamers' average daily game time is higher than active-mixed gamers, but the difference is not significant which means that hypothesis 5 is not supported by the results. However, passive gamers have more gamer friends than the active-mixed ones but the difference is not significant, which do not support hypothesis 4a. Although these findings

might indicate that passive gamers are more immersed in gaming activity which could lead to problematic gaming, results show no difference in POGQ's scores. This finding does not support hypothesis 2 and the suggestion of a previous study (Kuss & Griffiths, 2011) indicating that online gamers who are mostly passive gamers are more susceptible to problematic gaming than active gamers.

In line with these results no significant connection was found between the general mental health of the active-mixed and passive gamer groups, which does not support hypothesis 3. This outcome might indicate that the tested active-mixed gamers daily physical activity does not attain the adequate level neither in intensity nor in terms of duration despite regularly playing with an active game. Although our result significantly shows that more active-mixed gamers take part in regular sport activities than passive gamers, the relationship is very weak.

Limitations of the study are that we do not have any information about the proportion of playing active and passive video games in the group of the mixed gamers, that might have affected the outcomes. We rejected the idea of assessing separately the mixed, active and passive groups since the number of active gamers in the sample was too small. We neither have assessed the popularity of the used active video games. Moreover, POGQ questionnaire was used on both online and offline gamers, although it was originally developed and validated with online gamers. At this point we should mention that the questionnaire POGQ (Demetrovics et al., 2012) is created for assessing purely passive video game usage. For active gamers, the problematic level of usage almost cannot be reached due to the limitations of the human body (e. g. jumping and moving fast for an excessive time period and with high frequency).

In conclusion, our research tried to assess the effects of active gaming by exploring the differences and similarities between active-mixed and passive gamers. In reference to the question raised in the title (Can active games make a difference?) according to the present study our answer is: No or only by small means. Very few psychological difference has been found between active-mixed and passive gamers. It appears that active video game players do not have appreciably better mental health, and healthier lifestyle than passive players. In order to obtain a better understanding of the question, further large sample research would be necessary, e.g. assessing active and mixed gamers as separate groups. Furthermore, for clearer understanding it would be helpful to widen the group of the available games (active game-types such as AR, for example: Pokemon-GO or the VR-machines) which are getting more and more realistic and wide-spread among people. It means the number of the active gamers might have positively changed data. Secondly, nowadays not only the youngsters are involved using new technologies, so now on the age should not be a limit to the studies of this topic.

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