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INTRINSIC AND PEER-INFLUENCED MOTIVATION FOR PLAYING VIDEO GAMES: VALIDATION OF THE GAMING MOTIVATION QUESTIONNAIRE

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ABSTRACT

The instruments that have been used so far to assess motivation to engage in video games are grounded in self-determination theory and include dimensions pertaining to intrinsic and extrinsic motivation. In relation to video games, extrinsic motivation has been operationalised as playing video games for the purpose of collecting points, rare items, virtual currency, or reaching higher levels of the game and unlocking new segments. Nevertheless, the acquisition of such in-game incentives can also indicate an intrinsic motivation that could be driven by the pursuit of further progress in the game or the achievement of skills. Adolescents play video games for various social reasons. Given the strong desire for peer acceptance during adolescence, it is surprising that the influence of peers is overlooked when measuring extrinsic motivation for gaming. The aim of this study was to develop and validate a new instrument to measure motivation to play video games, in which extrinsic motivation is operationalised as playing video games as a result of peer influence. For this purpose, the Gaming Motivation Questionnaire, consisting of two dimensions - intrinsic and peer-influenced motivation, was constructed. A sample of 690 high school students (54.2% boys, age 14-19 years) from the four largest Croatian cities completed the Gaming Motivation Questionnaire, the Gaming Motivation Scale, and the Passion Scale. The results show that this instrument demonstrates good internal consistency and construct validity. The intrinsic motivation measured in this study was positively related to intrinsic motivation measured with another validated instrument used to assess motivation to play video games, as well as introjected regulation and harmonious passion for gaming. On the other hand, peer-influenced motivation was positively associated with introjected regulation and obsessive passion, as well as negatively associated with harmonious passion. In conclusion, the Gaming Motivation Questionnaire shows potential for use in further research on the topic of the influence of peer relationships on playing video games.

Keywords: motivation, video games, gaming motivation questionnaire, peer-influenced motivation, intrinsic motivation

INTRODUCTION

Playing video games is an activity that a sizable proportion of adolescents enjoy doing in their leisure time (Brooks et al., 2016). According to Juul (2010), the notable presence of video games as part of the leisure time of adolescents can be attributed to the so-called 'casual revolution' that took place at the beginning of the 21st century. The casual revolution was characterised by the emergence of casual games that are easy to learn and can be fit into the schedule and/or circumstances in which they are played. Such games sparked the interest of a large number of people who may not have previously shown any interest in playing video games.

As people became more interested in spending their free time playing video games, researchers became more interested in studying the consequences of playing these games, thus, leading to research that focused on two main themes. While some studies have explored and emphasised the benefits of playing video games (e.g., Adachi & Willoughby, 2017; Granic et al., 2014; Kovess-Masfety et al., 2016; Latham et al., 2013; Primack et al., 2012; Johannes et al., 2021), others have dealt with the problems that can arise from playing video games (Gentile et al., 2012; Kim, et al., 2024; Leung et al., 2024). Besides a potential increase in violent tendencies as a consequence of playing violent video games, addiction has been identified as a key problem associated with gaming (Reid, 2012). Playing video games can be a significant problem that can develop into an addiction if a person feels the need to spend increasing amounts of time engaged in games and remains unsuccessful in their attempts to reduce the amount of time spent playing. This issue has been recognised in the Diagnostic and Statistical Manual of Mental Disorders DSM-5-TR (APA, 2022) with the inclusion of diagnostic criteria for Internet Gaming Disorder under conditions for further study, as well as through the inclusion of Gaming Disorder in the International Statistical Classification of Diseases and Related Health Problems (ICD-11, 2022). The amount of time spent playing video games and the self-control associated with this activity depends in part on the person's motivation for playing (Bäcklund et al., 2022; Mills et al., 2017; Mills et al., 2018). Different types of motivation to engage in a particular activity are often related to the different outcomes that the activity provides for a person (Vallerand, 1997; Wang et al., 2021). Based on the above, we can conclude that motivation to play video games is a significant construct in the field that requires careful conceptualisation and operationalisation.

Operationalisation of motivation for gaming

There is a great deal of interest among researchers in the topic of gaming motivation. Therefore, it is not surprising that there are many conceptualisations of this construct and various measuring instruments used in the field. The proposals for motivation taxonomy, as well as the dimensions of the constructed measurement instruments differ depending on whether motivation is considered as a reason for playing some specific genres of video games or for gaming in general. Here we present some operationalisations of the two above-mentioned approaches and discuss their contributions.

Yee (2006) proposed taxonomy for those who play massively multiplayer online role-playing games (MMORPG). The author constructed a self-reported inventory based on Bartle's (1996) taxonomy of player types and applied it to a sample of 3,000 MMORPG players. Based on the data collected,

exploratory factor analysis identified 10 significant components, while second-order factor analysis revealed that achievement, socialisation, and immersion were significant factors, explaining 55% of the total variance. The same factors were confirmed in subsequent research on a sample of players from the USA, as well as in a cross-cultural comparison with a sample from Hong Kong and Taiwan (Yee et al., 2012). Based on measurement instruments and player statements from previous research, Lee et al. (2012) proposed potential motives for playing social network games, as well as eight potential player types. However, based on their results, Lee et al. (2012) confirmed only six types of players. Similarly, the scale measuring motivation to play World of Warcraft (WoW) was created by Fuster et al. (2012, 2013): the authors identified four dimensions of motivation to play - socialisation, exploration, achievement, and dissociation. Additionally, Hygen et al. (2024) developed the Fortnite Motivation Scale, which includes three dimensions - social, novelty, and achievement motivation.

The disadvantage of such specific operationalisations of motivation that are solely related to playing a particular genre is that they are intended for a smaller number of players of a particular genre during the time they play games in that genre. When it comes to measuring motivation to play video games, it seems that the measurement instrument can function as a general measure, and by changing the instructions, it is possible to use the same instrument to measure motivation to play games in different genres. This allows for a comparison of the various motivations associated with playing games in different genres. An example of such an instrument designed to measure motivation to play games in different genres is The Trojan Player Typology (Kahn et al., 2015). The instrument consists of up to six scales, i.e., player types - socialisers, completionists, competitors, escapists, story-driven, and smarty-pants, and it has been validated based on players of two different genres – multiplayer online battle arena (MOBA) and massively multiplayer online games (MMOG). The potential problem with this measurement, however, is that three of the six dimensions are assessed using only two items. This raises the question of whether the content of these dimensions can be fully encompassed with just two items, without compromising the validity and reliability of the scale (Clark & Watson, 1995). A similar taxonomy was offered by Demetrovics et al. (2011), where the results of their research indicated seven motivational factors (social, escape, competition, coping, skill development, fantasy, and recreation). Myrseth et al. (2017) proposed The Electronic Gaming Motives Questionnaire as an adaptation of the Gambling Motives Questionnaire - Revised (Myrseth & Notelaers, 2017). This questionnaire consists of four dimensions - enhancement, social, coping, and self-gratification. Additionally, Michelini et al. (2023) proposed the Videogaming Motives Questionnaire, which consists of eight intercorrelated dimensions.

It is important to emphasise that the taxonomies presented so far are not derived from theory, but they are mainly based on item analyses based on large samples of gamers, or in the case of The Electronic Gaming Motives Questionnaire, on the measure of gambling motives. When operationalised from a theoretical perspective, gaming motivation is predominately considered in the context of self-determination theory (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000).

Self-determination theory and gamers' motivation

Self-determination theory suggests that involvement in an activity is typically motivated by two types of motivation - intrinsic and extrinsic. Intrinsic motivation refers to the fact that a person engages in a particular activity solely because it is appealing, fun, or challenging to them. According to Lafrenière et al. (2012), gamers who are intrinsically motivated to play video games because they enjoy playing, exploring the worlds within video games, or enjoy improving their skills while playing. On the other hand, those who are extrinsically motivated play to earn points in the game, reach higher levels, collect rare items, or gain the admiration of other players. Therefore, when a person engages in a particular activity to achieve something he or she finds attractive or to avoid something he or she finds negative, then they are considered to be extrinsically motivated. According to Ryan (1995), extrinsically motivated behaviours can be understood through four different types of motivational orientations that differ in the extent to which a person's behaviour is self-regulated. Namely, these forms of regulation are external, introjected, identified, and integrated regulation. Accordingly, Lafrenière et al. (2012) constructed the Gaming Motivation Scale (GAMS), which measures six dimensions of motivation to play video games. In addition to the above-mentioned four dimensions of extrinsic motivation, GAMS also includes intrinsic motivation and amotivation.

Research examining the effects of motivation on problematic video game behaviour have confirmed the association between salient extrinsic gaming motivation and reports of problematic video game behaviour (Bäcklund et al., 2022; Mills et al., 2017; Mills et al., 2018), as well as associations with weaker self-control (Converse et al., 2019; Holding et al., 2019) and time spent playing video games (Mills & Allen, 2020; Mills et al., 2017).

The motivation to engage in an activity, including playing video games, is closely related to another conceptualisation based on self-determination theory (Deci & Ryan, 2000). This refers to the passion for playing video games (Vallerand, 2010), which can explain both the drive to play video games, as well as the positive and negative consequences of engaging in this activity. According to the dualistic model of passion (Vallerand, 2010), there are two types of passion - harmonious and obsessive passion. Harmonious passion is the result of the autonomous internalisation of the activity into one's identity and arises from intrinsic and integrative tendencies of the self that motivate a person to engage in the activity. Obsessive passion, on the other hand, is the result of a controlled internalisation of the activity into one's identity due to intra- and/or interpersonal pressures, as the activity is associated with consequences such as feelings of social acceptance or self-esteem.

Social factors in gamers' motivation

In the context of self-determination theory, extrinsic motivation is recognised as involvement in activities that result from the desire to achieve rewards and avoid punishments (Ryan & Deci, 2000). In this context, the authors mainly operationalise the realisation of rewards as the collection of points, rare items, and other various rewards within the game, i.e., rewards outside the social context. Viewing the collection of rewards and recognition within the game as extrinsic motivation may be seen as a bit simplistic. If a player enjoys collecting points, rare items, and other rewards within the game and does so because it is a way to track the improvement of one's skills, such gaming

can be considered intrinsically motivated. If, on the other hand, a player collects all rewards to secure the admiration of his peers, this is undoubtedly a case of extrinsic motivation.

There are several reasons why some adolescents feel that playing video games is an extremely attractive activity. These games are fun and challenging activities through which adolescents can explore different worlds, identities, and characters, while gaining a sense of progress and accomplishment. However, it is important to emphasise that playing video games also plays a significant role in the adolescents' social context. Although it is an activity in which the adolescent may be physically alone in the room, it can have an important social component. By playing video games, especially multiplayer online games, adolescents connect with peers, form a group identity, and secure social status in a peer group (Kong et al., 2012; Velez, 2019). The influence of peers in adolescence is strong: adolescents show a strong desire for peer acceptance and modify their behaviour precisely to secure rewards or avoid punishment in peer relationships (Berndt, 1989; Brown et al., 2008). It is, therefore, surprising that operationalisations of extrinsic motivation to play video games do not include peer influence.

Numerous authors have emphasised the importance of social factors in gamers' motivation, mainly involving social motives such as companionship (e.g., Bonny & Castaneda, 2022; Colwell, 2007), socialising (e.g., Arbeau et al., 2020; Bowman & Chang, 2023; Yee, 2006; Johnson et al., 2016), and the presence of other players (e.g., Ryan et al., 2006), as well as communication among group members with the aim of sharing knowledge and skills, so that the group achieves victory (Kong et al., 2012).

The importance of social motives has also been demonstrated in studies that have looked at the motivation to play some specific genres of games. For example, Klimmt et al. (2009) found that one of the most dominant motives for playing multiplayer browser games was the social relationships developed in the games. Conducting semi-structured in-depth interviews with a sample of regular MMORPG players, Lin and Lin (2011) showed that, in addition to fun and enjoyment, players emphasised that playing video games helped them gain warm relationships with others and a sense of belonging. The study by Kong et al. (2012), which examined the extent to which an individual is motivated to play WoW, emphasised the importance of peers for motivation. In their study, the authors operationalised motivation for playing WoW using two dimensions - peer intrinsic and peer extrinsic motivation. Peer intrinsic motivation is described by behaviour that is consistent with the norms and values of the group, while peer extrinsic motivation is characterised by the tendency to share knowledge and skills within the group in order to gain advantages for the group and victory over other groups.

Considering the findings of all the above-mentioned research studies, we can conclude that the presence of other players is very important when one plays a video game.

Purpose of the present study

Although there is a considerable amount of work on the topic of motivation in relation to playing video games (e.g., Martucci et al., 2023; Mills & Allen, 2020; Wang et al., 2021), as well as the conceptualisation of this construct (e.g., Cheah et al., 2021; Demetrovics et al., 2011; Kahn et al., 2015; Myrseth et al., 2017; Yee, 2006), this area requires further research. Rare conceptualisations have

a theoretical basis, with the dominant theoretical framework in this area being the self-determination theory (Ryan & Deci, 2000). As mentioned previously, several studies have emphasised the importance of social factors associated with gaming. Therefore, there is a need to test the conceptualisation of motivation to play video games that incorporates peer influence as a potential motivating factor, whilst also being theoretically grounded.

The purpose of the present study was to construct a measure of intrinsic and extrinsic motivation for playing video games intended for adolescents, with extrinsic motivation operationalised through peer influence, i.e., the Gaming Motivation Questionnaire (GMQ). Peers may influence adolescent behaviour by rewarding certain game-related behaviours (e.g., collecting rare items or points, passing certain levels, and so on) or by punishing undesirable game-related behaviours (e.g., ridiculing those who do not play). When we consider adolescent gaming, playing video games for fun, enjoyment, as a challenge, or to gain mastery can be seen as intrinsic motivations, while playing for the desire of securing rewards and avoiding punishment from peers can be seen as extrinsic motivations.

Once the final version of the GMQ was constructed, we assessed the validity of the instrument. If the GMQ has factorial validity, we hypothesise that the exploratory factor analysis will reveal two significant factors, with the items measuring intrinsic motivation forming one factor and the items measuring peer-influenced motivation forming the other factor (*Hypothesis 1*). In addition, the construct validity of the GMQ will be examined by investigating which dimensions of the Gaming Motivation Scale (GAMS, Lafrenière et al., 2012) and passion for playing video games (Vallerand, 2010) contribute significantly to explaining the dimensions of the GMQ. We hypothesise that intrinsic motivation for playing video games measured using the GMQ can be explained by intrinsic motivation measured using the GAMS, as well as by harmonious passion, such that higher levels of intrinsic motivation measured with the GAMS and harmonious passion are associated with higher intrinsic motivation measured with the GMQ (*Hypothesis 2*). On the other hand, we hypothesise that significant predictors of peer-influenced motivation as measured by the GMQ are external regulation, introjected regulation, harmonious passion and obsessive passion, such that higher external regulation, introjected regulation, and obsessive passion, as well as lower harmonious passion are associated with higher peer-influenced motivation (*Hypothesis 3*).

METHOD

Instrument development

Items for the GMQ were developed representing the reasons why adolescents play video games. They were based on the definitions of intrinsic and extrinsic motivation (Ryan & Deci, 2000). Intrinsic motivation involves playing video games for fun, enjoyment, satisfaction, exploration, as a challenge, and to gain mastery. Extrinsic motivation is operationalised as peer-influenced motivation. More specifically, it refers to playing video games because playing is considered to be a peer norm, and a means to obtain rewards (admiration, praise) or avoid punishments (avoidance, ridicule) from peers. A total of 21 items (9 for intrinsic motivation and 12 for extrinsic motivation) were created.

The items were rated on a 5-point Likert scale (where 1 corresponds to 'I strongly disagree' and 5 corresponds to 'I strongly agree'). Krosnick & Presser (2009) have shown that response scales with 5- or 7-points have a higher reliability than scales with a lower number of points. In addition, Boateng et al. (2018) emphasised that increasing the number of points above 7 does not bring any significant advantages to such scales. Therefore, the above-mentioned authors recommend the use of a 5-point scale for unipolar items and a 7-point for bipolar items. Since the GMQ consists of unipolar items associated with adolescents (i.e.) the target population, a 5-point scale was chosen.

Participants

The sample consisted of 690 high school students (54.2% boys) from the four largest Croatian cities and regional centres (50.6% from Zagreb, 27.6% from Split, 18.7% from Rijeka, and 3.2% from Osijek). The criterion for including participants in the sample was that they had played video games in the past month.

The age of the students ranged from 14 to 19 years ($M = 15.95$ years, $SD = 1.18$). Participants played video games for an average of 97.34 minutes on weekdays ($SD = 151.05$) and 171.20 minutes on weekends ($SD = 190.55$).

Measures

A total of 21 items were applied to measure adolescent motivation for playing video games, with 9 items constructed to measure intrinsic motivation and 11 items constructed to measure peer-influenced motivation. In addition, the GAMS (Lafrenière et al., 2012) and the Passion Scale (Vallebrand, 2010) were used.

Gaming Motivation Scale

GAMS (Lafrenière et al., 2012) was constructed based on the definition of motivation proposed by Deci & Ryan (1985, 2000) and similar scales developed to measure motivation in other domains. It consists of 18 items representing reasons for playing video games, and participants are asked to indicate the extent to which they agree with the statement provided based on whether it reflects their reason for playing video games. Possible responses range from 1 ('do not agree at all') to 7 ('very strongly agree'). The scale measures six different types of motivation: (1) intrinsic motivation – engaging in the activity because of the activity itself (e.g., "Because it is stimulating to play."), (2) integrated regulation – this represents the first level of extrinsic motivation and refers to the decision to engage in the activity because it is part of one's sense of self (e.g., "Because it is an extension of me."), (3) identified regulation – the second level of extrinsic motivation, which refers to engaging in the activity because of its perceived importance or connection to personal goals (e.g., "Because it has personal significance to me."), (4) introjected regulation – engaging in the activity due to internal pressures such as guilt or anxiety (e.g., "Because I must play to feel good about myself."), (5) external regulation – represents extrinsic motivation where engaging in the activity is driven by external means such as rewards (e.g., "For the prestige of being a good player."), (6) amotivation – the absence of intrinsic or extrinsic motivation (e.g., "It is not clear any-

more; I sometimes ask myself if it is good for me.”). The total score is calculated as the average of the scores for each item of the subscale. Lafrenière et al. (2012) confirmed a 6-factor model and acceptable internal consistency of the subscales (all subscales have an internal consistency of $\alpha \geq .75$). In the present study, the McDonald’s omega was used and all subscales demonstrate satisfactory internal consistency (all subscales have an internal consistency of $\omega \geq .81$).

Passion Scale

The Passion Scale (Vallerand, 2010) consists of two components, each containing six items, which are intended to assess harmonious and obsessive passion. Respondents were asked to indicate their level of agreement with each of the 12 statements on a 7-point scale (where 1 corresponds to ‘strongly disagree’ and 7 corresponds to ‘strongly agree’). A higher overall score on these subscales reflects a greater passion for playing video games. Participants were instructed to consider gaming as the specific activity in relation to which they were to evaluate their passion. Harmonious passion stems from the autonomous integration of an activity into one’s identity and encourages active participation in that activity. Here is an example of one of the six items associated with harmonious passion: “This activity reflects the qualities I like about myself”. Obsessive passion, on the other hand, arises from a forced internalisation and it represents an uncontrollable urge to pursue a beloved activity. For example, “I have the impression that my activity controls me.”. The total score represents the average of the ratings for the items of the individual subscales. Previous studies using the Passion Scale have confirmed its two-factor structure (Vallerand et al., 2003), its consistency in terms of convergent and divergent validity (Marsh et al., 2013), as well as its suitability for assessing passion across various activities (Marsh et al., 2013). The Croatian adaptation of the Passion Scale has favourable measurement characteristics (Lotar Rihtarić et al., 2022). In the present study, internal consistency for harmonious passion is $\omega = .87$ (95% CI [.85, .89]), and internal consistency for obsessive passion is $\omega = .85$ (95% CI [.82, .88]).

Procedure

In this study, data collection was conducted online. The proposed research design was reviewed and approved by the Ethics Committee of the Faculty of Education and Rehabilitation Sciences at the University of Zagreb. The researchers also obtained approval from the Ministry of Science, Education, and Youth to conduct the study in schools. School principals and professional associates were contacted, who then forwarded the information regarding the study to the teachers. Before approaching participants, teachers sent a letter to parents via the school’s communication channels informing them of the survey. Through their regular communication channels, professional associates and teachers invited the students to participate in the study and sent them a link containing details about the study, as well as access to instruments used in the study. Using this approach, the students were informed about the purpose of the study and how to participate in the survey before filling out the questionnaire. They were also informed that participation was voluntary and anonymous. If they agreed to participate in the study, they were asked to click the “Continue” button to provide their informed consent. After ten days, a reminder was sent to the students to inform them about the study again, in case they were still interested in participating and had forgotten to complete the instruments. Participants received no compensation for participating in the study.

Data analysis

An exploratory factor analysis using principal axis factoring with direct oblimin rotation was conducted to assess the dimensionality of the GMQ. Because the GMQ includes a dimension that has not been measured by other instruments, there is a lack of data on the relationship between intrinsic and peer-influenced motivation. Cabrera-Nguyen (2010) stated that oblique and orthogonal solutions do not differ when there is no relationship between the factors. Therefore, in cases where the relationship between the factors is unknown, it is preferable to use oblique rotation. Accordingly, in the present study was used an oblique rotation. The suitability of the data for the factor analysis was checked using the Kaiser-Meyer-Olkin measure and the Bartlett's test of sphericity. To identify the number of underlying factors, parallel analysis was conducted using syntax for SPSS provided in O'Connor (2000). The items for the final version of the scale were selected based on the saturation of the items with factors. The criterion for the elimination of items was a factor loading of less than 0.50 and/or cross-loading on multiple factors. These criteria are consistent with the recommendation of Clark & Watson (2019), who suggested a threshold of .45-.50 for narrower scales, as well as with the recommendations of Costello & Osborne (2005), who advised that loadings above .50 are desirable since they indicate solid factors. The same authors emphasised that in the case of items with strong loadings (.50 or higher), it is advisable to remove cross-loading items. The correlation between the dimensions of the GMQ and those of the GAMS and passion for playing video games was expressed using Pearson's correlation coefficient. Two hierarchical regression analyses were conducted to examine the contribution of each dimension of motivation and passion for playing video games, using the GMQ dimensions as criteria. Given the numerous studies showing differences in the motivation to play video games between boys and girls (e.g., Király et al., 2022; Martucci et al., 2023), gender was controlled for in the first step of the hierarchical regression analysis. In the second step, six motivation dimensions assessed by the GAMS were added, followed by the inclusion of harmonious and obsessive passion in the third step.

RESULTS

An exploratory factor analysis was conducted to select items for the final version of the questionnaire, as well as to explore its factor structure. Before conducting principal axis factoring with direct oblimin rotation, the prerequisites for performing the factor analysis were checked. The results of the Kaiser-Meyer-Olkin measure (0.90) and Bartlett's test of sphericity ($\chi^2 = 6476.82$, $df = 210$, $p < .01$) indicate that the data are suitable for factor analysis (Tabachnick & Fidell, 2013). To test whether the distribution of items deviate significantly from a normal distribution, the Shapiro-Wilk test was conducted. With the significance level set at .05, the results show that the distribution of all items deviated significantly from normal. The results of the parallel analysis showed that the eigenvalues of the first two factors alone were greater than the 95th percentile of all eigenvalues generated from the random data (1st factor $6.182 > 1.390$; 2nd factor $4.060 > 1.318$; 3rd factor $1.239 < 1.267$). These two factors explained 48.77% of the common variance. The first factor consists of items that measure peer-influenced motivation, while the second factor consists of items that measure intrinsic motivation to play video games. The items were removed one by one, starting with those with the lowest loadings. In this way, four statements each were removed from the

intrinsic motivation dimension and from the peer-influenced motivation dimension. All remaining items had factor loadings that were greater than .50. Hence, the removal of any of these items would not lead to an increase in the internal consistency of the dimension to which they belong.

The final version of the GMQ consists of a total of 13 items. Exploratory factor analysis (principal axis factoring) conducted on these 13 items revealed two significant factors that explain 60.71% of the common variance (39.27% first factor, 21.43% second factor). The first factor consists of 8 items measuring peer-influenced motivation and the second factor consists of 5 items measuring intrinsic motivation. The factor loadings of the items are shown in Table 1.

Table 1
Items and Factor Loadings of the Gaming Motivation Questionnaire

Items in English and Croatian	Factor loadings
Peer-influenced motivation	
1. I play because I am afraid that my friends might start avoiding me. // Igram jer se bojim da me prijatelji ne počnu izbjegavati.	.85
2. I play because my friends expect me to. // Igram zato što to moji prijatelji od mene očekuju.	.84
3. I play to be popular among my friends. // Igram da bih bio/la popularan/na među svojim prijateljima.	.81
4. I play so that my friends don't make fun of me. // Igram da me prijatelji ne bi ismijavali.	.80
5. I play because my friends have a bad opinion of those who don't play video games. // Igram zato što moji prijatelji imaju loše mišljenje o onima koji ne igraju.	.74
6. I play because I want my friends to praise my game. // Igram jer želim da prijatelji hvale moje igranje.	.66
7. I play video games to be admired by my peers. // Igram da bi mi se vršnjaci divili.	.65
8. I play some video games because I'm afraid I won't have anything to talk about with my friends. // Neke igre igram jer me strah da neću imati o čemu razgovarati s prijateljima.	.61
Intrinsic motivation	
1. I play because I simply enjoy playing video games. // Igram jer kada igram videoigre jednostavno uživam.	.85
2. I play video games because it gives me pleasure. // Igranje videoigara pruža mi zadovoljstvo.	.83
3. I play video games because it is fun. // Igram videoigre jer mi je to zabavno.	.58
4. I play because I feel joy when I notice that I am getting better at completing tasks, levels or missions. // Igram jer osjećam zadovoljstvo kad primijetim da sam sve bolji/a u svladavanju zadataka/nivoa ili ostvarivanju misija.	.58
5. I play video games because I like to explore new worlds, roles/characters and personalities. // Igram videoigre jer volim istraživati nove svjetove, nove uloge/likove i osobnosti.	.56

The results obtained from the factor analysis confirm the two-factor structure of the GMQ, thus confirming the first hypothesis of this study.

The internal consistency of the peer-influenced motivation scale based on Cronbach's α is .90 (McDonald's $\omega = .90$, 95% CI [.86, .93]), while the internal consistency of the intrinsic motivation scale based on Cronbach's α .78 (McDonald's $\omega = .80$, 95% CI [.77, .83]), which leads us to the conclusion that both scales have good internal consistency. Correlation between those two factors is $r = -.10$. The average values for the total sample are presented in Table 2.

Table 2
Descriptive Statistics for Dimensions of Gaming Motivation and Passion for Gaming Scales

Variable		M	SD	Min	Max
GMQ	Intrinsic motivation	3.88	0.92	1.00	5.00
	Peer-influenced motivation	1.24	0.54	1.00	5.00
GAMS	Intrinsic motivation	3.39	1.69	1.00	7.00
	Integrated motivation	2.91	1.79	1.00	7.00
	Identified motivation	3.10	1.69	1.00	7.00
	Introjected regulation	2.08	1.35	1.00	7.00
	External regulation	2.59	1.61	1.00	7.00
	Amotivation	2.27	1.43	1.00	7.00
Harmonious passion		3.99	0.92	1.00	7.00
Obsessive passion		2.15	1.22	1.00	7.00

Note: GAMS - Gaming motivation scale; GMQ - Gaming motivation questionnaire; * $p < .05$; ** $p < .01$

The results show that participants exhibit higher intrinsic motivation than peer-influenced motivation ($t = 60.70$, $df = 653$, $p < .01$).

Table 3
Correlations Between Dimensions of Different Measures of Gaming Motivation

Variable	2	3	4	5	6	7	8	9	10
GMQ	Intrinsic motivation	-.10*	.43**	.47**	.22**	.36**	.01	.64**	.28**
	Peer-influenced motivation	-	.32**	.30**	.44**	.33**	.25**	.08	.43**
GAMS	Intrinsic motivation	-	.77**	.81**	.60**	.71**	.15**	.70**	.57**
	Integrated motivation		-	.86**	.71**	.64**	.13**	.65**	.65**
	Identified motivation			-	.66**	.64**	.09*	.68**	.56**
	Introjected regulation				-	.68**	.36**	.36**	.72**
	External regulation						.29**	.47**	.60**
Amotivation								.02	.30**
Harmonious passion									.44**
Obsessive passion									-

Note: GAMS - Gaming motivation scale; GMQ - Gaming motivation questionnaire; * p < .05; ** p < .01

To verify the construct validity of the GMQ, it is essential to analyse the correlations between the dimensions of the newly constructed instrument and the existing instruments that measure intrinsic and extrinsic motivation for playing video games, as well as the dimensions of passion, which have been shown to be related. Therefore, we conducted a hierarchical regression analysis of intrinsic and extrinsic motivation. As shown in Table 3, the correlations support the construct validity of the new measure of motivation for playing video games. Intrinsic motivation has the highest percentage of common variance, with intrinsic motivation as measured by GAMS and harmonious passion. As we move along the spectrum of motivation from intrinsic motivation to external regulation, the correlations with intrinsic motivation in the GMQ reduce progressively. Furthermore, intrinsic motivation is not related to amotivation. Peer-influenced motivation shows the highest positive correlation with introjected regulation and obsessive passion. The correlation of peer-influenced motivation with external regulation and integrated motivation is slightly lower, but, as expected, it is not related to harmonious passion. Finally, intrinsic motivation and peer-influenced motivation have a very low negative correlation.

Since the dimensions of the GAMS and the Passion scale are (as expected) highly correlated with each other, it is important to determine the relative contribution of dimensions of the existing scales to the explanation of the dimensions of the newly constructed scale in order to confirm the construct validity of the GMQ. A hierarchical regression analysis was conducted using intrinsic motivation measured by the GMQ as the criterion variable and the dimensions of the GAMS, along with harmonious and obsessive passion as predictors. As there are statistically significant gender differences for almost all variables included in the regression analysis, gender was controlled for in the first step. In the second step, the six dimensions of motivation measured by the GAMS were included, and in the third step, harmonious and obsessive passion were included. We assumed that the dimensions of the questionnaire would have good construct validity, i.e., we assumed that the significant predictors of intrinsic motivation for playing video games would be higher intrinsic motivation (as measured by GAMS) and higher harmonious passion.

Table 4

Hierarchical Multiple Regression of Gaming Motivation Dimensions to Intrinsic Motivation Measured with GMQ

Dimensions		Step 1	Step 2	Step 3
		β	β	β
Gender		-.23**	-.08*	-.07*
GAMS	Intrinsic motivation		.50**	.26**
	Integrated regulation		.05	-.08
	Identified regulation		.12	-.01
	Introjected regulation		-.26**	-.13*
	External regulation		.06	.06
	Amotivation		.00	.01
Harmonious passion				.53**
Obsessive passion				.02
Model summary				
R		.23	.58	.68
Adj R ²		.05	.33	.45
ΔR^2		.05**	.29**	.12**

Note: GAMS - Gaming motivation scale; * $p < .05$; ** $p < .01$

In Table 4, we can see that all three steps contribute significantly to explaining the intrinsic motivation measured with the newly constructed instrument. The predictors included in the regression analysis explained 45% of the variance in intrinsic motivation measured with the GMQ. Gender is a significant predictor of intrinsic motivation and the results show that it is more pronounced in males. The six dimensions of motivation for playing video games measured with the GAMS contribute significantly to explaining intrinsic motivation, with intrinsic motivation itself being the best predictor, as expected. In addition to intrinsic motivation, introjected regulation contributes significantly to explaining the dimension of intrinsic motivation, such that a higher level of introjected motivation, as measured by the GAMS, predicts a lower level of intrinsic motivation, as measured by the GMQ. In the final step, harmonious passion is the only significant predictor of intrinsic motivation, and the relationship between these two variables is positive. Based on these findings, we can conclude that we have only partially confirmed the second hypothesis.

According to the last hypothesis, higher levels of peer-influenced motivation for playing video games would predict higher levels of external and introjected regulation, higher levels of obsessive passion, and lower levels of harmonious passion. To test this hypothesis, a second hierarchical

regression analysis was conducted using peer-influenced motivation as a criterion and the dimensions of GAMS and passion for gaming as predictors, after controlling for gender.

Table 5

Hierarchical Multiple Regression of Gaming Motivation Dimensions to Peer-Influenced Motivation Measured with GMQ.

Dimension		Step 1	Step 2	Step 3
		β	β	β
Gender		-.05	-.06	.05
GAMS	Intrinsic motivation		.06	.02
	Integrated regulation		.06	.03
	Identified regulation		.04	.14
	Introjected regulation		.36**	.18**
	External regulation		.04	.02
	Amotivation		.11	.08*
Harmonious passion				-.23**
Obsessive passion				.27**
Model summary				
R		.05	.46	.51
Adj R ²		.00	.20	.25
ΔR^2		.00	.21**	.05**

Note: GAMS - gaming motivation scale; * p < .05; ** p < .01

The results presented in Table 5 show that gender does not contribute to the explanation of peer-influenced motivation, while the other two levels make a significant contribution. The predictor variables explained a total of 25% of the peer-influenced motivation measured with the GMQ. Obsessive and harmonious passion were found to contribute most to the explanation of peer-influenced motivation for gaming, where harmonious passion showed a negative relationship. In addition to passion, introjected regulation and amotivation also contributed significantly to the explanation of peer-influenced motivation. In relation to the aforementioned hypothesis, only external regulation did not prove to be a significant predictor of peer-influenced motivation, leading to the conclusion that this hypothesis was also partially confirmed.

DISCUSSION

The aim of the present study was to develop a new instrument, based on the principles of self-determination theory (Deci & Ryan, 2000), which can be used to assess the motivation among adolescents to play video games. The difference between this instrument (i.e., the GMQ) and an existing instrument developed on the basis of this theory (Lafrenière et al., 2012) lies in the different operationalisation of extrinsic motivation. Extrinsic motivation refers to engaging in an activity due to certain external rewards that serve as an incentive, and these rewards are defined in video games by collecting rare items and points or reaching higher levels. While such a view may be true for some other activities, this explanation of extrinsic motivation seems too simplistic for playing video games. To determine whether playing video games is truly extrinsically motivated, it is not enough to determine whether a person plays to collect various indicators of gaming quality and persistence. Instead, one must ask why the player feels the need to achieve various forms of rewards. Players may collect rare items or points or pass difficult levels because these rewards are seen as indicators of ways in which they improve their skills and feel good about themselves and their development as a player. On the other hand, they may also collect these rewards because they seek recognition from others. When players collect various indicators of their success and progress in the game to gain recognition from peers, it is in fact extrinsic motivation that is influenced by peers. Therefore, extrinsic motivation in the GMQ has been operationalised based on peer influence.

The newly constructed GMQ consists of 13 items, 5 of which measure intrinsic motivation and 8 of which measure peer-influenced motivation. To examine the measurement properties of the GMQ, internal consistency, factorial validity, and construct validity were tested. According to the first hypothesis, we assumed that the GMQ would show two significant factors: this was confirmed by the results of the exploratory factor analysis with all items specifically saturating the factor that they were constructed for. To test the construct validity of the GMQ, we conducted an analysis to determine which dimensions of the existing instruments for measuring motivation to play video games, which are also based on self-determination theory, can best predict the dimensions of the GMQ.

According to the second hypothesis, we proposed that the most important predictors of intrinsic motivation for playing video games as measured by the GMQ would include intrinsic motivation as measured by the GAMS and harmonious passion. More specifically, we hypothesised that higher intrinsic motivation (measured by GAMS) and harmonious passion, along with lower obsessive passion, would be associated with higher intrinsic motivation in the GMQ. The results showed that higher levels of intrinsic motivation on the GMQ can be explained with higher levels of intrinsic motivation (GAMS) and harmonious passion. However, this dimension was also found to be significantly explained by lower levels of introjected regulation. Based on these results, we can conclude that we have partially confirmed the second hypothesis. Since introjected regulation refers to the motivation to perform an activity due to internal pressures such as guilt or anxiety (i.e., the need to play in order to feel good), it is logical that this dimension has a weaker relationship to intrinsic motivation. It is important to emphasise that, considering the correlations between these motivation dimensions, introjected regulation is still more strongly associated with peer-influenced motivation. This refers to the pressure that arises within the person themselves, but can evidently act as externally imposed pressure. This is confirmed by the significant positive correlation between

intrinsic motivation measured using the GMQ and harmonious passion, as well as by the lack of correlation with obsessive passion.

Regarding our third hypothesis, we expected that significant predictors of peer-influenced motivation, as measured by the GMQ, would be higher external regulation and introjected regulation as the two dimensions of motivation belonging to the extrinsic part of the spectrum, as well as higher obsessive passion and lower harmonious passion. The results show that introjected regulation is indeed a significant predictor of peer-influenced motivation, whereas extrinsic regulation is not. However, the best predictors of this dimension of motivation are lower levels of harmonious passion and higher levels of obsessive passion. Therefore, we can conclude that this hypothesis is also partially confirmed. This result, where external regulation does not contribute to the explanation of peer-influenced motivation compared to other dimensions of motivation and introjected regulation remains as the only significant predictor, supports our assumption that the extrinsic component of motivation for playing video games cannot be operationalised simply as the desire to collect in-game rewards, trophies, rare items, virtual currency, and so on. Playing may lead to collecting such items, but we still do not know what motivates players to spend extended periods of time collecting them or unlocking restricted game elements. There could be other factors related to intrinsic motivation associated with this activity (enjoyment of indicators of one's progress and improvement of gaming skills), or it may simply be the need for players to prove themselves to their peers. This is supported by our findings, showing that the item "I play because I feel joy when I notice that I am getting better at completing tasks, levels, or missions" is significantly saturated only by the factor of intrinsic motivation and not by the peer-influenced motivation. This suggests that collecting in-game rewards may indeed be driven by intrinsic motivation. Furthermore, the correlation between the two dimensions of motivation measured by the GMQ is very low and negative, suggesting that they are two almost independent dimensions.

Based on the results obtained, we can conclude that the GMQ is a short scale with good internal consistency and good factorial validity: this scale, indicating two almost independent dimensions and has good construct validity. This newly constructed scale may be useful for determining the extent to which peer influence is a motive for potential excessive video game playing. Unlike gaming driven by social motives, such as socialising, making friends, and having fun with peers, gaming motivated by peer influence can be a significant problem for adolescents. The difference is that socially motivated gaming is associated with harmonious passion, rather than obsessive passion (Fuster et al., 2014), indicating that it is more subject to the adolescents' control. On the other hand, gaming motivated by the desire for peer acceptance and the desire to prove oneself, as shown by the results of the present study, is significantly associated with obsessive passion. Furthermore, research shows that obsessive passion significantly contributes to the amount of time spent playing video games, with higher levels of obsessive passion associated with longer gaming sessions (Lotar Rihtarić et al., 2022).

The main limitation of the present study concerns the sample. The study was conducted with high school students from the largest Croatian cities, therefore, it is not possible to conclude whether the instrument has good measurement properties for younger age groups or students from smaller, more rural areas. Therefore, future research should examine the measurement properties of the GMQ on a representative sample of students. Since video games are already prevalent among

primary school students (Stenseng et al., 2020), the sample should also include children of primary school age. In addition, future research should also test the dimensionality of the scale with confirmatory factor analysis and examine the relationship between the dimensions of the GMQ, particularly peer-influenced motivation and excessive video game consumption.

CONCLUSION

The aim of this study was to develop a new measure of motivation for playing video games that is based on self-determination theory and incorporates peer influence as one of the social motives for adolescent gaming. The GMQ measures two dimensions — intrinsic motivation and peer-influenced motivation. The results confirm the two-factor structure and good internal consistency of the scale, indicating that the GMQ is a valid measure of adolescents' motivation for playing video games. Although the validation of a new instrument is a lengthy process and further validation is required for this instrument, the findings show that the GMQ is suitable for use in research investigating the influence of peers on video gaming behaviour among adolescents.

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