The Influence of Social Factors on Gaming Behaviour

Bachelorthesis

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Abstract

Gaming has become a popular leisure activity among adolescents, especially among male adolescents. Problems arise if people lose control over their gaming behaviour. Research shows that 3.2 % of the Dutch gamers are already addicted. Online games, in particular the massively multiplayer online games (MMOGs), are mostly associated with problems. A critical factor among these games is the social factor. The aim of this study is to examine the influence of social factors on gaming behaviour and on game addiction scores of adolescents. The influence of three social factors was analyzed: subjective norm (SN), descriptive norm (DN) and social pressure (SP). Also differences among genders were proposed from this study as well as from earlier studies. A questionnaire is used to assess the game behaviour and risk factors for game addiction among adolescent students. To test the research questions a cross sectional study was designed. In this study 496 Dutch gamers from secondary education and vocational education were included. Results show that males spent significant more time on playing games than females. Further males tend to have a higher addiction risk than females. The social factors correlate with the time spent on games and the game addiction rate. Further, a tendency towards a greater association with friends and online friends of the three social variables can be seen regarding the amount of time spending on games and the game addiction scale. Also online gaming was more associated with subjective norm than offline gaming. Descriptive norm and social pressure were significant for both types of gaming. Moreover, descriptive norm and social pressure are good predictors of the game addiction scale (GAS). Gender also was identified to be another good predictor with the descriptive norm and social pressure variables.

Introduction

Computer games are a very popular leisure activity in particular among adolescents. Throughout the history computer games have undergone a large development. In general, three broad genres of videogames can be identified: offline games, browser games and (multiplayer) online games (Van Rooij, Schoenmakers, Meerkerk & Van de Mheen, 2008). Offline games are the first type of games. They can be played without the internet and not only on the computer but also on the computer console. These games are most often single player games but can also be played with more people on one system (Van Rooij, Schoenmakers, Meerkerk & Van de Mheen, 2008). Examples include single player shooters (e.g. Call of Duty) or single player racing games (e.g. Burnout). Offline games were played by 54.5 % of Dutch adolescents on average for 6.3 hours per week. In comparison online games were played 11.9 hours per week by 34.5 % of the Dutch adolescents (Van Rooij, Schoenmakers, Meerkerk & Van de Mheen, 2008).

Browser games belong to the second genre. This category includes small games which can be played on websites (e.g. Spele.nl) (Van Rooij, Schoenmakers, Meerkerk & Van de Mheen, 2008). In most cases browser games can be played for free and no software is needed. Examples of browser games include Cityville, Farmville and Mafia wars. The structure of these games "mostly relies on complex tasks that need cognitive effort and time to be resolved" (Klimmt, Schmid & Orthmann, 2009). Furthermore, in browser games players can interact with each other and form alliances. Still, browser games are "easy-in, easy-out games" – they are typically only played for a short time per day. No continuous play is needed. Nowadays browser games became very popular, among the Dutch adolescents and are played by 55.2 %. Only a small amount of time is spent on these games, though: 2.7 hours per week (Van Rooij, Schoenmakers, Meerkerk & Van de Mheen, 2008).

In the past, only offline games were played. Within the growing technology and the availability of the internet, the third genre was developed: online games. Thereby the number of gamers among adolescents increased. Today many online games and online role-playing games are very popular, for instance "World of Warcraft" or "Final Fantasy" (Van Rooij, Schoenmakers, Meerkerk & Van de Mheen, 2008). Online games or Multiplayer Online Games (MOGs) are games that can be played online with other people. MOG's can be further divided into Massively Multiplayer Online Games (MMOG's) and Massively Multiplayer Online Role-Playing Games (MMORPGs). MMOGs (Massively Multiplayer Online Games) are "off-the-shelf games" which call for continuous play (Klimmt, Schmid & Orthmann,

2009). The difference between multiplayer games (e.g. Counterstrike) and massively multiplayer games (e.g. Everquest) is only the number of gamers (Seay, Jerome, Lee & Kraut, 2004). Counterstrike for instance can be played by 32 up to 64 players, but massively multiplayer games can be played by thousands of players (Seay, Jerome, Lee & Kraut, 2004). Massively multiplayer online role-playing games (MMORPG's) also belong to this category. Here, a virtual game world is created where a lot of people can meet each other, play and communicate (Wu & Liu, 2007).

The most time is spent on (multiplayer) online games. This was pointed out by Ng and Wiemer-Hastings (2005). They studied the gaming behaviour of students and employees and found out that 34% of the MMORPG players played between 21 and 30 hours per week. A study from Yee (2006) indicated similar findings regarding the play time. He identified that on average 22.71 hours per week were spent on MMORPGs. Ng and Wiemer-Hasting (2005) further stated that only 4% of the non-MMORPG players are so heavily involved.

A gender gap regarding gaming behaviour can be seen. A study from Yee (2006) pointed out that among adolescents under 18 years, males were the ones who played MMORPGs (96.8 %). In general, males play more than females (Van Rooij, Schoenmakers, Meerkerk & Van de Mheen, 2008), however, there is an increase in female gamers (Cole & Griffiths, 2007). Nevertheless, Cole and Griffiths (2007) still identified males to dominate games. One explanation for the small increase is that nowadays more games for females are developed than in the past (Hartmann & Klimmt, 2006). This is due to the difference in types of games males and females prefer to play. Males like to play aggressive games, whereas females favour games where they can design fantasies and can play in familiar settings (Chou & Tsai, 2007). For Chou and Tsai (2007) an explanation that males still dominate gaming is that females are favouring other activities like shopping and talking. Moreover, males are more likely to be addicted by sound and light effects (Chiu, Lee & Huang, 2004).

Problems may arise if people lose control over their gaming behaviour. Online games, in particular the MMORPG's, are the ones with the highest game addiction risk (Ng & Wiemer-Hastings, 2005; Van Rooij, Schoenmakers, Meerkerk, Griffiths, Van de Mheen, 2010). A study from Van Rooij, Schoenmakers, Meerkerk and Van de Mheen (2008) shows that 3.2 % of the Dutch adolescents meet the criteria of excessive internet use which can lead to game addiction. Among online gamers the rate is even higher, namely 5.4 %. For 9 % of the addicted online gamers negative psychological effects can be noted. They spend nearly 40 hours a week on online games (Van Rooij, Schoenmakers, Meerkerk & Van de Mheen, 2008). Although videogames may have positive effects such as long-lasting friendships, research

shows that excessive gaming may have negative consequences. Excessive gaming can lead to problems in schools and problems with social contacts to other people in the real life (Van Rooij, Schoenmakers, Meerkerk, Griffiths, Van de Mheen, 2010). Game addiction, in DSM IV (Diagnostics and Statistical Manual of Mental Disorders) terms also called pathological gaming, can be described "as persistent and excessive involvement with computer or video games that cannot be controlled despite associated social and/or emotional problems" (Lemmens, Valkenburg & Peter, 2010). Similar symptoms as in other addictions can be found in pathological gaming (Ng & Wiemer-Hastings, 2005). Characteristics of addiction can be tolerance, withdrawal, craving and negative life consequences (Ng & Wiemer-Hastings, 2005). Game addiction or pathological gaming is not yet accepted as an official DSM IV diagnosis. As such game addiction is difficult to measure and define.

As noted earlier, the most addictive games appear to be online games. The attractiveness may originate from their infinity and the available social factors (Van Rooij, Schoenmakers, Meerkerk & Van de Mheen, 2008). The infinity of these games can be explained by the goals and achievements which can be gained (Ng & Wiemer-Hastings, 2005). Goals are always changing and new achievements can be obtained so the game will never end. The player can achieve experience points when he reaches a new level. The farer a gamer gets the more complex are the goals (Ng & Wiemer-Hastings, 2005). Also, the computer game developers can publish more and more additive levels so that the gamers get new challenges. The social factors of games are composed of "the shared experience, the collaborative nature of most activities and, most importantly, the reward of being socialized into a community of gamers and acquiring a reputation within it" (Ducheneaut, Yee, Nickell & Moore, 2006). Teamwork is necessary to reach goals and achievements. Without the help of others, a player's character will not survive. Communication is thus necessary for online gamers to be in contact (Drachen & Smith, 2008). In a study from Griffiths, Davies and Chappell (2004) adolescent gamers indicated that the most popular features of the games were the social ones, like the contact with others, the ability to support others and the possibility to be a guild member. Because the social factor is proposed to be highest among online games such as online-role playing games and shooters, this paper will have a closer look on online games, as well.

Social factors such as subjective norm, descriptive norm and social pressure can influence the behaviour of young people to a high degree (Wu & Liu, 2007; Lu & Wang, 2006; Ducheneaut, Yee, Nickell & Moore, 2006). The three social factors are interrelated in a way. Subjective norm can be defined as the "individual's perception of social pressure from

important others to perform the behavior" (Norman, Clark & Walker, 2005). Descriptive norm can also be explained in terms of social pressure. Descriptive norm can be experienced through social pressure to perform behaviour because of the belief "that important others also perform the behaviour" (Norman, Clark & Walker, 2005). Thus both terms refer to social pressure: The first one is an indirect feeling of pressure and the later a direct perceived behaviour of others. Furthermore, social pressure is directly carried out by others. In the following paragraphs the three variables are explained.

Subjective norm is a term which can be found in the Theory of Planned Behaviour (TPB) from Ajzen (Figure 1) and plays an important role in behaviour intention. According to the Theory of Planned Behaviour intention is one of the primary predictors of behaviour and, as such, also for game behaviour. The theory defines three variables which influence the planned behaviour: attitude, subjective norm and perceived behavioural control (Ajzen, 1985). Subjective norm refers to the perception one has of what peers, friends and so on expect (Wu

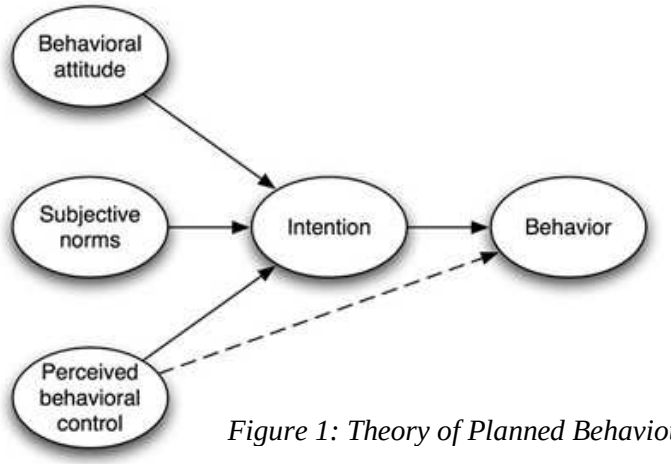

Figure 1: Theory of Planned Behaviour (Ajzen, 1985)

& Liu, 2007). It includes referent identification and norm compliance. The latter can be defined as performing the expectations of other people (Wu & Liu, 2007). The reasons for this can be that the person wants to belong to this person or to prevent hostility (Wu & Liu, 2007).

Wu & Liu (2007) believe that subjective norms have an impact on online game behaviour. A study from Lee and Tsai (2010) also points out that subjective norm is a critical factor in gaming behaviour of people. People are influenced by the wish "to act like others or think one should act" (Lee & Tsai, 2010). If adolescents see important others play games or hear they play games they start playing, too, because they think it is expected from them to have the same leisure activity. Although most gamers play for fun, Griffiths and Hunt found out that 25% of adolescents play because their friends did (Griffiths & Hunt, 1995). They also show that male gamers are more likely to begin with playing to impress their friends. These results also give support for the influence of descriptive norm on game behaviour. The study

can be interpreted both as influence of subjective norm and as influence of descriptive norm. Either they start playing because they think other expect it from them or because they observe important others and experience pressure to perform the same behaviour. A third explanation can be that the adolescent were really coerced to play.

The descriptive norm of playing games refers to the observation of the behaviour of important others. Students will start playing games because otherwise they think they do not belong to the group. A study from Lu and Wang (2006) detected descriptive norm to have a direct account for game addiction. Further they investigated that descriptive norm can also have a positive indirect effect. They stated that "online game players might derive more pleasure from playing games when their friends or significant others also participate" (Lu and Wang, 2006). These results demonstrate that the influence of friends is an important factor in the game behaviour. Less research is done on the gender difference regarding the descriptive norm.

Another important social factor is social pressure. Social pressure is a direct perceived force of other people to show a specific behaviour, e.g. gaming. Peer pressure is a classification of social pressure. In this study social pressure will be measured through the amount of perceived peer pressure. The persistence against the social pressure is developed between the age of 15 and 20. At a later age, most people can take an independent position (Jolles, 2007). Moreover it is proposed that females are less likely to follow peer pressure than males (Steinberg & Monahan, 2007). In the topic of gaming less research is done on the gender relations of peer pressure but as in the real life peer pressure can be a factor in playing games.

Results from studying the impact of online friends exist. World of Warcraft (WOW) for instance is a very popular MMORPG. Players can communicate with each other via "chat box" (Ducheneaut, Yee, Nickell & Moore, 2006). This is particularly important for so called "guilds". Guilds are longer-lived player associations which are needed to achieve goals in WOW (Ducheneaut, Yee, Nickell & Moore, 2006), guilds also exist in other online games and multiplayer games. Seay, Jerome, Lee & Kraut (2004) reveal that highly committed players play more than others who feel less committed to their guild. Thus guilds put a sense of social pressure on their members (Ducheneaut, Yee, Nickell & Moore, 2006). Furthermore it can be concluded that these guilds have unwritten norms. Arrangements will be made between members of guilds so that the members have to be online at a certain time. Behaviour and perception will be influenced through these norms (Hsu & Lu, 2004). In addition, many studies suggest that the social factors are important in playing online games (e.g. Kolo &

Baur, 2004; Ducheneaut, Yee, Nickell & Moore, 2006). In offline games the social factors are not available as much. The social experience is missing here because those games are mostly played alone.

All the studies just mentioned only identify that subjective norm, descriptive norm and social pressure influence the gaming behaviour positive but it is not clear if a specific peer group has greater impact than another. Also it is not explicit which impact these factors have on the time spent on offline gaming, the correlation with online games should be clear. Furthermore it has not been identified whether social factors have different influences on males than on females. Research on the influence of offline games is also limited and it must be clarified which impact these games have. Online games were already identified to influence the gaming behaviour. Thus, this study is designed to identify the peer group or groups which are responsible for the gaming behaviour and to show which influence offline games have on the gaming behaviour. Moreover it shall help to find differences between genders in case they exist. To explain the complex research a model was developed. The social factors, the peer groups and the game genres were integrated in the model. The TPB was used as a guideline to integrate all the variables. This model can be visualized as shown in Fig. 2. Descriptive norm, subjective norm and social pressure are all influenced by classmates, friends and online-friends, and differently for on-line games and off-line games. The three norms control the intention to play and, thereby, ultimately the gaming behaviour.

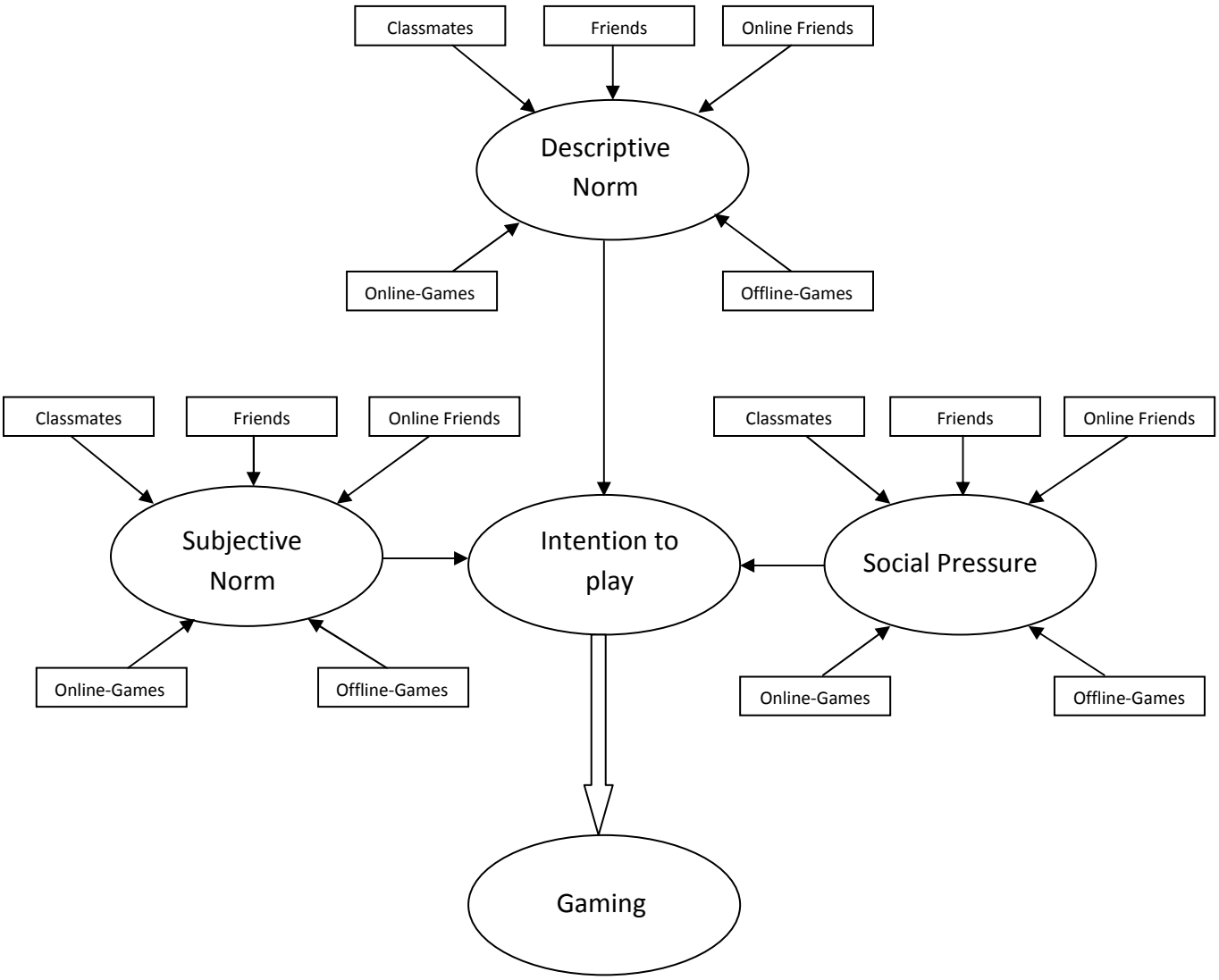

Figure 2: Model of Social Influences on Gaming

In the following, nine hypotheses were established to test the research questions. The social factors referred to the influence of subjective norm, descriptive norm and social pressure variables. The first hypotheses were also suggested by earlier studies, so the same results were expected:

1. *Males spent significantly more time on gaming than females.*
2. *Males are more likely to be addicted to games than females.*

Males and females were suggested to be differently associated with social factors, but no such relationship was proposed in the gaming topic up to now:

3. *Males score higher on the social factors than females.*

It was stated that there is a positive relationship between descriptive norm, social pressure and the amount of time spent on games. Moreover a negative relationship with subjective norm was suggested because the more the adolescents have the idea that the peer groups find they

should not game too much, the less they game and thus have a lower score on the amount of time spend on games. The same should be true for the fifth hypothesis:

4. *There is a relationship between the social factors and the amount of time spent on games.*
5. *There is a relationship between the social factors and game addiction.*

It was also stated that online friends correlate more with descriptive norm and social pressure. Also a positive correlation was proposed regarding the subjective norm:

6. *Online friends are more associated with game behaviour than classmates and friends in the real life.*
7. *Online friends are more associated with game addiction than classmates and friends in the real life.*

Also differences regarding game genres (online and offline gaming) were suggested:

8. *The social factors are more strongly associated with online gaming than with offline gaming.*

At last it was questioned which variables can predict the game addiction scale:

9. *The social factors and gender predict the game addiction scale.*

Research Method

Procedure and Subjects

Because it is difficult to identify at risk adolescents gamers, the recruitment took place at 2 different education level schools in the Netherlands: Secondary education and vocational education. It was proposed that with the help of teachers more students will participate in the study as otherwise. Furthermore, the chance was high to find some gamers. The schools received information about the study from a researcher. Then teachers were asked to give a questionnaire to their students. The questionnaire was established to identity influences of different variables on the gaming behaviour of adolescents. With the support of the teachers the adolescents filled in the questionnaire and sent it back to the University of Twente.

The total sample consists of 1525 adolescents aged 12 to 24 years (Table 1). The adolescents were students from secondary education and vocational education. From all of the students 881 (219 females and 662 males) indicated that they played games during the last six months. Because the relevant questions only ask for gaming behaviour, non-gamers were excluded. The following criteria were used to select the gamer sample.

Table 1:

Demographic variables from the whole sample by Gender

	N = 1525	Mean	SD	Maximum
Females	702			
Gamers	219			
Gamehours		8.48	15.83	99.00
Non-gamers	483			
Male	815			
Gamers	662			
Gamehours		25.21	41.03	388.75
Non-gamers	153			

First, the data was corrected by excluding students who have not answered all of the questions so that the data is free of missing values (Table 2). Second, students who played more than 90 hours per week (h/week) were deleted because this was an unrealistic value for a student and that those data were falsely entered. Further students who give the answer “not relevant” to all of the three variables from the social factor variables were excluded. For students who wrote only sometimes “not relevant” the scale was reversed to “totally never”.

Table 2:

Missing Values for the relevant Variables

	N
Gender	3
Gamers yes/no	4
Gamehours by Gamers	8
Subjective Norm Construct	616
Descriptive Norm Construct	263
Social Pressure Construct	426

As a consequence, the analysis of the data was done with 496 students. From these students 98 were females and 398 were males. The students ranged between 13 and 22 years (Table 3). Further 362 students were from secondary school and 134 were students from vocational education (Table 3).

Table 3:

Demographic Variables by Gender

	N	Mean	SD
Females	98		
Age		15.57	1.53
Secondary school	79		
Vocational education	19		
Males	398		
Age		15.75	1.56
Secondary school	283		
Vocational education	115		

Measuring instrument

The data were collected through a cross-sectional survey. The measuring instrument was a questionnaire (see Appendix 1) which contains questions about gaming behaviour and social influences. In total 50 questions were asked, but for this paper only 8 constructs of the questionnaire were important. The relevant questions asked about demographics, gaming behaviour, game addiction, subjective norm, descriptive norm and social pressure. In the following the constructs were illustrated separately.

Demographics. The first relevant constructs were included to test differences between relevant variables and gender or rather ages. For gender one of the two options had to be marked with a cross. Ages was assessed by the date of birth, which was converted into age values.

Gaming behaviour. The questions 14 through 15 were designed to address the particular gaming activities of the participant. Gaming behaviour on weekdays and weekend days during the past six months was measured using multiple items. First respondents were asked how many days they played games of the following genres on a weekday (Monday – Thursday): MMORP's, online shooters, online racing games, other MMO's, small flash games, social games, single player RPG, single player shooters, single player racing games and other offline games. The time spent on playing for each of the genres which were played by the respondent was further estimated. The time must be reviewed in minutes and hours per weekday. Respondents were also asked how often they play these games on a weekend day (Friday –

Sunday). Furthermore they also have to specify how much time they spent on playing these games. Total play time per genre was later calculated by multiplying the time spent on a weekday with the number of weekdays, the same was done with the weekend days. Then the total amount of weekday playtime was added to the total amount of weekend playtime. This variable is called GH. Two other variables were developed to further analyze the game behaviour. OnH referred to the total amount of online games played per week and OfH defined the total amount of offline games played per week. Under the category of online games the following genres were included: MMORPG's, online shooters, online racing games, other MMO's, small flash games and social games. Flash games were defined as online games because these games can only be played online. The other games were specified as offline games: single player RPG, single player shooters, single player racing games and other offline games.

Game addiction scale. In this construct 7-items were included to measure the amount of game addiction (question 20). This is the short version of the game addiction scale developed by Lemmens, Valkenburg and Peter (2009). It was asked how often the respondents displayed a certain gaming behaviour in the last half year. The content of the questions were the feelings of the gamers themselves and about the relationship between the gamer and other people or things. Further the influence of these things was assessed. The 7-items of the game addiction scale refer to the following topics (Lemmens, Valkenburg & Peter, 2009):

1. Salience
2. Tolerance
3. Mood modification
4. Withdrawal
5. Relapse
6. Conflict
7. Problems

Game addiction was then measured by the following items, beginning with "How often in the last six month...": "Did you think about playing a game all day long?"; "Did you spend increasing amounts of time on games?"; "Did you play games to forget about real life?"; "Have others unsuccessfully tried to reduce your game use"; "Have you felt bad when you were unable to play?"; "Did you have fights with others (e.g., family, friends) over your time spent on games?"; "Have you neglected other important activities (e.g., school, work, sports)

to play games?". Respondents have to judge the questions on a five-point-scale ranging from "never" to "very often".

To calculate the game addiction scale construct (GAS construct), the means of the seven items were established. Further a reliability analysis was conducted to see how well the items correlate with each other. The internal consistency for the seven items is good (α = .78; Table 4). This cannot be increased by the deletion of an item, so all seven items were used for the GAS construct. Further another variable was computed by dividing the scale in at risk and not at risk adolescents. Respondents with a mean value between 1 and 3 belong to the "not at risk group" and the other to the "at risk group" (3 to 5). The reason for a bisection of the scale was that most of the adolescents scores were on the "never" and "rarely" scales (85.3 %). Only a few adolescents indicated "often" (N = 5) and "very often" (N = 1) at the GAS scale (1.2 %). So the addicted group was very small and it was chosen for only bisection the scale. The adolescents who are in the "at risk group" can also be already addicted, but in this study a more gentle term was used.

Table 4:

Reliability Analysis for Game Addiction Scale and the Social Variables (N=496).

Construct	Number of Items	Cronbach's alpha (α)	M	SD
Game addiction scale	7	.81	1,78	.68
Subjective norm	3	.94	1.81	1.04
Descriptive norm	3	.78	2.12	1.03
Social pressure	3	.87	1.64	.82

Subjective Norm Peers. The construct of the subjective norm was measured with question 38. Three statements were established to assess the feeling of expected gaming behaviour by different peer groups. The peer groups from which influence was supposed are: classmates, friends in the real life (RL), and online friends. For each of the peer groups the respondents should tell how much it applied to them ("My classmates/friends/online friends find that I should not game too much".). The answers were given on a five-point Likert scale ranging from "totally disagrees" to "totally agree". For the non gamers the option not relevant was given. Before calculating a new construct it was tested if the items have internal consistency. Cronbach's Alpha for the subjective norm variable was high (α = .94; Table 4). All items were then integrated in the new construct. To analyse the influence of the whole subjective

norm variable, the mean of the three constructs was estimated which is called SN construct in the following.

Descriptive Norm Peers. In addition three questions were asked to measure the descriptive norm construct (question 36). The same peer groups as in the subjective norm variable are relevant here. To measure the descriptive norm it was asked: "How many of your classmates/friends/online friends game too much?" The scale ranged from "nearly nobody" to "nearly everybody". Furthermore for the non gamers the option "not relevant" was given. The internal consistency between the three items of the descriptive norm is high ($\alpha = .78$; Table 4) and cannot be increased. So the mean was established between all three variables. In the following, this construct is called DN.

Social Pressure Peers. Question 37 measured the social pressure construct where pressure regarding to the game behaviour was evaluated. The amount of pressure was assessed by asking questions about the peer group of the respondent. For each of the peer group a separate question was asked: "How often do you have the feeling that your classmates/friends/online friends will that you play longer?" The questions had to be answered on a five-point scale ranging from actually never to very often. A further scale was added for the respondents who think that this question was not relevant for them. A reliability analysis of the three items displayed a high internal consistency ($\alpha = .87$; Table 4). Then, the total mean of the social pressure variable was computed in the SP construct.

Data analyses

First, reliability analyses were made to measure the reliability of the item constructs. The reliability analysis made use of the Cronbach's Alpha value. Further descriptive statistics were done for different variables: Game hours, Game addiction, Social variables and Gender. Second, t-tests were established to examine significant differences among genders. Because the criteria of a normal distribution were not met, both the Mann-Whitney U test and the t-test were estimated. Because both tests provided the same results, the parametric t-test was used. Also correlation analyses were used to detect relationships between variables. At last, regression analyses were carried out to test if the social variables can lead to an improvement for the model of game addiction.

Results

The mean age of the sample was 16 years for the total sample. The mean playing time of both genders was 17.12 hours per week (h/week). Differences in the playing time between genders can be identified with males playing on average 19.16 h/week and females 8.85 h/week (Table 5). Further differences between genres of games can be seen. Overall, online games were played more than offline games for both genders. The score on the game addiction scale is also higher for males (1.86) than for females (1.46) (Table 5). In percentages, 3.1 % of the females and 6.0 % of the males show a high risk to develop a game addiction. The total addiction risk of the sample is 5.4 %. Moreover the scores of the social factors (SN, DN and SP) are higher for males (Table 5).

Table 5:

Means and standard deviations of the gamers' characteristics by gender

	Females (N=98)		Males (N=398)	
Characteristics	Mean	SD	Mean	SD
Age	15.57	1.53	15.75	1.56
Game Behaviour				
Total amount of game hours (GH)	8.85	16.02	19.16	18.50
Total amount of online hours (OnH)	5.38	12.01	12.74	15.85
Total amount of offline hours (OfH)	3.47	6.87	6.41	10.24
Game addiction scale (GAS)	1.46	0.68	1.86	0.60
Social Variables				
Subjective norm (SN)	1.55	1.05	1.87	1.03
Descriptive norm (DN)	1.59	0.77	2.25	1.04
Social pressure (SP)	1.29	0.53	1.73	0.85

Note.

The social variables are the construct of the items.

The mean data indicates higher values for males than for females regarding game behaviour and game addiction scores (GAS). For the first hypotheses (H1: Males spent significant more time on playing games than females) it was tested if these differences between the means are significant. A significant difference between the two genders and the game hours (GH) was evaluated ($t = 5.07$; $p<0.01$). Consistent with gaming behaviour, males also score higher on the addiction scale than females. Consistent with the second hypotheses (H2: Males are more likely to be addicted to games than females), results indicated a significant difference between the two genders and the GAS ($t = 5.33$; $p<0.01$). Further differences between the social factors and gender were proposed (H3: Males score higher on subjective norm/descriptive norm/social pressure than females). Differences were already seen by comparing the mean data. Males tend to score higher on all of the social variables. The tests also detected a significant difference between gender and the SN, DN and SP variables (Table 6).

Table 6:

T-Values for Social Variables tested with gender

Social variables	t
SN	2.78*
DN	5.81*
SP	4.86*

* T-test is significant at the 0.01 level

Consistent with the fourth hypothesis (H4: There is a positive relationship between descriptive norm/social pressure and the amount of time spending on games and a negative one between subjective norm and the amount of time spending on games) a correlation between these factors was found ($p<0.01$), see Table 7. Positive correlations between SN, DN and SP were detected. Inconsistent with the hypothesis a positive correlation for SN was found although a negative one was expected. Small differences between the values can be established. The correlation values of DN and SP seem to be higher than the value for SN. Further a positive relationship with all three social variables and the GAS ($p<0.01$) were identified, see Table 7. Again there is a positive correlation with subjective norm, although a negative one was proposed by the fifth hypothesis (H5: There is a positive relationship between descriptive norm/social pressure and the game addiction scale and a negative one between subjective norm and game addiction scale). A trend can be observed towards a higher

correlation of DN and SP, although all values are significant. When comparing GH and GAS, it seems that GAS is a better indicator than GH for the association with the social variables because values are higher here. Yet, all indicators were significant.

Table 7:

Correlations between the Amount of Gaming Hours, Game Addiction Scale and the Social Variables

	1	2	3	4	5
1. Game Hours (GH)	-	-	-	-	-
2. Game Addiction Scale (GAS)	.51*	-	-	-	-
3. Subjective Norm (SN)	.16*	.17*	-	-	-
4. Descriptive Norm (DN)	.39*	.44*	.22*	-	-
5. Social Pressure (SP)	.32*	.39*	.44*	.57*	-

* Correlation is significant at the 0.01 level

For the next two hypotheses the correlation with the peer groups: classmates (CL), friends in the real life (FR) and online friends (OF), was tested. First, it was suggested that OF correlates more with the game behaviour than CL and FR (H6). For SN, DN and SP a positive correlation was proposed. For SN a positive correlation was proposed because OF are the ones who will not stop the game behaviour but will increase it. Inconsistent with the hypothesis it was found that all peer groups have a significant positive relationship with the amount of time spend on games ($p<0.01$), see Table 8. A tendency toward a greater correlation with friends and online friends can be identified when comparing the correlation values.

Results of the tests for the seventh hypothesis (H7: Online friends are more associated with game addiction scale than classmates and friends in the real life) indicated that there were also no significant differences between peer groups regarding the GAS. For all peer groups the correlation was positive and significant. Although no differences between peer groups were found, a small tendency toward a greater correlation with friends and online friends can be established.

Table 8:

Correlations between Game Hours/Game Addiction and the Peer Groups of the Social Variables

	1	2
1. Game Hours (GH)	-	-
2. Game Addiction Scale (GAS)	-	-
Subjective Norm		
3. Classmates (CL)	.14*	.13*
4. Friends (FR)	.17*	.17*
5. Online Friends (OF)	.12*	.18*
Descriptive Norm		
6. Classmates (CL)	.17*	.27*
7. Friends (FR)	.38*	.40*
8. OF	.39*	.41*
Social Pressure		
9. Classmates (CL)	.24*	.28*
10. Friends (FR)	.30*	.34*
11. Online Friends (OF)	.30*	.39*

* Correlation is significant at the 0.01 level

After comparing the GH with the social factors of the peer groups, a comparison with the two game genres (OnH and OfH) was done. Consistent with the hypotheses (H8: Subjective norm/descriptive norm/social pressure are more strongly associated with online gaming than on offline gaming) it was found that SN is more associated with online game behaviour ($p<0.01$) than with offline game behaviour ($p>0.01$), see Table 9. With regard to online games, a small tendency toward a higher correlation with FR can be identified. The peer groups of the DN and SP variable correlate significant and positive with online games, too ($p<0.01$). In both cases a small tendency towards a higher association with OF can be discovered. Interestingly it was found that OfH was not significant among all peer groups of the social variables DN and SP. The DN with respect to OF is not associated with offline game behaviour. In comparison, the two other peer groups are significant with a greater correlation with FR ($p<0.01$) than CL ($p>0.01$). The pressure (SP) to play offline games is more experienced from FR ($p<0.01$) than from OF ($p>0.01$), with no significant correlation with CL.

Table 9:

Correlations between Online/Offline Game Hours and the Peer Groups of the Social Variables

	1	2
1. Online Hours (OnH)	-	-
2. Offline Hours (OfH)	-	-
Subjective Norm		
3. Classmates (CL)	.15**	.04
4. Friends (FR)	.16**	.06
5. Online Friends (OF)	.12**	.03
Descriptive Norm		
6. Classmates (CL)	.15**	.09*
7. Friends (FR)	.34**	.19**
8. Online Friends (OF)	.42**	.08
Social Pressure		
9. Classmates (CL)	.23**	.09
10. Friends (FR)	.26**	.17**
11. Online Friends (OF)	.30**	.10*

** Correlation is significant at the 0.01 level

* Correlation is significant at the 0.05 level

So far only variables were tested. Now predictors for the GAS were estimated. For the next hypotheses (H9: All three social variables have a predictive influence on the game addiction scale) a significant relationship between the variables was found ($F(3, 492) = 45.82$; $p<0.0001$). The analysis for the individually variables showed a non significant relationship with the SN construct ($t = 0.29$; $p>0.01$), see Table 10. At least it was tested if gender is a further addictive value for the GAS prediction (H10). Because SN was no predictor, the analysis was done with only DN, SP and gender. Results indicate that DN, SP and gender are good predictors for the addiction scale ($F(3,492) = 49.22$; $p<0.0001$), see Table 11.

Table 10:

Regression Analyses with the Game Addiction Scale and the Individually Social Variables

	B	t
Subjective Norm (SN)	.01	.29
Descriptive Norm (DN)	.21	6.58*
Social Pressure (SP)	.17	3.81*

* Significant at the 0.0001 level

Table 11:

Combined Regression Analysis with Game Addiction Scale, Social Variables and Gender

	B	t
Descriptive Norm (DN)	.20	6.07*
Social Pressure (SP)	.16	4.03*
Gender	-.20	-2.84*

* Significant at the 0.01 level

Discussion

The aim of this study was to examine the motivation to play games and to get more insight in the game behaviour of adolescents. More specifically, the influence of social factors on gaming behaviour and on game addiction scores of adolescents was the topic of interest. The influence of subjective norm, descriptive norm and social pressure was estimated through a cross-sectional study. Students from secondary education and from vocational education in the Netherlands were subjects of this study. The research questions of whether social factors have a positive correlation on game behaviour were assessed through eight hypotheses.

The first hypothesis was that males spent significantly more time on gaming than females. The results were consistent with the hypothesis and with earlier research (Van Rooij, Schoenmakers, Meerkerk & Van de Mheen, 2008; Yee, 2006). Males spent twice as much time on gaming than females. A further difference can be seen by comparing the sample size of the two genders. Of the total sample males spent more time on gaming than females. The prevalence can also be seen by using another criterion: the sample size. In the present study, more males than females were included. A further difference can be seen by comparing the whole sample before selection. Explanations can be that adolescent females have other

interest like shopping and talking (Chou & Tsai, 2007). Moreover stereotypes regarding gaming exist. Males were the ones who were associated with playing games. These stereotypes also dominate the game industry, although today more games for females were developed than in the past (Hartmann & Klimmt, 2006), males are the ones who buy 75-80% of the games (Natale, 2002).

Males were also identified to be at higher risk to develop a game addiction than females (Haugle & Gentile, 2003). The second hypothesis tested if this was also the case in this study. As mentioned in the "Method" section, 1.2 % of the respondents of this sample score high on the GAS. This rate is smaller than the rate found by Van Rooij, Schoenmakers, Meerkerk and Van de Mheen (2008). They detected a rate of 3.2 %. The difference may come from the different sample size. The study from 2008 included 4475 students ranging from 13 to 16 years. The present study only implied to 496 students. To go a step further, 5.4 % tend to be at risk to develop game addiction in this sample if only bisection the sample.

To test if there is also a gender gap regarding the social factors, the third hypothesis was stated. Consistent with earlier studies (Griffiths & Hunt, 1995; Steinberg & Monahan, 2007) a gender difference between subjective norm and social pressure was found. Also less research is done after the gender differences within descriptive norm, the correlation was also significant. This may suggest that males are the ones who were more likely to be influenced by social factors than females.

The fourth and fifth hypotheses searched for a correlation between the social factors and the amount of time spending on games and the game addiction scale. The findings of the present study are consistent with earlier studies (Wu & Liu, 2007; Lu & Wang, 2006; Ducheneaut, Yee, Nickell & Moore, 2006). It was suggested that descriptive norm and social pressure correlate positive with the amount of time spending on games and the game addiction scale. Consistent with the hypotheses a positive correlation was found. In particular, the more they play and the more they feel addicted, the more they have the feeling that the peer group or groups influence they game behaviour. This indicates that the more time adolescents spend on games the higher their scores on the social factors are. Furthermore, a negative correlation with subjective norm was proposed. It was suggested that the more they have the feeling that the peer groups want them to play less, they also play less. Inconsistent with the hypothesis a positive one was found. Also the game addiction scale should be negatively correlated. Yet, this was not the case. One explanation may be that the more they play and are addicted, the more they have the feeling that the peer groups want them to play less. Through cross-sectional data the unexpected correlation can be explained. Only

associations can be drawn from cross-sectional studies. To test causal relationships a longitudinal design is needed. Another suggestion was that the subjective norm variable has only small validity. Although the reliability of the subjective norm variables is very high, the construct maybe has small validity. It seems that the subjective norm variables do not measure what it pretends to measure.

Further it was established which of the peer groups were manly associated with gaming behaviour of adolescents with the sixth hypothesis. It was proposed that online friends correlate more with social variables (descriptive norm & social pressure) on the gaming behaviour than the other peer groups. Moreover also a positive correlation between subjective norm and online friends was proposed by the sixth hypothesis. Online friends are the ones who play with them. So they wish that the gamer play more and not less. Earlier studies also determined the influence of online friends (Ducheneaut, Yee, Nickell & Morre, 2006) but less research is done after the influence of classmates and friends. Contrary to the hypotheses it was discovered that the whole peer group has a positive significant correlation with the gaming behaviour of the adolescents. Only small tendencies towards a greater association with friends and online friends can be detected. Similar to the sixth hypothesis the seventh hypothesis determined the correlation with the game addiction scale. Findings were consistent with the results just discussed. Although friends were defined as real life friends in the study respondents may integrate their online friends as their friends. A study from Smyth (2007) suggested that people reduce the time with real life friends so that they spend more time online. The time they spend online is not only due to play "but also to socialize and form social networks or connections with online friends" (Smyth, 2007). The less they spend time with real life friends the more they integrate their online friends also as real friends. Moreover, another argument is that it may be possible that real life friends were now online friends. Research in this topic is limited. But studies exist in which people indicated that they play because they friends did (Griffiths & Hunt, 1995). So if they become addicted they have no real life and normal friends anymore and friends may become online friends then.

Further differences between the types of games were proposed by hypothesis eight. The games were divided into online and offline games. In online games the social factors tend to be more available than by offline games (Van Rooij, Schoenmakers, Meerkerk & Van de Mheen, 2008). They feel socially integrated by communicating with other gamers (Ducheneaut, Yee, Nickell & Moore, 2006). So also the time spent on online games should correlate higher with the social factors than with the time spend on offline games. The influence of friends and online friends on the game behaviour was already tested (Griffiths &

Hunt, 1995; Ducheneaut, Yee, Nickell & Moore, 2006) but not within the topic of all three social variables. Research is also limited in the topic of classmates. Further less research was done after the influence of peer groups on offline games. Consistent with the hypothesis, it was found that subjective norm correlates more strongly with online than with offline game behaviour. Inconsistent with the hypothesis, descriptive norm and social pressure was found to correlate with both types of gaming behaviours. For the descriptive norm variable, no association with online friends on offline games was found. This can be logically explained. By offline games gamers cannot communicate as by online games. So the association is smallest here because motivation to play may be more intrinsic. Descriptive norms to play offline games can thus come from classmates and friends. The control if someone really plays games may take place when they meet in their real life. When someone cannot discuss a specific game within the peer group, he/she feels excluded. Although the correlation with classmates is not significant for offline games, the correlations with friends and online friends (to a lesser degree) are significant for the social pressure variable. Whatever the explanation of the correlation with online friends, the correlation with friends is clear. A higher correlation with friends regarding online games can also be detected by both descriptive norm and social pressure. For online games a tendency towards a higher correlation with friends and online friends can be found by all three social variables. The association with online friends and friends is likely the same as explained above. People can communicate with online friends only in online games (Drachen & Smith, 2008). The social factor is highest in these games (Van Rooij, Schoenmakers, Meerkerk & Van de Mheen, 2008), so the association with the social variables should also be highest.

The last hypothesis tested a model to predict the game addiction scale. Descriptive norm and social pressure were found to be predictive variables. Further gender was also an additive predictor. The question arises again if subjective norm variable maybe has a small validity. For developing a game addiction model these factors should thus be included.

In summary, males play significantly longer games than females. Further males tend to have a higher addiction risk than females. The social factors correlate with the time spending on games and the game addiction rate. A tendency towards a greater association with friends can be seen regarding the amount of time spending on games because norm's influence. Descriptive norms and pressure to play online games is mostly perceived from friends and online friends. For both an association with friends with respect to play offline games exist. Moreover, descriptive norm and social pressure are good predictors of the game addiction scale. Also gender is an additive factor for this model.

Thus, friends in the real life are the ones with a tendency towards a higher correlation with game behaviour of adolescents for all social factors. In further analysis peer groups can be reduced to RL friends and online friends because classmates only have a small association with adolescents overall. Further, a lot of adolescent have friends within the class, so classmates are also friends for them. This can explain the small correlation with classmates because they were integrated as friends or maybe online friends but not integrated as class mates in this study.

Limitations of this study are that only students of two levels of schools were included in the study. Another limitation is that the data included all types of gamers ranging from low to high play time. For further studies on the influence of social factors on gamers it would be better to include other adolescents and search for at risk gamers. Then, the data will be more reliable and can better be tested for the real influence factors. A final limitations was that the instructions how to fill in the questionnaire were not respected from all respondents. For further studies, a better instruction how to fill in the questionnaire would be helpful, so that the amount of wrongly filled questionnaires will be smaller. As can be seen in Table 2, 616 respondents have left the subjective norm construct, although a “not relevant” option was given. Getting more and more insight in the gamers behaviour permitted to design an intervention study so that the game addiction rate could decrease. At last it should be mentioned that not all adolescent gamers are at risk to get addicted. It has to be carefully selected which adolescents need help and should be included in an intervention study.

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Appendix

Appendix 1: Questionnaire (Questions 3-4, 14-15, 20, 37-38)

3. What is your gender?

4. What is your date of birth?

14. Beneath are some type games. You must say per type how often you play these games on the week (Monday to Thursday).

	Days	Hours	Minutes
MMORPG's (e.g. World of Warcraft)			
Online shooters (e.g. Call of Duty)			
Online race games (e.g. Forza via Xbox Live)			
Different MMO's, namely:			
Browser games (e.g. via Spele.nl)			
Social games (e.g. Farmville, Mafia wars)			
Single player shooters (e.g. Call of Duty, Gears of War campaigns)			
Single player RPG (e.g. Oblivion)			
Single player racing game (e.g. Burnout)			
Different Offline games, namely:			

15. Beneath are some type games. You must say per type how often you play these games on the weekend (Friday to Sunday).

	Days	Hours	Minutes
MMORPG's (e.g. World of Warcraft)			
Online shooters (e.g. Call of Duty)			
Online race games (e.g. Forza via Xbox Live)			
Different MMO's, namely:			
Browser games (e.g. via Spele.nl)			
Social games (e.g. Farmville, Mafia wars)			
Single player shooters (e.g. Call of Duty, Gears of War campaigns)			
Single player RPG (e.g. Oblivion)			
Single player racing game (e.g. Burnout)			
Different Offline games, namely:			

20. How often in the last six month…

	Never	Rarely	Sometimes	Often	Very often
Did you think about playing a game all day long?					
Did you spend increasing amounts of time on Games?					

Did you play games to forget about real life?					
Have others unsuccessfully tried to reduce your game use?					
Have you felt bad when you were unable to play?					
Did you have fights with others (e.g., family, friends) over your time spent on games?					
Have you neglected other important activities (e.g., school, work, sports) to play games?					

36. Mark in each row the box which applies most to you.

	Nearly nobody	Less than the half	About the half	More than the half	Nearly everybody	Not relevant
How many of your classmates game too much?						
How many of your friends game too much?						
How many of your online friends game too much?						

37. Mark in each row the box which applies most to you.

	Never	Little	At times	Frequently	Very often	Not relevant
How often do you have the feeling that your classmates will that you play longer?						
How often do you have the feeling that your friends will that you play longer?						
How often do you have the feeling that your online friends will that you play longer?						

38. Mark in each row the box which applies most to you.

	Totally disagrees	Disagrees	Not disagrees/ not agree	Agree	Totally agree	Not relevant
My classmates find that I should not game too much						
My friends find that I should not game too much						
My online friends find that I should not game too much						