

# The Prevalence of Problematic Video Gamers in The Netherlands

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## Abstract

This study surveyed Dutch adolescents and adults about their video gaming behavior to assess the prevalence of problematic gaming. A representative national panel of 902 respondents aged 14 to 81 took part in the study. The results show that gaming in general is a wide-spread and popular activity among the Dutch population. Browser games (small games played via the internet) and offline casual games (e.g., offline card games) were reported as most popular type of game. Online games (e.g., massively multiplayer online role-playing games) are played by a relatively small part of the respondents, yet considerably more time is spent on these online games than on browser games, offline casual games, and offline games (e.g., offline racing games). The prevalence of problematic gaming in the total sample is 1.3 percent. Among adolescents and young adults problematic gaming occurs in 3.3 percent of cases. Particularly male adolescents seem to be more vulnerable to developing problematic gaming habits.

## Introduction

ALTHOUGH SEVERAL STUDIES show that playing video games may have beneficial effects,<sup>1,2</sup> most research on video game behavior has focused on the negative effects on gamers. Currently, there is some evidence that playing videogames may have serious negative effects, including the risk for some people to develop addictive patterns of gaming.<sup>3-8</sup> A study by Gentile<sup>9</sup> revealed that among a national sample of American youth aged 8 to 18 years, 8.5 percent of the gamers showed problematic gaming behavior (PGB). Salguero and Moran<sup>7</sup> found similar results with a prevalence of 9.9 percent problematic gamers among Spanish adolescents aged 13 to 18 years. Rehbein, Kleimann, and Mößle found a lower prevalence among German adolescents; 1.7 percent was considered as a problematic gamer and 2.8 percent was considered as at risk for developing problematic game behavior.<sup>9</sup>

The problematic gaming patterns that these excessive gamers display are associated with a range of problems such as poorer grades, attention problems,<sup>10</sup> reduced sleep time, limited leisure activities,<sup>9</sup> lower self-esteem and lower satisfaction with daily life.<sup>11</sup> It is also suggested that problematic gamers substitute real human contact and relationships by virtual relationships in the online world.<sup>12,13</sup>

Although "video game addiction" is currently not included as a mental disorder in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), it may be included in 2012 according to the American Psychiatric Association.<sup>14</sup> This

implies that consensus on a definition of problematic gaming is not yet reached. Currently, in many studies a definition that is derived from the DSM-IV criteria for pathological gambling is applied.<sup>7,10,15</sup> These criteria also share some core characteristics with Brown's<sup>16</sup> 'components' model of addiction. Although there are people who experience considerable problems related to their gaming behavior,<sup>17</sup> there is no agreement on whether problematic gaming can be seen as pathological. Therefore, criteria used to measure pathological gaming should be considered as criteria to measure problems associated with game behavior instead of symptoms of pathological behavior. LaRose, Lin, and Eastin also suggested that media addiction is overstated, and that in many cases the symptoms that these addicted individuals display should be considered as problems that are within the capability of the individual to correct.<sup>18</sup> For this reason the term PGB will be used in this study instead of pathological video game use or game addiction.

Until now, most studies on problematic gaming have focused on children or adolescents and have used fairly small convenience samples.<sup>7,19,20</sup> In the Netherlands a few studies were conducted on gaming habits and prevalence of PGB among adolescents.<sup>15,21</sup> With the development of new gaming console machines and the use of the Internet for gaming, new games were introduced that enable people to play together online. Many different genres and platforms are available and games are also popular among adults.<sup>5,22</sup> This implies that PGB may also occur among adult gamers. However, reliable data from older age groups are largely lacking.

The first purpose of the present study was to assess the gaming habits of a representative national sample (aged 14–81 years) in the Netherlands. The second purpose was to estimate the prevalence of PGB among both Dutch adolescents and adults. The third purpose was to identify some general risk factors, such as demographic characteristics, and game characteristics, that may be associated with PGB. Problem awareness was also assessed to compare a subjective measure of PGB with a validated scale.<sup>15</sup>

## Methods

### Sample and procedures

Subscribers to a national panel which represents the Dutch population were invited via email to participate in an online survey. In May 2009 the data were collected by a for-profit research and consultancy company using a stratified random sampling method that employed demographics as strata. In total, 3,200 subscribers were invited to participate in the study before the number of 900 respondents was reached (nonresponse was 72 percent). No differences were found on any of the demographic variables between the nonrespondents and the participants.

The demographics and gaming prevalence of the 902 Dutch residents that took part in the study are shown in Table 1. There were 47.1 percent male ( $n=425$ ) and 52.8 percent female participants ( $n=476$ ). The general population in Netherlands consisted of 49.5 percent males and 51.5 percent females at the time of this study (CBS, 2009). The participants' age range was 14 to 81 years ( $M=44.54$ ,  $SD=16.6$  years). Regarding both gender and age, this sample is a reasonable representation of the Dutch population. It should be noted that due to the stratified sampling method used in this study, women were stratified until there were as many women as men in the sample, it is possible that there is an over representation of women who are well familiar with technology. However, the main purpose of this study was not to focus on differences among gamers within the gender groups.

TABLE 1. DEMOGRAPHICS AND PREVALENCE OF GAMERS IN TOTAL SAMPLE ( $n=902$ )

	n	Percent	Prevalence gamers percent
Gender			
Men	425	47.1	39.1
Women	476	52.8	58.2
Unknown	1	0.1	-
Age			
14–29	214	24	71.0
30–44	209	23	56.5
45–59	280	31	45.7
60 >	199	22	22.6
Total	902	100	49.1

Note: Total sample versus census population (CBS, 2009): 8.2 percent were under 20 years of age (census population=7.3 percent), 22.6 percent were aged 20–34 years (census population=18.1 percent), 56.4 percent were aged 35–64 years (census population=43 percent), and 12.9 percent were over 65 years of age (census population=11.2 percent).

## Measures

**Demographic characteristics.** Gender and age were assessed, in addition to educational level and occupational status. For occupational status respondents reported which situation best described their current occupation (see Table 2). Respondents who were scholars or students reported their current education level; the rest of the respondents reported the highest education level they completed (see Table 2).

**Game genre.** Respondents were asked which type of game (e.g., massively multiplayer online role-playing games [MMORPG], sport games, browser games) they most frequently played and whether they played this genre usually online or offline. The different game types were then categorized into four broad video game genres: browser games, offline casual games, online games, and offline games (see Table 3). Respondents were categorized in one of these four genres according to their most frequently played game type, which was assessed by asking which game genre they played most of the time.

**Game use.** To measure game use an average total weekly playing time was obtained. First, respondents were asked whether they played any games during the past 3 months, to assess *prevalence of recent gaming*. If they answered yes, respondents were asked to estimate how many hours they play on an average weekday and how many weekdays they usually play each week. Total playing time was calculated by multiplying the hours played on a typical weekday (Monday–Thursday) with the number of weekdays that the respondent reported playing. Likewise, the total playing time on weekend days (Friday–Sunday) was calculated and added to the total on weekdays.

**Problematic gaming behavior.** To measure awareness of PGB a subjective measure of PGB was used with the following three items: 'I think I spend too much time on gaming', 'I think my game behavior is problematic', and 'I think I'm going to seek help' (scale ranged from (1) "certainly not" to (5) "certainly";  $\alpha=0.81$ ,  $M=4.5$ ,  $SD=2.05$ ). A score of 4 or 5 was coded as presence of awareness and a score below 4 was coded as absence of awareness. The first item was used to estimate initial problem awareness. A high score ( $>4$ ) on at least one of the two latter items was scored as a dichotomous measure of high problem awareness.

Additionally, a Dutch translation of the game addiction scale (GAS) was used. This scale is developed to measure pathological gaming in an adolescent population although it was used across a wider age range.<sup>15</sup> The short version of the scale includes 7 items and is based on the pathological gambling criteria found in the DSM. Validity tests demonstrated strong construct validity of the scale.<sup>15</sup> As pointed out in the introduction, in this study these criteria are considered to measure problems related to game behavior instead of measuring symptoms of pathological behavior. Each statement is scored on a 5-point Likert scale (1="never", 2="virtually never", 3="sometimes", 4="often", 5="very often"). The internal consistency ( $\alpha=0.85$ ,  $M=1.4$ ,  $SD=0.54$ ) is above aspiration level ( $\alpha>0.70$ ).

In this study a monothetic format is used to determine problematic gaming. Lemmens<sup>15</sup> suggested that the use of a

TABLE 2. DEMOGRAPHICS, PLAYING TIME, AND PROBLEMATIC GAMING BEHAVIOR SCORES OF GAMERS ( $n=443$ )

	n	percent	Playing time (hours/week)		Problematic gaming behavior			
			M	SD	M	SD	Percent	(95 percent CI)
Gender								
Men	166	37.5	6.7	8.26	1.45	0.61	3.0	
Women	277	62.5	5.6	6.36	1.32	0.49	2.5	
Total	443	100	6.0	7.15	1.37	0.54	2.7	
Age								
a. 14–29	152	34.3	5.0	8.34	1.44	0.59	3.3	(0.4, 6.2)
b. 30–44	118	26.6	5.6	4.76	1.32	0.46	1.7	(–0.7, 4.1)
c. 45–59	128	28.9	6.8	7.30	1.37	0.59	3.9	(0.5, 7.3)
d. 60+	45	10.2	7.8	7.15	1.24	0.35	0	
Occupation								
a. Scholar aged 14–18	38	8.6	4.62	4.62	1.71 <sup>a</sup>	0.73	10.5	
b. Scholar/student aged 19>	76	17.2	4.14	4.96	1.39	0.51	0	
c. Part-time job	94	21.2	5.74	5.68	1.34	0.51	2.1	
d. Full-time job	143	32.3	5.34	4.72	1.31	0.51	2.1	
e. Other (e.g., housewife/man, unemployed)	92	20.8	9.23 <sup>b</sup>	11.46	1.32	0.51	3.3	
Education level								
a. Elementary school	6	1.4	4.3	5.09	1.14	0.29	0.0	
b. Secondary education	128	28.9	7.3	10.26	1.49	0.66	4.7	
e. Senior secondary vocational education	103	23.3	6.2	4.97	1.27	0.46	2.9	
f. Higher professional education	122	27.5	5.0	5.67	1.33	0.51	2.5	
g. University	68	15.3	4.2	4.11	1.37	0.46	0.0	
h. Other	16	3.6	8.6	7.47	1.36	0.52	0.0	

<sup>a</sup>Post hoc test significant: a > b, c, d, e.

<sup>b</sup>Post hoc test significant: e > a, b, c, d.

CI, confidence interval.

monothetic format (meet all the criteria) would lead to a better prevalence estimate of problematic gaming than by using a polythetic format (at least half of the criteria must be met for a positive diagnosis), for two reasons. First, the use of polythetic formats is more likely to lead to an overestimation of prevalence, and second, a monothetic format more clearly distinguishes problematic behavior from habitual behavior. Experiencing each of the seven criteria at least “sometimes” (>3) is defined as problematic gaming.

### Statistics

*T* tests and analysis of variance were used to explore whether game behavior (playing frequency, total playing time, and PGB) is associated with demographics and type of games played. To determine whether the type of game played is associated with problematic gaming, gamers were classified according to the genre they most frequently play.

### Results

Almost half of the participants (49.1 percent) reported playing video games in the last 3 months. This sample of gamers was aged between 14 and 75 years, with a mean age of 38.74 years ( $SD=15.4$ ). Almost two-third (62.5 percent) were women. Of the total sample, 58.2 percent of all women and 39.1 percent of all men recently played games. Demographics of gamers are shown in Table 2. As expected, gaming was most prevalent among adolescents and young adults (14–29 years). Almost all of the adolescent males in the sample played video games, two-third of female adolescents

played games. The gaming prevalence significantly decreased with age for both men and women (see Table 4).

### Gaming behavior

**Playing frequency and playing time.** Of the gamers ( $n=443$ ), 16 percent played every day and 47.6 percent played at least 4 days a week. The mean playing time per week among gamers was 5.97 h (Median=3.75,  $SD=7.15$ ). Respondents reported a wide range of hours played per week, varying from less than 5 h by 61.4 percent of gamers, 5–10 h (21 percent), 10–15 h (10.8 percent), 15–25 h (5 percent), and over 25 h (1.8 percent). Two respondents reported playing 50.5 and 84 h.

**Differences in playing frequency and playing time according to demographics.** Overall, no significant differences were found in mean playing time per week regarding gender and age (see Table 2). When comparing gender at different age categories, there were differences ( $F(1, 442)=7.10$ ,  $p<0.01$ ); men aged 14–29 spend significantly more time on gaming than young women. Further, women over 45 played more hours per week than women younger than 30.

**Type of games played online versus offline.** A third of the gamers played offline casual games (e.g., offline card games, see Table 3). Another third of the gamers preferred playing other offline games, including primarily; strategy games, simulation games, and racing games. A quarter of the gamers played browser games (small games played via the Internet). Only a small percentage of gamers (11.1 percent)

TABLE 3. PREFERRED GAME GENRES: PERCENTAGES OF GAMERS ACCORDING TO GENDER AND AGE (*n*=443)

	Browser games percent	Offline casual games percent	Online games percent	Offline games percent
<b>Men</b>				
14–29	10.4	14.6	20.8	54.2
30–44	18	6	18	58
45–59	13	28.3	15.2	43.5
60>	22.7	59.1	0	18.2
Total	15.1	21.7	15.7	47.6
<b>Women</b>				
14–29	27.2	29.1	7.8	35.9
30–44	35.3	29.4	13.2	22.1
45–59	35.4	46.3	6.1	12.2
60>	47.8	47.8	4.3	0
Total	33.3	35.9	8.3	22.5
Total	26.5	30.5	11.1	31.9
Hours per week ( <i>M</i> )	6.3	4.6	11.3	5.0

Note: Browser games > small games played via the Internet using a web browser (e.g., online hidden object games); Offline casual games > small games played offline (e.g., offline card games); Online games > other games played via the Internet (e.g., massively multi-player online role-playing games); Offline games > games played offline (e.g., offline racing games).

reported playing other online games (mainly; shooters, MMORPGs, and strategy games).

Differences in playing time and playing frequency according to game genre. Although online games (e.g., MMORPGs) were preferred by a relatively small part of the gamers, online gamers clearly spent more time (*M*=11.33, *SD*=13.92) on gaming than players of browser games (*M*=6.38, *SD*=6.35), offline casual games (*M*=4.69, *SD*=5.17), and other offline games (*M*=5.01, *SD*=4.79) (*F* (3, 438)=12.52, *p*<0.01).

Differences in preferred game genre according to gender and age. Women preferably played browser games and offline casual games, men mostly played other offline games. A comparison according to age provided another difference. Respondents older than 60 years predominantly played card and board games, both offline casual games. Among the

younger respondents the genres and types of games were much more varied.

*Problematic game behavior*

Prevalence of problematic game behavior. Among the total sample a prevalence of 1.3 percent (95 percent CI: 0.56 percent–2.04 percent) of problematic gaming was observed according to Lemmens’ monothetic criterion. Among the subsample of gamers (*n*=443), the prevalence was 2.7 percent (95 percent CI: 1.19 percent–4.21 percent).

When asked about the respondents own problem awareness of PGB, 8.6 percent of the gamers thought they spend too much time on gaming and thus had initial problem awareness. 2 percent considered their game behavior as problematic and/or was thinking about seeking help and thus had high problem awareness. For each GAS criterion the percentage of respondents who met this criterion and the reported problem awareness are shown in Table 5. Of the respondents who met all GAS criteria, 33.3 percent reported low problem awareness and only 16.7 percent reported high problem awareness. Table 6 shows for each of the 7 items of the GAS the percentage of respondents who experience each criterion sometimes, often, or very often.

Differences in PGB related to demographic variables. As expected, the score on PGB was positively correlated with playing frequency (*r*=0.21, *p*<0.01) and total playing time (*r*=0.31, *p*<0.01). For gender there were significant differences in PGB scores; in general men scored somewhat higher on PGB than women (*F* (442)=6.99, *p*<0.01) (see Table 2). When comparing gender at different age categories, the gender difference was limited to the younger age group of men (*F* (431)=3.54, *p*<0.01). Although young men had a higher mean score on PGB, 5 of the 12 gamers who were identified as problematic gamers appeared to be adult women.

Differences in problematic gaming according to game genre. The preferred game genre was associated with the score on PGB (*F* (3, 438)=3.8, *p*<0.05). Online gamers scored higher (*M*=1.56, *SD*=0.73) on PGB than players of offline casual games (*M*=1.29, *SD*=0.51). An interaction effect for gender (*F* (3, 162)=2.66, *p*<0.10) was found though, indicating that this genre related difference was significant for males, but not for females.

TABLE 4. PREVALENCE OF GAMING, AVERAGE WEEKLY PLAYING TIME AND PREVALENCE OF PROBLEMATIC GAMING BEHAVIOR BY GENDER AND AGE CATEGORY AMONG THE TOTAL SAMPLE (*n*=902)

Age category	Men				Women			
	n	Prevalence gamers percent <sup>a</sup>	Playing time (hours/week)	Problematic game behavior (M)	n	Prevalence gamers percent <sup>b</sup>	Playing time (hours/week)	Problematic game behavior (M)
14–29	59	48 (81.4 percent)	8.9	1.70	155	104 (67.1 percent)	3.2	1.33
30–44	93	50 (53.8 percent)	5.8	1.39	116	68 (58.6 percent)	5.4	1.26
45–59	135	46 (34.1 percent)	5.0	1.38	144	82 (56.9 percent)	7.8	1.36
60 >	138	22 (15.9 percent)	7.2	1.23	61	23 (37.7 percent)	8.3	1.25

<sup>a</sup>H (3)=84.983, *p*<0.01 with a mean rank of 123.12 for age category 14–29, 181.75 for age category 30–44, 223.59 for age category 45–59, and 262.12 for age category 60+

<sup>b</sup>H (3)=15.644, *p*<0.01 with a mean rank of 217.31 for age category 14–29, 237.48 for age category 30–44, 241.47 for age category 45–59, and 287.26 for age category 60+

TABLE 5. PERCENTAGES OF SCORE ON SUBJECTIVE PROBLEMATIC GAME BEHAVIOR FOR EACH GAME ADDICTION SCALE ITEM ( $n = 443$ )

<i>Addiction Scale Item (percent that met the criterion)</i>	<i>M</i>	<i>SD</i>	<i>I think I spend too much time on gaming (8.6 percent) Percent</i>	<i>I think my game behavior is problematic or I think I'm going to seek help (2 percent) Percent</i>
Did you spend all day thinking about playing a game (5.2 percent)	1.19	0.53	30.4	21.7
Did you start spending increasing amounts of time on games? (15.1 percent)	1.52	0.83	28.4	10.4
Have you played games to forget about real life? (20.8 percent)	1.59	0.96	18.5	7.6
Have others unsuccessfully tried to reduce your game use? (7.9 percent)	1.25	0.69	31.4	14.3
Did you feel bad when you were unable to play? (7.7 percent)	1.27	0.65	32.4	20.6
Did you have fights with others (e.g., family, friends) over your time spent on games? (4.3 percent)	1.20	0.58	36.8	21.1
Have you neglected other important activities (e.g., school or work) to play games? (15.8 percent)	1.55	0.85	30.0	8.6
GAS criterion (2.7 percent)	1.37	0.54	33.3	16.7

## Discussion

The aim of this study was to assess video gaming habits among the Dutch population in general, and to estimate the prevalence of problematic gaming in particular. Results show that gaming, although clearly more common among adolescents and young adults, is a wide-spread activity across the whole Dutch population. For the large majority gaming appears to be a harmless leisure activity. However, a small but noticeable proportion of gamers show PGB. This is, as expected, more prevalent among younger males, but clearly not exclusively limited to this group. In this study 1.3 percent of the respondents could be considered as problematic gamers according to the monothetic criterion based on the GAS.<sup>15</sup> Among the subsample of people who play games the prev-

alence of problematic gaming is estimated at 2.7 percent. This prevalence appears to be higher among gamers younger than 30 years (3.3 percent), which is consistent with other research.<sup>23</sup> Surprisingly, the prevalence was also higher among gamers between 45 and 60 years (3.9 percent) and 5 of the 12 identified problematic gamers were women over 30 years old.

Although gaming is popular among both men and women of all ages, important differences related to age and gender can be observed. Prevalence of current gaming is higher among adolescent and young adult males than among females in that age group. Moreover, these young men (14–29) spend almost three times more hours per week on gaming than young women. This is consistent with recent studies.<sup>9,24</sup>

Hours spend on gaming is positively related with problematic game use in this study. However, as suggested in

TABLE 6. PERCENTAGES FOR EACH GAME ADDICTION SCALE ITEM FOR ANSWER CATEGORIES SOMETIMES, OFTEN, VERY OFTEN ( $n = 443$ )

<i>Addiction Scale Item</i>	<i>Sometimes</i>	<i>Often</i>	<i>Very often</i>	<i>Total percent that met the criterion</i>
Did you spend all day thinking about playing a game	21 (4.7 percent)	2 (0.5 percent)	-	5.2 percent
Did you start spending increasing amounts of time on games?	54 (12.2 percent)	12 (2.7 percent)	1 (0.2 percent)	15.1 percent
Have you played games to forget about real life?	71 (16 percent)	15 (3.4)	6 (1.4 percent)	20.8 percent
Have others unsuccessfully tried to reduce your game use?	27 (6.1 percent)	4 (0.9 percent)	4 (0.9 percent)	7.9 percent
Did you feel bad when you were unable to play?	26 (5.9 percent)	8 (1.8 percent)	-	7.7 percent
Did you have fights with others (e.g., family, friends) over your time spent on games?	12 (2.7 percent)	5 (1.1 percent)	2 (0.5 percent)	4.3 percent
Have you neglected other important activities (e.g., school or work) to play games?	55 (12.4 percent)	13 (2.9 percent)	2 (.5 percent)	15.8 percent

previous studies<sup>25</sup> playing time should not be considered as a main criterion for problematic gaming. Total playing time in this sample is much lower than found in previous studies;<sup>26,27</sup> this is probably because of the broad age range and the fact that gamers played all sorts of genres. For example, older respondents who play casual games spend only a few hours per week on gaming which results in a lower mean playing time.

If all age groups are included, gaming is slightly more prevalent among women than among men. This is remarkable, as videogames are considered as a typical male activity for many years.<sup>24</sup> Our findings suggest that although among adolescents and young adults males play relatively more video games, it becomes a less common activity for them as they grow older. Also, the time they spend on gaming is slightly decreasing. Among women a different pattern is found, it seems that gaming prevalence slightly decreases, but the time they spend on gaming strongly increases. An explanation for this finding is that the data was collected using an online panel. Although the total sample was representative of the Dutch population regarding gender and age, it could be the case that the subsample of women was not representative regarding their gaming behavior. As mentioned earlier, it is possible that female subscribers of online panels are more technology savvy and more involved than the Dutch female population in general.

Griffiths and Wood<sup>28</sup> concluded that adolescents are more vulnerable to PGB than adults. In this study this is partially confirmed, as particularly male adolescents appear to be at risk. In general, it was found that men, and young men in particular, appear to play video games continuously longer than women and scored significantly higher on PGB, therefore they may be considered as a more vulnerable risk group. Nevertheless, we also identified problematic gamers among adult women. Further research should also consider the older female population as a potential risk group.

Online gamers, especially those who played MMORPGs and virtual worlds, played for more hours per week and scored higher on problematic game behavior. This confirms earlier findings which showed that especially online games may be more problematic.<sup>29,6,30</sup> More research is needed on the mechanisms that may explain this increased risk. There are many appealing structural characteristics within online games that result in prolonged gaming which in turn may lead to problematic behavior.<sup>31</sup>

### Limitations

As mentioned earlier, there is still controversy about whether excessive gaming should be considered as a distinct clinical problem and consequently much debate about terminology and assessment. Some researchers argue that criteria based on the DSM-IV criteria for pathological gambling for defining the concept of PGB may be inappropriate and that problematic gaming is a symptom rather than a genuine addiction.<sup>32</sup> In this study a monothetic approach was used, which probably explains the low prevalence in comparison with estimation of prevalence in other studies.<sup>7,9</sup> The purpose of this study was not to resolve these issues, but rather to provide relevant data on demographics of gamers, their gaming habits, and to estimate the prevalence of problematic gaming.

### Disclosure Statement

The authors state that the findings reported have not been previously published and that the manuscript is not being simultaneously submitted elsewhere. No competing financial interests exist.

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