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Beyond the fascination of online-games: Probing addictive behavior and depression in the world of online-gaming

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ABSTRACT

This study examined problematic gaming behavior and depressive tendencies among people who play different types of online-games. Other game-related variables were investigated to determine if other differences between three game types could be established. Participants in the current research ($n = 468$) can be classified into three independent groups. Subjected users either solely played massive multiplayer online role-playing games (MMORPGs) or they preferred online-ego-shooters (OES) or real-time-strategy games (RTS). Results indicate that MMORPG users show more often problematic gaming behavior, depressive tendencies and lower self-esteem compared to users playing other online-games. MMORPG users reported to playing significantly more often in order to escape from real-life problems, which might be a valuable coping strategy but might also lead to problematic gaming behavior.

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1. Introduction

"Beyond the gates of mighty kingdoms, lies a vast and unexplored world. A world of honor. A world of mystery. A world of danger". This trailer from World of Warcraft® was the entrance for thousands of online-gamers to a new, unexplored world. These fields were exciting and stimulating, had ancient qualities like glory, courage or commitment, afforded mysterious contacts and established pathways of heroism and danger, mostly embedded in a fantasy tale; full of opportunities and without observing the limits of daily life.

1.1. Overview

Massively multiplayer online role-playing games (MMOPRGs) are virtual environments with a persistent interaction of people playing these games (Ng & Wiemer-Hastings, 2005) using a self-created virtual character – the avatar. Smahel, Sevcikova, Blinka, and Vesela (2009) described three main factors of playing MMORPGs (1) doing quests and achievements, (2) interacting with other players and (3) "leveling-up" the avatar. Compared to other online-games – such as traditional ego-shooters or real-time-strategy games, which follow a bounded storyline and become boring or simply end at some point – MMOPRGs are endless, because of a widespread system of goals, awards and personal achievements. The avatar rises to a higher level or becomes wealthier and stronger, by collecting valuables and weapons. The relationship between the player and the avatar is described by the players' affection to the character, which leads to negative feelings if the avatar is under attack or dies (Wolvendale, 2006). Another important factor is that it is not a simple one-man-show; players have to collaborate in "guilds" (virtual groups of players with their own social rules and structure) to gain higher or more complex goals; sometimes players have to interact in these "guilds" for their own avatars' survival and form some kind of social community (Bilzzard Entertainment, 2008). For many players actually playing the MMORPG is less important than the social in-game interaction (Griffiths, Davies, & Chappell, 2004). Some players tend to consider that social relationships and interaction in online-games are more satisfying than their offline-relationships (Ng & Wiemer-Hastings, 2005). At the same time, some authors (Smahel et al., 2009) emphasize that these players do not automatically develop problematic internet behavior. They could also communicate online without playing MMORPGs and show no problematic online behavior. Nevertheless, there seems to be a growing consensus that a preference of online social interactions over offline face-to-face communication plays a major role in the development of problematic internet behavior (Caplan, 2005; Morahan-Martin & Schumacher, 2003).

Further research shows MMORPG users spend more hours playing than other online game players (Ng & Wiemer-Hastings, 2005). From this point of view the social component could be an important factor for being more in-game. Thus, Yee (2006a) showed several components of player motivation for engaging in

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MMORPGs. In addition to a (1) social component, there are (2) the achievement component and (3) the immersion component. *Escapism*, a subcomponent of the category immersion; and *advancement*, a subcomponent of achievement could be identified as best predictors for addictive behavior. It is possible to differentiate between players characterized by *escapism*, who play to escape from real-life or to avoid real-life problems and players characterized by *advancement*, who play for power and status. Newer studies of Caplan, Williams, and Yee (2009) showed the immersion motivation and especially the subcomponent of escapism as the strongest predictors for problematic internet use and online-gaming. Regarding these findings Hsu, Wen, and Wu (2009) found five factors of critical user experiences in MMORPGs concerning problematic internet use and online-gaming. The first factor seems to be (1) *curiosity* which leads the user to interaction with the game content, furthermore (2) *rewards* satisfy peoples' needs in the real world or rewards that the real world fails to provide, also (3) *belonging* and (4) *obligation* as factors relating to the online social community should be mentioned, and (5) the *characteristics of role-playing*, especially the development of the character, its progress and also the users' attachment to the avatar.

Regarding questions concerning the psychopathological dimensions of excessive online-gaming several studies showed connections between problematic internet use and problematic online-gaming with major depression, bipolar disorders, anxiety disorders or OCD (Ceyhan & Ceyhan, 2008; Shapira, Goldsmith, Keck, Khosla, & McElroy, 2000; Shapira et al., 2003; Sheperd & Edelmann, 2005; Spada, Langston, Nikcevic, & Moneta, 2008; Ybarra, Alexander, & Mitchell, 2005; Young & Rogers, 1998), and also with aggression (Grüsser, Thalemann, & Griffiths, 2007), low self-esteem (Kim & Davis, 2009; Niemz, Griffiths, & Banyard, 2005), loneliness and depressive tendencies (Amichai-Hamburger & Ben-Artzi, 2003; Caplan, 2003; Morahan-Martin & Schumacher, 2003; Stepanikova, Nie, & He, 2010), social anxiety and social skills deficits (Caplan, 2005, 2007; Liu & Peng, 2008, 2009; Lo, Wang, & Fang, 2005) or other psychopathological problems and personality traits (Meerkerk, Van den Eijnden, Franken, & Garretsen, 2010). Yet not all gamers seem to be affected; according to the early work of Young (1998a, 1998b) these problems appear before these people go online and maybe coexist afterwards in form of a vicious cycle.

Self-esteem seems to be a necessary variable in explaining problematic internet behavior (Kim & Davis, 2009) and maybe also for problematic online-gaming. Bessiere, Seay, and Kiesler (2007) show players with high self-esteem recreate the avatar according to their actual self. Lower levels of self-esteem lead to a creation of an *ideal self based character*. This trend is more prominent among those who were more depressed and had lower levels of self-esteem. Another way to describe excessive online-gaming regarding the players' self, is concerned with the players' perceived self-efficacy based on a desire for control and also the possibility of positive self-presentation; both connected with a strong engagement to the game brand itself (Wan & Chiou, 2006). Considering all; Young (1998a, 1998b) stated that embedded interactive applications appear to play a role in the development of problematic internet use. The results of Caplan et al. (2009) confirm the thesis that using the internet for social interactions, for meeting new people and participating online in social communities are predictors of problematic internet use. As explained above MMORPGs are very social and users of MMORPGs seem to be particularly endangered concerning problematic internet use or problematic online-gaming behavior.

1.2. Aim of the current study

The present research addresses often discussed fundamental questions regarding problematic gaming behavior, depression and self-esteem of online-gamers. The specified assumptions of this research were divided in two separate sections. A first sequence of hypotheses (H1–H4) focuses on differences between three types of online-games regarding problematic gaming behavior, depressive tendencies and several aspects of self-esteem. Additionally the effect of escapism and time were included in this set of assumptions. A second element of this research (RQ2, H5) is based on using cut-off criteria to diagnose conspicuous behavior. Participants were grouped according to the empirically proven cut-off scores for problematic gaming behavior and non-critical gaming behavior (Hahn & Jerusalem, 2001) as well as according to the DSM-IV criteria for Depression (Kühner, 1997). Participants fulfilling either the cut-off criteria for problematic gaming behavior, depression according to DSM-IV or both were considered as a conspicuous sample.

We assume that several types of online-games have different distributions in these variables above, because it can be supposed that participants playing a MMORPG are faced with a completely other game environment than users of online ego-shooters (OES) or real-time-strategy (RTS) due to an omnipresent integration of social interaction, the complex system of achievements and the effect of immersion, especially concerning the component of escapism (Caplan et al., 2009; Griffiths et al., 2004; Ng & Wiemer-Hastings, 2005; Smahel et al., 2009; Williams, Yee, & Caplan, 2008).

- H1: MMORPG users show higher values concerning problematic gaming behavior and depressive tendencies than other inartificial groups of online gamers.
- H2: MMORPG users show lower values concerning social and emotional aspects of self-esteem than other inartificial groups of online gamers.

As noted in former studies time was found as an important variable for investigating MMORPGs (e.g. Caplan et al., 2009; Ng & Wiemer-Hastings, 2005). Also factors of immersion, especially escapism can be identified as predictors for internet use (Yee, 2006a, 2006b).

- H3: MMORPG users show higher values concerning the effect of escapism than other inartificial groups of online gamers.
- H4: MMORPG users spend continuously more time playing the game than other inartificial groups of online gamers.

Whereas the first step announced specific differences of the three types of online-games the second step analyzed the epidemiological data by using a case-control design. We tried to answer questions about MMORPGs as an indicator for conspicuous behavior. Additionally some generic descriptive information about inconspicuous and conspicuous behavior should be considered, because of growing prejudices in society.

- RQ1: How many participants could be characterized as conspicuous or inconspicuous?
- RQ2: Are MMORPGs more related to conspicuous behavior than OES or RTS?

According to the findings of Ng and Wiemer-Hastings (2005) the participants' data is investigated concerning time spent ingame continuously. Following this research a cut-off score of eight hours was chosen to test the assumption that playing online-games over eight hours continuously can be established as an indicator for conspicuous behavior.

H5: Users of online-games spending over eight hours continuously playing the game show more often problematic gaming behavior and depressive tendencies.

2. Methods

The current study addresses the MMORPGs World of Warcraft (WoW), EverQuest 2 (EQ2), Lord of the Rings Online (LOTRO) and Warhammer Online (WhO); the online-ego-shooters Counterstrike (CS), the Battlefield-Series (BF) and Far Cry (FC); the real-time-strategy games Warcraft, Age of Empires (AoE) and Command and Conquer (CC). These popular titles seem to represent mainstream games from each type. The MMORPGs are mostly fantasy role-playing games and embedded in a nearly never-ending story with manifold possibilities to interact in-game with others and a widespread system of acknowledgements and gratifications. Online-ego-shooters are similar to common ego-shooter games with minor variations regarding the users' social interacting behavior. As distinguished from typical ego-shooters this game is played online and establishes the options of interaction within the game. This interaction is more related to game events than on a social communication and has a defined system of acknowledgements and gratifications. Real-time-strategy games focus on the interaction of game events instead of finding friends and playing together over a longer period of time. There is also a limited system of acknowledgements and like online-ego-shooters they end when the enemy is conquered or the world is saved.

2.1. Procedures

To answer the questions above a questionnaire was posted on over 30 online game forums and online-fan-pages with German-speaking domains. A hyperlink led to the index page of the online survey, which was located on a secure university-server. If participants no longer wished to take part, they were instructed only to leave the webpage and all data was then deleted. For further questions the participants could contact the authors via e-mail. The webbased survey took about 35 min. We did not offer money or other benefits as an incentive. Data entries including less than 90% of the answers and duplicated datasets from the same user were omitted.

2.2. Participants

All accommodated participants in the sample size played just one online game type. Participants playing more than one type of online game regularly were connected to other questionnaires. The whole sample size comprises 468 online gamers from the German-speaking parts of Europe (Germany: 83%, Austria: 12%, Switzerland: 4%, other countries: 1%). About 97 participants were excluded from the study because 18 produced extreme scores in every item and every scale, 65 did not respond to all questions as required and 14 persons failed the plausibility check. The plausibility check verified if the participants' data is logically consistent. In this procedure we checked especially the logically consistence of age (data from persons 5 < or > 99 were omitted), and the relation between age, educational level and current employment. Therefore, 468 participants with a medium age of 23 years (ranging from 11 to 67 years) obtained from 408 (87%) male participants and 60 (13%) female participants were statistically analyzed. The final sample size can be divided into three independent groups of 38% ($n = 175$) MMORPG users, 30% ($n = 142$) OES users and 32% ($n = 151$) RTS gamers.

2.3. Measures

Participants were surveyed using an online-questionnaire battery consisting of an adapted version of the problematic internet use scale (ISS-20) measuring problematic gaming behavior (Hahn & Jerusalem, 2001); the questionnaire for depression diagnostics (FDD for DSM-IV), to assess depressive symptoms according to DSM-IV (Kühner, 1997), and the multidimensional self-esteem scale (MSWS) for a multidimensional evaluation of self-esteem (Schütz & Sellin, 2006).

The ISS-20 is originally an instrument to measure problematic internet use. Terms like problematic online-gaming behavior or online-gaming addiction are used homogenously for problematic behavior which focuses on online-games and is followed by negative consequences for the user. Hereafter we use the term problematic gaming behavior to describe the results of the ISS-20. The ISS-20 (Hahn & Jerusalem, 2001) specifies problematic gaming behavior concerning the theoretical components of (1) loss of control, (2) problems in social offline relationships, (3) withdrawal symptoms, (4) tolerance and (5) impairments in daily life. Concerning problematic gaming behavior similar factors can be reported by Griffiths and Meredith (2009). The items were modified and empirically investigated regarding online-gaming. Empirically verified and confirmed cut-off scores were used to identify participants with problematic gaming behavior (Hahn & Jerusalem, 2001). A factor analysis followed by Varimax rotation was performed on the correlation matrix with all items of the ISS-20. Factor analysis revealed a one-factor solution according to Cattell's scree test. This factor (20 items) yielding an eigenvalue of 14.62 accounted 63% of the total variance. Participants rated their agreement with each item on a six-point Likert-type scale. Based on the current data this scale shows a good reliability according to Cronbach Alpha ($\alpha = 0.96$).

Davis (2001) mentioned problematic internet use and depression in the cognitive behavioral model of pathological internet use. Depression and depressive tendencies can be characterized by the criteria of depression according to DSM-IV. The FDD for DSM-IV (Kühner, 1997) is a German adaption of the Inventory to Diagnose Depression (IDD) by Zimmerman and Coryell (1987). Each item focuses on a two week period. Participants respond to each item on a five-point Likert-type scale. Factor analysis followed by a Varimax rotation suggested that the FDD for DSM-IV measures only one dimension (19 items) revealing an eigenvalue of 4.87, which explains 44% of the total variance. The questionnaire is reliable according to Cronbach Alpha ($\alpha = 0.91$).

Two different dimensions of self-esteem regarding online-gaming behavior should be illustrated according to the German version of the scales by Fleming and Courtney (1984). A factor analysis followed by Varimax rotation was performed on the correlation matrix over all items of the German adaption. The number of factors to retain was determined through Cattell's scree test. A two factor solution was suggested explaining 54% of the total variance. The first factor consisted of 10 items explained 25% of total variance revealing an eigenvalue of 14.18 and overlaps with the construct of social self-esteem including assurance in social interaction as well as critical discernment. A second factor consisting of 7 items explained 19% of the total variance and reveals an eigenvalue of 11.14. This component was highly consistent with the construct of emotional self-esteem and is characterized by general self acceptance, attitudes to the own self and self confidence. Both factors showed good internal coherence, $\alpha = 0.91$ for the first factor and $\alpha = 0.85$ for the second factor. All other items of the MSWS were retained. Participants rated their agreement with each item on a seven-point Likert-type scale. The MSWS (Schütz & Sellin, 2006) as a multidimensional evaluation of self-esteem is a newer German adaption of the scale based on the hierarchical facet model by Fleming and Courtney (1984) and measures these aspects of self-esteem.

Additionally the participants answered five questions about their motivation of playing online-games concerning escaping from real life. We used items like "I feel much better while I'm

playing the game than I feel in other situations" or "I'm playing online-games to avoid my problems offline". After Varimax rotation the factor analysis show a general factor solution explaining 87% of the total variance and reveal an eigenvalue of 10.56 with these five items. Respondents agreed on a seven-point Likert-type scale. These items were reliable according to Cronbach Alpha ($\alpha = 0.96$). To estimate the amount of time participants spent continuously using online-games, the survey asked participants to answer a single item that asked them how many hours they spent playing the online game continuously in average of the last 4 weeks.

2.4. Statistical analyses

All hypotheses of the first section (H1–H4) were addressed with ANCOVAs for three groups. Means and standard divisions from ANCOVA were used to arrange Cohen's *d* as effect size estimates (Cohen, 1988) in post hoc analysis according to Bonferroni for deeper understanding and to approve relevance in practice. The research question and the hypothesis of the second section (RQ2, H5) were analyzed calculating Odds Ratios for case-control designs. We answered the other research question (RQ1) using descriptive statistics.

3. Results

The average gamer in the recent study spent nearly 6 h continuously ($M = 5.97$, $SD = 3.42$) playing online-games; 8% spent 1–2 h, 32% spent 2–4 h, 22% spent 4–6 h, 16% spent 6–7 h and 21% spent more than eight hours (see Table 1). Most of the surveyed online gamers stated to play in the evening (66%) and only 8% at night. 13% ($n = 22$) of MMORPG users, 12% ($n = 17$) of OES users and 14% ($n = 21$) of RTS gamers were female.

3.1. MMORPGs, online-ego-shooters and real-time-strategy games

The first hypotheses (H1–H4) of the present study was to analyze problematic gaming behavior and depressive tendencies of online-gamers in reference to different types of online-games – MMORPGs, online-ego-shooters (OES) and real-time-strategy (RTS) – such as described above. To control the confounding effect of age in the results we decided to choose age as a covariate to our analysis. The analysis of covariance (ANCOVA) shows no significant influence of participants' age on the three types of games regarding problematic gaming behavior (F (1, 467) = 1.387; $p = 0.240$), depressive tendencies (F (1, 467) = 0.238; $p = 0.626$), emotional self-esteem (F (1, 467) = 1.381; $p = 0.240$) and escapism (F (1, 467) = 0.056; $p = 0.813$). Age has a significant influence concerning social self-esteem (F (1, 467) = 14.830; $p < 0.001$) and time spent continuously in-game (F (1, 467) = 7.419; $p = 0.007$) on the three types of games. Due to these findings we used the results from ANCOVA for further analysis.

The results of the one-way ANCOVA for the first two hypotheses (H1, H2) indicate that there were significant differences between the three game types regarding problematic gaming behavior (F (2, 465) = 10.693; $p < 0.001$), depressive tendencies (F (2, 465) = 5.345; $p = 0.005$), social self-esteem (F (2, 465) = 12.926; $p < 0.001$) and emotional self-esteem (F (2, 465) = 6.826; $p < 0.001$). In comparison to the group of gamers playing OES and gamers using RTS multiple comparisons post hoc analyses according to Bonferroni from Table 2 reveal that participants playing MMORPGs reported the highest value of problematic gaming behavior. MMORPG users also showed the highest tendency towards depressive symptoms compared to the group of gamers playing OES and RTS. Analyzing diverse components of self-esteem two of the measured factors indicated some relevant distinctions regarding the three types of online-games. Participants playing

Table 1
Time online-gamers spent playing continuously ($N = 468$).

Time	Total	MMORPGs	Ego-shooter	Strategy games
1–2 h	38 (8%)	10 (6%)	11 (8%)	17 (11%)
2–4 h	152 (32%)	45 (26%)	58 (41%)	49 (32%)
4–6 h	105 (22%)	43 (25%)	29 (20%)	33 (22%)
6–8 h	76 (16%)	33 (19%)	22 (15%)	21 (14%)
8 h +	97 (21%)	44 (25%)	22 (15%)	31 (21%)

Note: All descriptive values were presented with their percentage concerning the compared type of game or the total number of participants in this study.

Table 2
Bonferroni post hoc analysis for multiple comparisons of the one-way ANCOVA for three groups testing differences between several game types (H1–H4).

Problematic gaming behavior		
MMORPG	Ego-shooters	Strategy games
M (SD)	M (SD)	M (SD)
42.91 (19.30)	35.96 (15.86)	35.00 (14.02)
Multiple comparisons:	*p*	*d*
MMORPG-OES	0.001***	0.65[b]
MMORPG-RTS	0.000***	0.83[c]
OES-RTS	1.000	0.10
Depressive tendencies		
MMORPG	Ego-shooters	Strategy games
M (SD)	M (SD)	M (SD)
11.01 (9.75)	8.50 (8.63)	8.04 (8.01)
Multiple comparisons:	*p*	*d*
MMORPG-OES	0.040*	0.44[a]
MMORPG-RTS	0.007**	0.55[b]
OES-RTS	1.000	0.09
Social self-esteem		
MMORPG	Ego-shooters	Strategy games
M (SD)	M (SD)	M (SD)
39.05 (11.68)	44.52 (10.22)	43.80 (9.46)
Multiple comparisons:	*p*	*d*
MMORPG-OES	0.000***	0.79[b]
MMORPG-RTS	0.000***	0.73[b]
OES-RTS	0.886	0.10
Emotional self-esteem		
MMORPG	Ego-shooters	Strategy games
M (SD)	M (SD)	M (SD)
29.62 (6.00)	31.81 (4.76)	30.92 (4.93)
Multiple comparisons:	*p*	*d*
MMORPG-OES	0.001***	0.35[a]
MMORPG-RTS	0.115	0.40[a]
OES-RTS	0.356	0.26[a]
Escapism		
MMORPG	Ego-shooters	Strategy games
M (SD)	M (SD)	M (SD)
2.30 (1.57)	2.04 (1.42)	1.77 (1.29)
Multiple comparisons:	*p*	*d*
MMORPG-OES	0.302	0.17
MMORPG-RTS	0.003**	0.36[a]
OES-RTS	1.000	0.19
Time spend continuously in-game		
MMORPG	Ego-shooters	Strategy games
M (SD)	M (SD)	M (SD)
6.56 (3.45)	5.60 (3.44)	5.65 (3.30)
Multiple comparisons:	*p*	*d*
MMORPG-OES	0.048*	0.27[a]
MMORPG-RTS	0.023*	0.26[a]
OES-RTS	1.000	0.01

Notes: Effect sizes ranged between 0.20 and 0.49 indicate a small effect; effect sizes ranged between 0.50 and 0.79 indicate medium effects and effect sizes ranged over 0.80 indicate large effects according to Cohen (1988).

[a] Small effect size.
[b] Medium effect size.
[c] Large effect size.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

OES and surveyed RTS users had higher self-esteem scores concerning their social interactions and social skills compared to the MMORPG players. The MMORPG players reported having less emotional self-esteem than gamers playing OES.

Additionally for the third and fourth hypotheses (H3, H4) concerning the effect of escapism (F (2, 460) = 5.532; p = 0.004) and the time users spend continuously playing online-games (F (2, 465) = 4.119; p = 0.017) we found also statistically significant differences between the three types of online-games. Multiple comparisons post hoc analyses according to Bonferroni from Table 2 show that gamers of MMORPGs compared to gamers of OES or gamers of RTS – reported that they often played online-games to avoid real-life problems or to escape these. Furthermore, the group of subjects playing MMORPGs also spent significantly more time continuously playing online than OES users or participants playing RTS.

3.2. Conspicuous and inconspicuous gamers

Descriptive analyses concerning the first research question (RQ1) revealed that in sum 84% (n = 395) of the surveyed gamers do not show any psychopathological symptoms at all (according to the used procedures and parameters). Only 8% (n = 37) of the total sample fulfill the criteria for problematic gaming behavior. About 4% (n = 17) can be classified as depressive according to DSM-IV. Additionally 4% (n = 17) show a combination of problematic gaming behavior and depression. Although the percentage is small the outcome for the persons concerned (and their social networks) is severe. The following results therefore focus on the relations between conspicuous behavior (psychopathological issues) and the type of game used (RQ2). This research question was answered using the cut-off scores described above (see Section 1.2) and odds ratios (OR) to estimate the risk of conspicuous behavior if the participant is a MMORPG user. We chose OES gamers and RTS gamers as two control samples in independent analyses. The OR is the ratio of the odds obtained from two different dichotomous variables (types of games/inconspicuous versus conspicuous). Formula 1 shows that we calculated the ratio of the number of conspicuous (a) and inconspicuous (b) MMORPG users in comparison to the ratio of the number of each conspicuous (c) and inconspicuous (d) control group (OES, RTS). An OR higher than 1 indicate that MMORPG users show more often conspicuous behavior than the control trial used (OES, RTS).

$$\mathrm{OR} = (a/b)/(c/d) \quad (1)$$

According to Table 3, of the 175 MMORPG users 24% (n = 42) exceed cut-off criteria and were considered as conspicuous and 76% (n = 133) as inconspicuous. In comparison to these findings 87% (n = 123) of OES users and 92% (n = 139) of RTS users show inconspicuous behavior. The first comparison of MMORPG users with OES users show an odds ratio of 2.04 (95% confidence interval ranges from 1.13 to 3.71). The second comparison of MMORPG users with RTS gamers show a higher odds ratio of 3.65 (95% confidence interval ranges from 1.85 to 7.25). These results indicate that MMORPG users were more often exposed to conspicuous behavior than OES users or RTS users.

The fifth hypothesis (H5) addressed conspicuous behavior of online gamers in general (n = 468) spending over eight hours continuously playing the game. Odds ratios were calculated to answer this hypothesis. Users spend less than eight hours continuously in-game showing conspicuous behavior (14% of all participants playing less than eight hours, n = 47) were defined as (a). Participants of this group without conspicuous behavior (86% of all participants playing less than eight hours, n = 287) were defined as (b). Whereas users spending over eight hours continuously in-game were divided into conspicuous subjects (19% of all participants playing over eight hours, n = 26) defined as (c) and inconspicuous subjects (81% of all participants playing over eight hours, n = 108) defined as (d). The results show an odds ratio of 1.47 (95% confidence interval ranges from 0.87 to 2.49) and indicate that online gamers playing over eight hours continuously were more often exposed to conspicuous behavior.

4. Discussion

Online-gamers are often exposed to generalizations and stereotypes in public media as well as in the scientific community; furthermore deviant behaviors and emotional problems are attributed to them. According to the recent findings it could be revealed that most gamers – 84% (n = 395) of all participants in the current study – show neither problematic gaming behavior nor depressive tendencies, even though the percentage differed regarding the type of game (ranging from 76%, n = 133, in MMORPGs; 87%, n = 123, in OES; and 92%, n = 139, in RTS). An empirical analysis of cut-off scores shows that the ratio of conspicuous and inconspicuous MMORPG users is two times higher compared with a control of OES users (OR = 2.04) and more than three times higher when compared MMORPG users with users of RTS (OR = 3.65). Following this MMORPG users show more often conspicuous behavior than other online gamers surveyed in this study. Furthermore the first hypothesis (H1) can be supported, because in comparison to other online-games, such as online-ego-shooters or real-time-strategy, more gamers with problematic gaming behavior played MMORPGs. MMORPG users also show a higher tendency towards depression compared to gamers of online-ego-shooters or real-time-strategy.

Self-esteem according to the chosen instrument was divided amongst other scales into social and emotional self-esteem. Further relevant results were found regarding the relation between MMORPGs and other online-games (OES and RTS). Significantly lower values concerning social self-esteem was found in the group of MMORPG players which supports the first part of the second

Table 3
Inconspicuous and conspicuous behavior regarding several types of games (N = 468).

	Inconspicuous behavior	Conspicuous behavior		
		Problematic gaming behavior	Depressive tendencies	Problematic gaming behavior and depression
MMORPGs	133 (76%)	23 (13%)	5 (3%)	14 (8%)
OES	123 (87%)	7 (5%)	8 (6%)	4 (3%)
RTS	139 (92%)	7 (5%)	4 (3%)	1 (1%)
Total	395 (84%)	37 (8%)	17 (4%)	19 (4%)

Notes: Cut-off criterion for conspicuous behavior is calculated using the frequencies of problematic gaming behavior, depressive tendencies and the combination of both psychopathologies. Cut-off scores were calculated using an average ranking larger than 3 according to each item (88th percentile) of the ISS-20 for problematic gaming behavior (Hahn & Jerusalem, 2001) and DSM-IV criteria for depression.

hypothesis of this research (H2). Some authors (e.g. Ng & Wiemer-Hastings, 2005; Smahel et al., 2009) emphasize that playing online-games has a social component and gamers spending long periods of time continuously in-game form friendships, seek relationships and become a member of a community, so therefore it is not manifested in deviant behavior or emotional problems. Also low social self-esteem in gamers is not automatically a predicament. According to these results it seems possible that those (shy) persons find it easier to interact with people online or in-game, than in a real-life context (Liu & Peng, 2008; Lo et al., 2005). It was already documented that especially MMORPG users have a different perspective of social interaction (Ng & Wiemer-Hastings, 2005). Regarding emotional self esteem only online-ego-shooters differ significantly from MMORPGs and no significant effects between MMORPGs and Real-time-strategy were found. The presented results concerning social and emotional self esteem are consistent with the assumptions of these former studies that MMORPGs major component is the social interaction in-game to cope low self-esteem in real life. Due to the findings that self-esteem is an important variable for the development of psychopathologies (Ceyhan & Ceyhan, 2008; Kim & Davis, 2009) constant interaction with other gamers can become a protective factor and encourage social self esteem in this context and transfer new skills and experiences into real life and could be of relevance for future applied studies. An important question for future research is why some people show problematic behavior concerning online-games and others stay inconspicuous.

Following the hypotheses three to five (H3–H5) a critical time frame could be eight hours of continuous online game playing. An indication for problematic gaming behavior or depression may be gaming sessions lasting longer than eight hours (OR = 1.47). This assumption should be taken into consideration cautiously, because 81% (n = 108) of the participants playing over longer periods of time in this sample showed no psychopathological symptoms at all and the difference to the group of participants playing less than eight hours was not significant (95% confidence interval ranges from 0.87 to 2.49). According to this data time as a unique criterion for problematic gaming behavior seem to be highly inconclusive. When looking at other game types, the most interesting aspect seems to be that the surveyed online-ego-shooter or real-time-strategy gamers spent less time playing their game continuously compared to MMORPG users. That supports the finding that MMORPG users prefer to play in order to escape (relating to Yees' motivational factors) from real-life problems than users of other online-games (OES and RTS). Using the option of escapism might also be a valuable coping strategy (online coping) in dealing with daily troubles, but could also lead to problematic gaming behavior.

Some limitations of this study should be taken into consideration when discussing these results. First, the sample is not demographically even, only 12% (n = 60) female participants and 88% (n = 408) male participants responded to the survey, based on the assumption that not only 12% of all online-gamers are female – epidemiological studies of the basic population are clearly missing. Further studies of the authors are going to include parameters measuring coherence factors to gain a deeper understanding of protective factors. Second, the presented study could include inherent biases due the self selected group of surveyed online-gamers. Especially motivational components among the participants of this study should be taken into consideration. Future research should estimate social developments in-game in relation to the users' emotional status. Furthermore there is a lack of longitudinal data in research of problematic internet use and also of problematic gaming behavior.

Recent research supported the hypothesis that online-gaming seems to be one of the most likely reasons for problematic internet use (Meerkerk, Van Den Eijnden, & Garretsen, 2006; Morahan-Martin & Schumacher, 2000). Caplan et al. (2009) as well as a Young (1998a, 1998b), nearly a decade ago, stated that especially applications with high interactive and high immersive components play a major role in developing problematic gaming behaviors. According to the presented findings this fact seems to be accurate. The current study shows that problematic gaming behavior and emotional problems can not be attributed to all excessive online gamers. Most conspicuous participants seem to be excessive MMORPG users who play continuously longer than eight hours. It has to be taken into consideration that also inconspicuous MMORPG users play longer than eight hours continuously, but show neither problematic gaming behavior nor depressive symptoms. About 76% (n = 133) of MMORPG users play these games due to other motivations and without any psychopathology. Beyond the issues of problematic gaming behavior and depressive symptoms; online-games provide us with the opportunity to explore new worlds, to discover mysterious lands, to be someone else and to become a hero at last.

5. Conflict of interest statement

None declared.

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