EMERGING OPPORTUNITIES AND RISKS IN MASSIVELY MULTIPLAYER ONLINE ROLE PLAYING GAMES

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ABSTRACT

Massively Multiplayer Online Role Playing Games (MMORPG’s) are highly immersive environments which promote and sustain hyper personal interaction amongst players. This body of work aimed to identify, compare and draw conclusions from existing and ongoing research on player behaviour, motivations, addiction, data disclosure and the potential for harm in MMORPGs. Two quantitative survey based studies and a series of semi structured interviews formed the evidence base for the research findings. The first quantitative study consisted of European participants (n=357) and the second of Singaporean participants (n=188). In addition the European study encompassed qualitative findings from semi structured interviews.

Player behaviour was measured using Bolino and Turnley’s (2003) Impression Management (IM) Scale adapted to fit the context of online gaming. An adapted Basic Psychological Needs scale from Deci and Ryan’s (2000) Self Determination Theory (SDT) was used to measure the degree to which online gaming fulfils the basic psychological needs of the participant gamer. Addiction was measured using the Game Addiction Scale (GAS) developed by Lemmens et. al. (2009) and data disclosure was measured and scored based on the number of data types previously disclosed within MMORPG environments. Participants exhibited varying levels of addiction and over half were found to be high level disclosers of personal and sensitive data, making them potentially more vulnerable to exploitation and predation. Hours of game play was found to
influence data disclosure indicating that participants who engage in MMORPG environments for excessive periods of time could be more likely to disclose greater amounts of personal and sensitive data. Significant correlations were found between addiction and data disclosure highlighting that players who exhibit higher levels of addiction to MMORPGs typically disclose greater amounts of data. Players perceived their progression and development of in-game relationships was most effective when complimenting and praising fellow gamers. Self promotion was found to be the second most effective behaviour whereby players talk about their experiences, achievements, accomplishments and talents in order to impress fellow gamers. Intimidation and supplication were found to be the least effective impression management behaviours.

Many participants exhibited a susceptibility to harm as 67% had previously met an online based gaming acquaintance in person. Other gamers reported falling foul to one or more social engineering attacks including: stealing of account credentials and character abilities, fraud and transmission of sexually oriented pictures. The evidence base found that a) addiction to online games increases levels of data disclosure b) the unique structural characteristics of MMORPGs adds new dimensions to social interactions introducing emerging risks and vulnerabilities (including increased levels of trust, inter-player dependency and consequential privacy risks through data disclosure), c) self-promotion was found to strengthen inter-player relationships and d) engagement in online games in many cases fulfils players basic psychological needs of autonomy, competence and relatedness.

**KEYWORDS:** Online gaming, addiction, data disclosure, privacy, risk

**Introduction**

Massively Multiplayer Online Role Playing Game’s (MMORPG) are unique, fully immersive environments housing populations of characters with their own varying experiences, assets and values (Öqvist, 2009). MMORPGs are highly social arenas consisting of platforms where players can chat and interact with one another whilst participating in a fantasy world with like minded individuals (Chen et. al. 2008). These environments have evolved from traditional single-player games to global communities in which end users can meet other gamers and build reputations based on their performance and ability to meet common goals (Yee, 2006).

Structural characteristics of MMORPGs differentiate these environments from other online interactive platforms (e.g. instant messengers and email). Players can create one or more visual representations of themselves known as avatars which enable them to experiment with and explore different identities (e.g. gender and class). Avatars hold different sets of professions or roles that the MMORPG provides and the permanence and fluidity of roles varies depending on the design of the environment (Yee, 2006). Each role has varying strengths and weaknesses and the structural characteristics of many MMORPGs forces players to trust and become dependent on their more experienced counterparts.
MMORPG environments are infinite both in terms of size and ending. Based on Skinner’s (1974) theory of behaviourism, goals and rewards typically use a random ratio reinforcement schedule based on operant conditioning (Yee, 2006; Yee, 2004). Hence, in the context of MMORPGs, early achievements are quick, almost instantaneous; however as a player progresses in the game the amount of time, effort and level of complexity is increased until progression becomes almost imperceptible.

Several studies have focused on specific opportunities and risks within MMORPG environments. Waters (2007) illustrates the benefits of using MMORPGs as a pedagogical tool for educators whilst Cole (2007) and Chen et. al (2008) highlight the level of social and emotional support fostered between players. On the negative side, Griffiths and Hunt (1995) and Lemmens et. al (2009) discuss the detrimental impacts of pathological gaming and Foo et. al (2008) present evidence on motivations related to players characterised as ‘griefers’ who “stalk, hurl insults, extort, form gangs, kill and loot” (Pham, 2002). Qualitative studies have explored the social interactions and roles of gamers (Chen et. al. 2008), and survey studies have revealed that many players are motivated by the social factor of MMORPGs (Yee, 2006). Existing literature surrounding the plethora of opportunities and risks in Internet based communication platforms (e.g. instant messaging, forums, social networking sites) highlights the potential manifestation of opportunities and risks through peer-to-peer interaction (Hasebrink et. al. 2009; Livingstone and Haddon, 2009). With this in mind, there is a clear requirement for evidence based research on the opportunities and risks of social interaction in MMORPG environments.

Methods

Quantitative research methods were utilised by the authors to measure addiction, player behaviour and levels of data disclosure within MMORPG environments. Hammersley (1987) proposes that quantitative measurement is most often addressed by means of well-established concepts of validity and reliability. With this in mind the two survey studies conducted by the authors (Sanders et. al. 2010a; 2010b) used well-established, reliable and valid constructs. Player behaviour was measured using Bolino and Turnley’s (2003) Impression Management scale together with Deci and Ryan’s (2000) Self Determination Theory (SDT) construct. Impression management is the process through which people try to control the impressions other people form of them. It is a goal directed conscious or unconscious attempt to influence the perceptions of other people about a person, object, or event by regulating and controlling information in social interaction. The impression management scale was adapted to fit the context of online gaming. Their taxonomy includes: self promotion (pointing out ones abilities or accomplishments in order to be seen as competent by observers), ingratiation (using flattery or favours to elicit an attribution of likability from observers), exemplification (self sacrifice or going above and beyond the call of duty in order to gain the attribution of dedication from observers – (this subscale was omitted as it was considered irrelevant to
MMORPG environments), *intimidation* (signalling of power or potential to punish in order to be seen as dangerous by observers) and *supplication* (advertising weaknesses or shortcomings in order to elicit an attribution of being needy from observers).

According to Deci and Ryan’s (2000) Self Determination Theory (SDT), for an individual to develop and function in a healthy and optimal way the following fundamental needs must be continually satisfied: *autonomy*, (the condition of being autonomous; self-government, or the right of self-government; independence), *relatedness* (association or connection to others) and *competence* (possession of required skill, knowledge, qualification, or capacity; of sufficient quality).

Addiction was measured using a 22 item Game Addiction Scale (GAS) developed and validated by Lemmens et al. (2009) based on Griffiths and Hunt’s (1995) original six point behavioural addiction criteria. Risks to privacy were measured using an average score of data types previously disclosed within the MMORPG environments and users were classified as either high or low risk depending on their average score (Sanders et. al. 2010). The three aforementioned scales were adopted as each had previously been rigorously tested for reliability and validity.

In addition to the quantitative method outlined above, participants were invited to provide more qualitative data on their personal experiences in online gaming environments, thereby gathering a subjective in-depth insight into their feelings, experiences and motivations of behaviour which could not necessarily be captured by the objective quantitative approach (Lobe et. al. 2007). For the minimisation of risk and optimisation of opportunities to be effective a sound understanding of context is required. Therefore, the combination of both quantitative and qualitative approaches provided both breadth of coverage and depth of understanding.

Empirical findings on player behaviour, basic needs satisfaction, behavioural addiction and levels of data disclosure in MMORPG environments were sought through two online surveys. The first survey which recruited a total of 357 participants from the west (Europe), investigated risks related to pathological gaming and its causal relationship to privacy and levels of personal and sensitive data disclosure.

The second survey consisting of 188 Singaporean gamers built on the findings of the first and sought to identify specific behaviour types and levels of needs satisfaction in online gaming environments. These findings, in some instances, positively or negatively influenced the probability of the identified opportunities and risks found in the first study. In addition, addiction and data disclosure were measured in the second survey to facilitate a cross-national comparison.
Findings

Evidence collated from previous studies (Chen et. al. 2008; Yee, 2006; Hasebrink et. al. 2009) together with the aforementioned survey findings (Sanders et. al. 2010a; Sanders et. al. 2010b) suggests that factors unique to MMORPG environments create emerging opportunities and risks for gamers.

EU Study

As a starting point, the EU survey sought to assess levels of addiction, time spent online, social impact lifestyle impact and the potential for harm and risk to privacy through engagement in MMORPG environments. The key findings of this research are summarised below:

Demographic

- 86% of respondents were male
- The average age of respondents was $M = 25.7$ years ($SD = 4.32$)
- European gamers spent on average 5.37 ($SD = 1.81$) days per week, $M = 4.37$ ($SD = 1.64$) hours per weekday and $M = 5.72$ ($SD = 1.25$) hours per weekend playing MMORPGs
- The most popular online game was World of Warcraft (67%)
- 53% of EU participants stated they would prefer to live in the online gaming world as opposed to the real world if given the choice.

Addiction

- 20% openly admitted to being addicted to MMORPGs of which 17% felt that they could not give up on their own.
- 23% were classified as behaviourally addicted to MMORPGs in line with the Game Addiction Scale (GAS) and Griffith’s (1998) six point criteria framework.
- 29% have attempted to cut down the amount of time they spend on MMORPGs but were unsuccessful.
- 63% found themselves spending increasing amounts of time online.
- 85% frequently found themselves staying up until late into the evening playing MMORPGs.
- 80% often found themselves thinking about the game when they were not physically playing.

Social Impact

- 84% believe that their online gaming habit has had a negative effect on their real world social life.
53% prefer to socialise within MMORPG environments than with real world offline friends.

52% found playing an MMORPG more exciting than going out with friends.

51% find interacting with online friends easier than conversing with real world friends.

80% had formed particularly close friendships with other MMORPG players.

96% discussed personal issues not related to game play with fellow players.

Potential for Harm and Privacy Risks

89% had previously divulged personal and sensitive data in an MMORPG environment, including age (81%), location (77%), and email addresses (48%).

38% sent personal pictures to online friends upon request

22% previously divulged personal telephone numbers.

10% had divulged credentials upon request.

45% had previously become suspicious of other players behaviour whilst playing MMORPGs. Concerns included stalking, harassment, racism, stealing online currency and assets, extreme aggressive behaviour.

The second stage of the EU study comprised of semi-structured interviews with participants who were classified as behaviourally addicted to MMORPGs. This approach enabled the researchers to explore the contextual issues surrounding player’s addiction and semi structured questions were used to examine the consequential impact of pathological gaming. Participants responses were transcribed verbatim and semi structured questions were scored with percentile values.

17% felt they were addicted to their game and could not live without it.

66% stated that MMORPGs provided them with a sense of purpose and invoked a feeling of being valued and respected.

47% were either married or had a family. 84% of these admitted that their online gaming activities had a negative impact on their family life and 8% stated that their online gaming had contributed to family breakup.

16% acknowledged that they had previously encountered one or more social engineering style attacks within the online gaming environment with 5% of participants being victims of such attacks.

38% had previously met online based friends in person and 20% of these found the real life meeting much different than expected.

It is commonly acknowledged that privacy and disclosure of personal and sensitive data is considered to be one of the most significant risks in the online domain. With this in mind a strong positive correlation (r (N=357) = .985 p < .001) was found between addiction and data disclosure, suggesting that
pathological online gamers are more likely to disclose greater amounts of personal and sensitive data than non pathological online gamers.

The findings of the EU study provided further clarification and insight into the commonly acknowledged risks inherent in online gaming arenas. In contrast, however, many participants praised the opportunities experienced in MMORPGs with many gamers highlighting the highly social element. Many participants enjoy networking with like minded people and discussing both game related topics as well as more personal issues. High levels of trust between players were evident from participant responses and some perceive the online gaming environment to be far safer in comparison with real world society.

“I'm a guild master in World of Warcraft. I have many good friends in WoW and we look after and protect each other. My role as guild master is important and my group members respect me and follow my command. I have met many good loyal friends online who I discuss many issues with. I play the game for several hours a day and find it a very positive social experience” [Male, 18 – 21]

“It’s safer than going out on a Friday/Saturday night, i.e. no physical harm when playing online. Plus it’s a lot cheaper” [Male, 18 – 21]

“I enjoy socializing with like minded people. We all have something in common and I found communicating with people online much easier than with people offline” [Male, 25-29]

Participants commented upon the diverse range of roles and attributes of their avatar characters and the perceptions of equality within the online gaming arena. Others highlight the potential for self expression and the adoption of leadership roles and some players believe that communication with family and friends in the online gaming environment has strengthened their offline real world communication.

“I feel important and valued when I play EverQuest. People listen to me and take notice of what I have to say. Nobody judges you on your looks or way you dress. Everybody is equal and respected.” [Female, 18 - 21]

“I have played MMORPGs with my wife for nearly two years. We take different roles and approaches in game. My wife is more passive where as I am more active and adopt more of a leadership role. We have developed more ways of communicating together” [Male, 30 - 39]

The quantitative findings juxtaposed with the evidence collated from the semi-structured interviews provided a sound evidence base on which to further explore the opportunities and risks in online gaming environments. In the context of MMORPGs and other online environments many opportunities and risks emerge from contact with other gamers; as such the second study explored factors which directly contributed and affected social interaction, namely: player behaviour, impression management and basic needs satisfaction.
Singaporean Study

Building on the findings of the EU study, the second survey study conducted amongst Singaporean participants explored impression management behaviour and the level of basic needs satisfaction derived from engagement within the MMORPG environment. The findings are summarised below:

Demographic

- 74% of respondents were male
- The average age of respondents was ($M=22.6$ years, $SD = 2.21$ years)
- Singaporean gamers spent on average $4.69$ ($SD = 2.17$) days per week, $M = 4.42$ ($SD = 5.43$) hours per weekday and $M = 4.48$ ($SD = 3.31$) hours per weekend playing MMORPGs
- The most popular online game was World of Warcraft (32%)
- 31% of Singaporean participants stated they would prefer to live in the online gaming world as opposed to the real world if given the choice.

Avatars

Just under one third of respondents (31%) used 5 or more avatars in the MMORPG they spent the most time playing. 40% used between 2 and 4 different avatars and just under a third (29%) only used 1 avatar. Only 13% of participants previously sold their avatar for real money and of these, 13% had regretted selling their character, highlighting the level of emotional attachment. In addition, 56% of participants had previously gender-swapped their avatar.

Lifestyle Impact

Participants were asked if they had a lifestyle choice of living in a virtual world environment or in the real world environment as we exist today. Almost one third of participants (31%) stated they would prefer to live in a virtual environment as opposed to the remaining respondents (69%) who would prefer to live in a real world environment. Moreover, a chi-squared test ($X^2$) which compares the similarity of two distributions revealed that females showed no preference between the real ($n=30$) and virtual worlds ($n=18$), $X^2 (1, N = 48) = 3.00, p = .083$, (where $n$ denotes the category size and $N$ denotes the sample size). However, a greater number of males prefer the real world ($n=100$) over the virtual world ($n=40$), $X^2 (1, N = 140) = 25.714, p = .001$. These and other test statistics reported in this paper also provide a measure of the probability that the results are due to chance ($p$).

Addiction

Approximately one quarter (24%) of participants were classified as highly addicted to MMORPGs. Similar results were found for self-perceived addiction.
with 80% of participants categorising themselves as moderately addicted and 20% categorising themselves as highly addicted. Regression analysis, which provides a measure of the usefulness of one or more variables in predicting another, found that participants who classified themselves as highly addicted typically obtained a high addiction score from the six point addiction construct ($R(N=188) = .295 \ p < .001$). In addition, males ($M=3.4614$, $SD=.85390$) typically exhibited higher levels of addiction to MMORPGs than females ($M=3.0646$, $SD=1.00642$). These differences were found to be statistically significant, $t(186)=-2.446 \ p= .015$, using an independent samples $t$-test ($t$) which compares the differences between the group means. There was however no significant difference in the number of hours spent playing MMORPGs between participants categorised as highly addicted ($t(139)=-.810, \ p=.419$) and those classified as moderately addicted ($t(47)=.782, \ p=.438$).

**Impression Management**

Participants with a subscale score of >4 (median value of 7 point Likert scale) were categorised as exhibiting high levels of self-promotion, ingratiation, intimidation or supplication and respondents with a score <=4 were categorised as exhibiting low levels of the aforementioned behaviours. The most common type of impression management behaviour exhibited within the MMORPG environment was ingratiation (high level 45%, low level 55%), illustrating that many players perceived their progression and development of in-game relationships was most effective when complimenting and praising fellow gamers. Self-promotion (high level 34%, low level 66%) was perceived to be the second most effective behaviour, whereby players talk about their experiences, achievements, accomplishments and talents in order to impress fellow gamers. Intimidation (high level 26%, low level 74%) was found to be less frequently adopted in online gaming, suggesting that players found aggression and awkward behaviour to be less of an effective tactic. In addition, supplication (high level 15%, low level 85%) was viewed as the least effective behaviour, suggesting players who constantly pretend to require assistance in an attempt to elicit help from fellow players found this to be relatively ineffective. There was no significant difference in the adoption of impression management techniques between male and female participants.

**Basic Psychological Needs (SDT) of Online Gamers**

Participants with a subscale score of >4 (median value of 7 point Likert scale) were categorised as experiencing high levels of autonomy, competence or relatedness and respondents with a score <=4 were categorised as experiencing low levels of the aforementioned behaviours. The results revealed that gamers’ levels of autonomy (high level 83%, low level 17%) was the most satisfied basic psychological need. Relatedness (high level 52%, low level 48%) and competence (high level 52%, low level 48%) were satisfied to an equal degree. Participant subscale scores (autonomy, competence and relatedness) were averaged to give an overall measurement of needs satisfaction derived from MMORPGs. Respondents with an overall score of >4 (median value of 7
point Likert scale) were categorised as experiencing high levels of psychological needs satisfaction, where as respondents with a score of \( \leq 4 \) were categorised as experiencing low levels of psychological needs satisfaction. The majority of participants (69\%) were found to be experiencing high levels of psychological needs satisfaction with approximately one third (31\%) of participants experiencing low levels of satisfaction. There was however, no significant difference in basic psychological needs between genders.

*Interaction with Fellow Gamers*

The majority of participants (41\%) mainly interact with online friends and some offline friends although an equal proportion of respondents (39\%) interact mainly with offline friends and some online friends. Furthermore, 40\% of respondents felt their relationship between their online and offline based friends were equally important to them.

*Issues Discussed*

Issues discussed within MMORPG environments varied considerably, with 66\% of respondents frequently discussing game tactics, over one third (39\%) often giving advice on personal issues and nearly a quarter (21\%) frequently receiving advice on personal issues. Interestingly, over half of respondents (57\%) rarely followed advice from fellow gamers on personal issues leaving 43\% of respondents who occasionally followed advice on personal issues. The results also revealed a positive correlation between gamers that offered more advice on personal issues received more advice on personal issues (\( r \ (N=188) = .664 \ p < .001 \)). Moreover, a positive correlation revealed that gamers who received greater amounts of advice on personal issues tended to follow the advice given to them more often (\( r \ (N=188) = .541 \ p < .001 \)).

*In-Person Meetings*

Just over two thirds (67\%) of participants had previously met an online based gamer in person. Of these, 13\% found the meeting to be completely different to what they had expected it to be whilst one third (33\%) had no prior expectations. There was however no difference in expectations between genders.

*Potential for Harm and Privacy Risks*

Each participant was given an overall disclosure score based on the number of data types they had previously disclosed within MMORPG environments. Participants with a disclosure score of \( > 7 \) (median value) were categorised as high level disclosers and respondents with a score \( \leq 7 \) were categorised as low level disclosers. The study revealed high levels of data disclosure within MMORPGs environments with exactly 50\% of respondents categorised as high
level disclosers, however there was no statistical difference between genders or age groups.

There was a weak positive correlation between the hours of game play per week and levels of data disclosure \((r(N=188) = .150 \ p < .040)\), illustrating that participants who engage in MMORPG environments for excessive periods of time could be more likely to disclose greater amounts of personal and sensitive data. Moreover, a positive correlation between levels of addiction to MMORPGs and levels of data disclosure was found \((r(N=188) = .286 \ p < .001)\).

An analysis of variance (ANOVA) on disclosure across interaction between fellow gamers revealed that the more gamers interacted with online based friends the higher the levels of disclosure \((F(3, 184) = 3.323 \ p = .021)\). Moreover, post hoc tests showed that gamers who interacted with only offline based friends disclosed significantly less than people who interacted with some or all online based friends \((all \ p < .02)\).

Positive correlations emerged between the SDT subscales and levels of data disclosure. Indeed, analysis showed a positive correlation between relatedness and data disclosure \((r(N=188) = .432 \ p < .001)\) and competence and data disclosure \((r(N=188) = .294 \ p < .001)\). However no correlation was found between autonomy and data disclosure.

Positive correlations emerged between the impression management subscales and levels of data disclosure. Indeed, analysis showed a positive correlation between self-promotion and data disclosure \((r(N=188) = .347 \ p < .001)\), ingratiating and data disclosure \((r(N=188) = .285 \ p < .001)\) and intimidation and data disclosure \((r(N=188) = .257 \ p < .001)\). However no correlation was found between supplication and data disclosure. These findings support theories by Joinson (2003) who found that the affordance of anonymity and hyper personal interaction encourages participants to disclose greater amounts of personal and sensitive information within online interactive environments.

**Emerging Opportunities and Risks in MMORPG Environments**

The research findings presented hitherto examined the effect of addiction on levels of data disclosure within Massively Multiplayer Online Role Playing Game environments together with an illustration of gamers’ vulnerabilities to exploitation and predation. Results demonstrated significant relationships between pathological gaming and high levels of personal and sensitive data disclosure. Furthermore, evidence suggests that in the majority of cases, prolonged immersion in online gaming environments erodes real life social communication with over half of the EU respondents preferring to socialise in the MMORPG arena and 53% stating they would prefer to live in the MMORPG environment if given a choice. In line with previous findings, the majority (80%) of MMORPG players had formed what they deemed to be particularly close friendships with other players and 96% discussed personal issues with fellow gamers, highlighting the high level of trust between players. Participants also highlighted the need for inter-player dependability for faster progression in the
game. High levels of perceived trust between players juxtaposed with high levels immersion and data disclosure presents an emerging avenue for exploitation and predation. To this end, just under half of EU participants had previously become suspicious of other players behaviour with some having encountered aggression, stalking, harassment, racism and stealing. Perceived levels of inter-player trust in game may have prompted 38% of participants to meet online based friends in person thereby increasing the potential for harm. Over half (56%) of the participants had previously gender-swapped their character. Qualitative responses revealed that players who adopted different personas elicited more benefits and advantages. Examples included greater levels of attraction from avatars of the opposite sex, increased control over other guild members and a decrease in unwanted contact from persistent male gamers.

Ingratiation and self promotion were found to be the most commonly adopted impression management behaviours in the online gaming arena suggesting that players found complementing and praising other players as well as talking about their own achievements and accomplishments to be the most effective communication strategy. In the context of online gaming, complimenting and praising other players would form an integral part of Joinson’s (2003) hyper personal interaction theory in which online communicators optimise transmitted cues in order that the recipient builds an idealised view of the sender and thereby accelerating and intensifying the relationship formation. Previous evidence suggests that such behaviours have been adopted by predators to build relationships with vulnerable individuals. Juxtaposed with findings on addiction, immersion and data disclosure in MMORPG environments presents a clear and emerging avenue for exploitation.

In contrast, qualitative findings highlighted a number of positive social opportunities and enablement to develop new skills. Indeed, participants enjoyed networking with other like minded individuals from different geographical locations. Moreover, some participants perceived their online game as a place of equality in which they can learn new skills, teach and lead others and experiment with new identities. Others praised the peer-to-peer support fostered between players and the consequential raising of self confidence.

In line with evidence put forward by Yee (2006) participants were motivated by different facets of the game, with some enjoying the escapism into a fantasy world and others motivated by achievement and sense of empowerment. Several participants highlighted the growing business opportunities in the game and the development of entrepreneurial skills. Many players reported to have developed custom made add-ons and other opportunities to develop their imaginative and creative sides.

Combined evidence from the two survey studies, semi structured interviews and empirical findings from Yee (2006) and Griffiths and Hunt (1995), facilitated the identification of 12 opportunities and 12 risks as illustrated in Table 1. This is not an exhaustive list, but one compiled from the current evidence base.
<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presents challenges, facilitates personal skills development</td>
<td>Tracking &amp; harvesting personal data</td>
</tr>
<tr>
<td>Team work, collaboration, evaluation and reflection skills</td>
<td>Unwanted intrusion, data disclosure</td>
</tr>
<tr>
<td>Share knowledge, support, motive others</td>
<td>Creating and distributing malicious add-ons and plug-ins</td>
</tr>
<tr>
<td>Rewarded success, new challenges and opportunities</td>
<td>Desensitisation to violent, gruesome, harmful scenes</td>
</tr>
<tr>
<td>Adapting to new hierarchical social structures</td>
<td>Victim of griefing, trolling, cyber bullying</td>
</tr>
<tr>
<td>Advise and lead others</td>
<td>Harassing, cyber bullying another</td>
</tr>
<tr>
<td>Facilitates creativity and customisation of gaming experience</td>
<td>Desensitisation to sexual scenes</td>
</tr>
<tr>
<td>Using user generated content to enhance gaming experience</td>
<td>Unwanted contact and predatory behaviour. Being groomed</td>
</tr>
<tr>
<td>Create and publish user generated content</td>
<td>Erotic role play. Inappropriate sexual conduct</td>
</tr>
<tr>
<td>Emerging forms of self-other expression</td>
<td>Behavioural (operant) conditioning</td>
</tr>
<tr>
<td>Emerging dimensions of social engagement</td>
<td>Pathological gaming, behavioural addiction</td>
</tr>
<tr>
<td>Civic engagement, experimentation and expression of identity</td>
<td>Encouraging inappropriate, unhealthy behaviour</td>
</tr>
</tbody>
</table>

Table 1: Emerging Opportunities and Risks in MMORPG Environments

**Conclusions**

The combination of quantitative and qualitative methods gave a unique insight into the myriad of opportunities and risks encountered in Massively Multiplayer Online Role Playing environments. Analysis of the dataset revealed
opportunities and risks emerging from two distinct areas: contact with the structural characteristics of the environment and peer-to-peer contact. Evidence also suggested that the identified opportunities and risks were exacerbated as a result of players’ behaviour and level of engagement in the environment. Furthermore, high levels of trust reinforced by the game dynamics gave rise to further potential for harm.

It is important to note the limitations of the research. The opportunities and risks presented in Table 1 emerged from the evidence based on participant responses. As such, the evidence base is subject to participants own interpretation of risk and their internal risk models. It is therefore suggested that further ethnographical research is undertaken in order to validate the opportunities and risks put forward by participants.

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