

In-game and Out-of-game Social Anxiety Influences Player Motivations, Activities, and Experiences in MMORPGs

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ABSTRACT

Socializing is an important part of why people choose to play games and is at the core of many game mechanics. Anxiety and fear about social interactions can lead to withdrawal from socializing in the physical world, yet players with social anxiety preferentially choose MMORPGs—a highly social genre—raising questions of whether social anxiety expresses differently during in-game interactions. In the present study (N=181), we explore whether and how social anxiety translates into MMORPGs. By developing a measure of in-game social anxiety, we find that although fear and apprehension of socializing in the physical and game worlds are related, they differently affect preferences, behaviours, and experiences. Social anxiety in the physical world drives reasons for playing, whereas in-game anxiety affects behaviours, reducing participation in activities related to socializing and difficult in-game challenges. Our findings can inform the design of social games and the links between social anxiety and social gaming.

Author Keywords

Online gaming; social anxiety; MMORPG; socializing

CCS Concepts

• **Human-centered computing~Human computer interaction (HCI)** • Human-centered computing~Collaborative and social computing • **Applied computing~Computer games**

INTRODUCTION

People have a fundamental need to form and maintain meaningful relationships [9], which is increasingly being met through socialization with others in the digital realm [24, 52, 71, 84], and in particular through digital games. Socializing

within games is a primary motivator for play [39], with 63% of adult gamers reporting that they play with others, in part because gaming helps them connect with their friends and family [29]. While there is still debate as to whether socialization in games is as effective at satisfying social needs as interacting offline (e.g., [36, 45, 74]), recent work shows that stereotypes about the lonely gamer are inaccurate [47, 67]. Players view games as a social medium through which they socially interact [49, 74, 80], and for typical players, there are benefits to well-being [22, 50, 54, 68].

However, the benefits of socializing through games might not be accessible to all players. In the physical world, people differ in how challenging they find socializing, due to fear and anxiety experienced in social interactions [81]. This fear causes socially anxious individuals to withdraw from social situations and isolate themselves [21, 70, 76]. On the other hand, there is evidence that the same people who experience fear around socializing in the physical world are drawn to online interactions, such as online chats and social media platforms [69, 75, 90]. Further, some research suggests that gamers high in social anxiety are preferentially choosing to play Massively Multiplayer Online Role-Playing Games (MMORPGs) over other types of multiplayer games [66, 93]. MMORPGs are a highly social game genre [15, 58, 85], in which players interact with others in a persistent virtual world, and are used to maintain existing relationships, form new ones, and even find romantic partners [93].

It is possible that people who experience fear and anxiety around social interactions (i.e., social anxiety) are drawn to MMORPGs to satisfy their social needs. However, we do not know if social anxiety experienced in the physical world translates into an MMORPG context, or whether socially anxious players leverage the fantasy of the game world and the affordances within it to represent themselves as they wish and engage in social interactions with reduced fear.

To determine how social anxiety affects people's access to, behaviours in, and experiences of social games, we surveyed 181 MMORPG players about their experienced social anxiety in the physical world and the game world, along with their MMORPG preferences, motivations, and activities.

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CHI '20, April 25–30, 2020, Honolulu, HI, USA
© 2020 Association for Computing Machinery.
ACM ISBN 978-1-4503-6708-0/20/04...\$15.00
<https://doi.org/10.1145/3313831.3376734>

Because previous approaches focused on physical world contexts or social media contexts [3], we had to develop our own tool to measure social anxiety in the context of online gaming. We based this tool on the gold standard of social anxiety assessment through self-report, the Liebowitz Social Anxiety Scale [60]. Our measurement tool showed high internal consistency and descriptive characteristics in line with existing measurements of social anxiety for use in the physical world. We used this tool to assess whether social anxiety expresses differently in the game world than in the physical world (RQ1, RQ2). We question whether the degree of social anxiety (both out-of-game and in-game) affects seven identified reasons why players choose MMORPGs (RQ3), their preferences for six different in-game activities (RQ4), and their resulting game experiences (RQ5, RQ6).

Our results show that social anxiety in the physical world and social anxiety in the game world are related but differently affect players preferences and behaviours. Social anxiety in the physical world significantly predicted the reasons for playing, with players reporting that it is easier to connect with others in-game, that the MMORPG world is less broken, and that they feel more socially competent within it. On the other hand, in-game anxiety predicted reduced participation in activities related to socializing and difficult in-game challenges. These differences in play behaviour did not affect overall enjoyment of the MMORPG genre, which was very high in our sample. Regardless of anxiety type or level, players found events in the physical world to be more threatening than the same events in the game world.

We discuss how game designers can leverage our results, possible implications for therapeutic use, and add relevance to current debates around problematic game usage. Social anxiety is a major mental health issue globally [49] and our results provide deeper insights about how it expresses in the world of online game interactions.

RELATED WORK

We present related work from three perspectives (inspired by Björk's framework [11]): The game (MMORPGs), the gamer (and social anxiety), and gaming (socializing in MMORPGs).

The Game: The MMORPG Genre

MMORPGs are a popular game genre—the most popular game in the genre, *World of Warcraft*, had an estimated 5 million active players in 2019 [82], and at its peak (2010) it had 12 million players [69]. MMORPGs feature fully simulated multiplayer game worlds in which players can create their own in-game representations, known as a “character” or “avatar” [18, 31]. Players use these characters to interact with the digital world as well as with other players. Players can express themselves by customizing their character's appearance, personality, and skills. By facing in-

game challenges, players can advance their character, unlock new abilities, and acquire new equipment.

Many MMORPGs feature built-in systems to associate with other players, e.g., factions, guilds, and clans. Additionally, they provide activities that can be broadly classified as either Player vs. Environment (PvE; players fight together against virtual enemies) or Player vs. Player (PvP; players fight each other). These can be played in a group, or solo, and players can selectively engage in or ignore these different aspects of the game. The long-term success of MMORPGs has been attributed to these features [4, 16, 75], as well as to the rich social interactions available within the game [86].

The Gamer: Characteristics of Social Anxiety

For some people, socializing can be frightening or anxiety-inducing to a level where they experience “social anxiety”, which is characterized by a persistent fear of situations in which they are exposed to unfamiliar people or to possible scrutiny and negative evaluation by others [1, 3]. As a result, they tend to avoid social situations or endure them with significant distress. Social anxiety is most accurately expressed along a severity continuum [73], where one can experience a high degree of social anxiety yet not reach the threshold for clinical diagnosis. The degree of social anxiety is affected by several individual and environmental [81] risk factors, which lead to different expressions of social anxiety [32]. Further, individuals may experience high social anxiety only within specific contexts, such as giving a presentation [12], while other situations are less distressing.

Previous studies show that individuals with social anxiety may have greater difficulties forming relationships with others [64]. As a result, they tend to have fewer close friends [87], and are less accepted or even ignored by their peers [35]. They may also be victimized by others due to differences in social competence [63, 64], and are at higher risk of being bullied [21]. Individuals who experience social anxiety can develop unhealthy coping strategies, including substance abuse [18] and problematic gaming behavior [37].

Gaming behaviour has been argued to exist on a “continuum ranging from non-problematic occasional and regular gaming at one end of the scale through to problematic excessive and addictive gaming at the other.” [38]. The term “problematic gaming” is used by Griffiths et al. as “an umbrella term to describe the phenomenon of problematic video game use” [37], which has a spectrum of severity, ranging from lightly disordered patterns of play through gaming disorder, defined by the WHO IDC-11 as being “*characterized by impaired control over gaming, increasing priority given to gaming over other activities to the extent that gaming takes precedence over other interests and daily activities, and continuation or escalation of gaming despite the occurrence of negative consequences.*”[94].

Cole et al. [23] found that gamers measuring high in problematic internet use due to MMORPG gaming were more likely to experience higher levels of social anxiety. A study of problematic online gaming by Park et al. [67] suggests that of four genres (MMORPG, First Person Shooter, Real Time Strategy, and “Others”), players with higher levels of social anxiety were more likely to play MMORPGs than other genres, and less likely to play FPS games. Furthermore, Gavriloff et al. [33] found that socially anxious gamers show less dispositional mindfulness—which is characterized by the mental state of being aware of one’s current experience and functioning [17]—than non-anxious gamers. They suggest that players use games to self-regulate their social anxiety with mindful awareness of their emotional state by participating in the social aspects of the game. Despite past work, we still lack understanding of why socially anxious players are drawn to play MMORPGs.

The Interaction: Socializing in Games and MMORPGs

Forming and maintaining relationships and feelings of belonging are fundamental needs [9] that are increasingly being fulfilled by using online games for social interaction [23, 26, 49]. There is some debate as to whether this is desirable (e.g., [52]), possibly stemming from the stereotype of the lonely, socially-isolated gamer [45, 67]. Particular concerns include the possibility that in-game relationships are low-quality in terms of providing social support [16] or that they displace physical-world ties [45, 74]. Investigations into social displacement theories have found support for the idea that in-game ties are negatively associated with physical-world ties [51]; however, in-game relationships are not necessarily “lesser” than physical-world relationships [22, 48]. When measures of well-being are considered, in-game social interactions are positively associated with a player’s sense of self-esteem [56], perceptions of social competence [56], reductions in loneliness [22, 54, 68], and increased relatedness [25]. A factor when investigating these concerns is that the line between game-world and physical-world friendship is blurred—many players use online games to maintain pre-existing relationships [22, 23]; conversely, many friendships that start in the game-world eventually get taken to the physical-world [22, 81].

MMORPGs feature multiple ways to socialize. Players usually have access to many different chat channels at any point in time; for example, guild or clan chats, team chats, faction chats, open world chats, nearby chats that only the players in a specific area can see, and direct chats in which one can privately whisper with a certain player. Additionally, non-verbal communication techniques allow players to communicate strategies by drawing instructions on the in-game map, alert others by pinging, or guide novices through a difficult part of the game, which can help players to

improve their performance and foster relationships with other players [2, 57, 85].

Many in-game activities require teamwork, and therefore a group of players will unite to achieve a common goal. Players can further benefit from cooperation by making use of the complementary abilities of their characters. Individual MMORPGs also feature unique interaction mechanics, but common examples include role-playing, player emotes and dance moves. Some MMORPGs allow players to start a family or even marry another player in-game.

Even though in-game socialization can result in positive outcomes, there are risks involved. In particular, in-game social interactions can be negative or “toxic”. In online games, this takes the form of one player harassing another [30], which in extreme cases can lead to bullying [57]. A 2015 study found that 52% of MMO players had been victims of cyberbullying [7]. Many in-game tasks are challenging and players who are judged as “weak” may be socially excluded from groups or from joining the strongest guilds [57]. Overall, previous research draws a strong link between social anxiety, game genre preferences, and problematic game usage. However, explanations are still missing for why socially anxious players enjoy—and perhaps even prefer—MMORPGs.

STUDY METHODS

To provide a better understanding of this link between social anxiety and MMORPG play, we conducted an online survey with MMORPG players. Our goals were to investigate if social anxiety translates into the digital world and if so, how it affects reasons for choosing MMORPGs, the MMORPG activities players engage in, and their play experience. Further, we were curious if social anxiety affects perception of the game as a safer space relative to the physical world.

Procedure and Participants

We deployed an online survey to participants recruited using Amazon’s Mechanical Turk (MTurk). MTurk is an online platform where “requesters” can post Human Intelligence Tasks (HITs) that workers can opt-in to complete. Data collected from MTurk has been successfully used for research in the area of human-computer interaction (HCI) [10, 37, 61, 69], although some care must be given to ensure that bots or negligent workers are excluded from consideration in the final analyses [33, 59]. Ethical approval for the study was provided by the ethics board of the University of Saskatchewan and all participants first provided informed consent.

As we were interested in recruiting MMORPG players, we first deployed a “screening” HIT, asking participants about the game genres they play. Participants who indicated they played MMORPGs were then assigned a “qualification” that

would allow them to see the HIT for our survey. Participants were paid \$3 USD for completing the survey, which took approximately 15 minutes to complete.

We recruited 181 participants (74 female, 107 male, 0 non-binary) aged 19–66 (mean=33.6, SD=8.7). One participant was not able to complete the questionnaire due to technical difficulties. We asked participants to check off whether they played particular popular MMORPG games, and found the most popular MMORPGs among our participants to be *World of Warcraft* (N=144), *Final Fantasy XIV* (N=92), *The Elder Scrolls Online* (N=81), *Guild Wars 2* (N=81), and *Final Fantasy 11* (N=60). To identify negligent participants (or bots) who did not answer the survey with consideration, we removed participants who moved through the questions very quickly (<1.5 seconds per item, N=6) [15], leaving 174 participants in all subsequent analyses.

Measures

In addition to standard demographic information, we asked a variety of questions related to social anxiety and MMORPG motivations, preferences, and behaviours. As some of these scales were constructed for the purpose of this study, we describe them in detail.

Assessment of Social Anxiety

We used the self-report version [28, 34] of the Liebowitz Social Anxiety Scale (LSAS) [60], which estimates the severity of social anxiety. It consists of 24 items, measuring both fear and avoidance (separately) of a range of social situations, with instructions to consider experienced fear and anxiety over the past week. There are 11 items related to social interactions (SI) and 13 items linked to public performance (PP). Each item is rated on two 4-point Likert scales: the fear rating ranges from 0 (none) to 3 (severe) and the avoidance rating ranges from 0 (never; 0%) to 3 (usually; 68-100%). All scores are summed together.

Assessment of In-Game Social Anxiety

As previous research showed, social anxiety may be experienced differently depending on the context of the social interaction [32], which leads to the concept of in-game social anxiety – anxiety experienced during social game contexts. While in other contexts, such as social media usage [3], specialized assessments have been developed, there is no tool to measure the social anxiety experienced during MMORPG. To understand how social anxiety translates into the game world, we created a new scale of in-game social anxiety, basing its design on the Liebowitz scale (LSAS). As LSAS focuses on the experience in the physical world, not all items could be directly translated into an MMORPG context. We reviewed the 24 items and classified them into three categories: the first category contained six items (5 SI and 1 PP), which could be used without further adjustments, such as “Participating in small groups”. The second category

consisted of 13 (4 SI and 9 PP) items, which required a recontextualization into the in-game world. For example, “Telephoning in public”, was changed to “Talking in a group voice chat while gaming with other players”. The last category contained five items (2 SI and 3 PP) items, which were not applicable to the digital world, due to their focus on being physically near others (e.g., “Drinking with others in public places”). We replaced these items with new items unrelated to the original LSAS items but containing typical situations players might fear in games, such as “Comparing your performance with that of other players (e.g., leaderboards)”, and we kept the same proportion of SI and PP items. The instructions were changed to be clear that participants should rate how much they fear and avoid these situations *in the game world* of an MMORPG. Individual items in this Gaming Social Anxiety Scale (GSAS) can be seen in Table 1. As with the LSAS, each item was rated on two 4-point Likert scales: The fear rating ranges from 0 (none) to 3 (severe) and the avoidance rating ranges from 0 (never; 0%) to 3 (usually; 68-100%), and then all scores are summed. The GSAS showed high internal consistency (Cronbach’s $\alpha = .978$; Guttman lambda-2 = .979).

Category	Item
Public Performance Items	Talking in a group voice chat while gaming with other players.
	Participating in small groups.
	Finding out that somebody on your team is streaming.
	Comparing your performance with that of other players (e.g., leaderboards).
	Performing a special task while other players rely on you.
	Being observed in the game world.
	Having someone in the game world watch you perform a task.
	Making a mistake in a raid.
	Losing connection during a group activity.
	Speaking up in a group.
	Being invited for a trial run / dps test (etc.) to prove your skills.
	Contributing to an in-game group discussion.
	Trying to flirt with another player.
Social Interactions	Talking to people in authority.
	Joining a group of other players in a fun activity in the open world (e.g. dance parties).
	Contacting another player, you don't know well.
	Talking with people you don't know very well.
	Meeting strangers.
	Being the center of attention.
	Expressing a disagreement or disapproval to people you don't know very well.
	Starting or joining a voice chat to socialize.
	Joining a group where everyone already knows each other.
	Starting your own group or guild.
	Resisting a high-pressure recruitment.

Table 1: The Gaming Social Anxiety Scale (GSAS) items

Assessment of MMORPG Enjoyment

To evaluate personal enjoyment of playing MMORPGs, we asked our participants to rate their enjoyment on a 5-pt scale (with 1= Not at All; 5=Very Much).

Assessment of Reasons for MMORPG Play

To determine the reasons that people play MMORPGs, we asked a set of questions. Four experts, each with a decade of experience in MMORPG play and games user research backgrounds, created 30 items intended to fit into seven categories of reasons *why* players play MMORPGs. After data collection, two items with low correlations to their intended scale were removed (e.g., “I feel less affected by

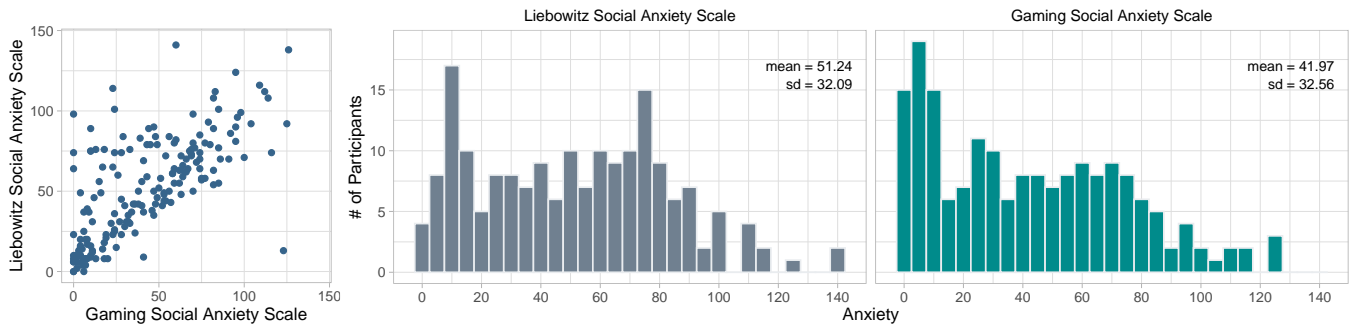


Figure 1: Social Anxiety Score (LSAS) and In-Game Social Anxiety Score (GSAS) and the relationship between both scores (left).

what happens in an MMORPG than by what happens in the physical world” – Feelings of Safety). Table 2 describes the seven reason categories and their internal consistencies.

Participants were instructed to rate, on a 5-point Likert scale, how often they have thoughts similar or equal to the presented item while playing an MMORPG, ranging from “Never” (1) to “All the time” (5).

Assessment of Activities Inside the Game World

To investigate which activities players engage in within MMORPGs, we followed a similar approach to the one taken to characterize reasons. The same four experts determined six categories of frequent MMORPG activities and created 37 items to reflect typical examples of in-game activities. Participants were instructed to rate how likely they would be to engage in these activities while playing an MMORPG on a 5-point Likert scale ranging from “Very unlikely” (1) to “Very likely” (5). Three items (e.g., “Pay for an advantage or to make up for your shortcomings” – Low Challenge) were removed because of a low correlation with their intended scale. Table 2 describes the six categories of activity items and their internal consistencies.

Relative Threat Assessment

We asked participants to rate their relative anxiety in eight specific social interactions (e.g., “Someone criticizing your choices”) between the physical world and the game world. They were asked to respond on a 50-pt slider ranging from “physical world” (-25) to “digital world” (25). We instructed participants to set the slider to the middle (0) if they were “equally anxious or non-anxious about both contexts”. Individual items can be seen in Table 4.

RESULTS

We present the results, organized by our research questions.

RQ0. In a sample of MMORPG players, what is the distribution of social anxiety?

Figure 1 shows the distribution of scores for the LSAS (Cronbach’s $\alpha=.974$; Guttman lambda-2 =.976). People can be considered socially anxious if their score exceeds 30 and are likely to have generalized social anxiety disorder if their score exceeds 60, subject to clinical diagnosis [74]. Our

score distribution reveals that our sample did include many MMORPG players that experience social anxiety.

RQ1. In MMORPG players, is there an expression of in-game social anxiety?

Our research is partly motivated by not knowing whether social anxiety is experienced by players during interactions in the game world. Our in-game measure of social anxiety (GSAS, see Methods) suggests that people do experience in-game social anxiety. The distribution of GSAS scores (see Figure 1) is similar to that of LSAS, with some differences. Descriptively, we can see that the maximum scores are lower for in-game anxiety and that there are more participants who experience low levels of in-game anxiety (GSAS) in MMORPGs than in the physical world (LSAS).

RQ2. In a sample of MMORPG players, how does social anxiety within games and outside of games relate?

Although both social anxiety and in-game social anxiety were observed in our sample of players, a Pearson correlation between LSAS and GSAS is significant ($r=.677$, $p<.001$), suggesting that the experience of social anxiety in-game is significantly and positively associated with social anxiety out-of-game. However, the scatter plot and distributions shown in Figure 1 suggest that there are also people for whom social anxiety is high, but in-game social anxiety is low. Although there is a strong linear association between social anxiety expressed within and outside of games, Figure 1 shows a trend for players to rate their social anxiety out of game as higher than their in-game social anxiety. A paired-samples t-test confirms this difference ($t_{173}=4.736$, $p<.001$). We tested for heteroscedasticity by using the Breusch-Pagan test ($\chi^2=.397$, $df = 1$, $p=.528$).

RQ3. For what reasons are players with social anxiety and in-game social anxiety playing MMORPGs?

To determine whether reasons for playing MMORPGs differ based on social anxiety, either within or outside of the game, we conducted moderated regressions predicting each of the *Reasons* subscales in the Methods Section by LSAS, and

					1	2	3	4	5
Reason	1 Better World	Feelings that the digital world is less broken and makes more sense than the physical world.	"In an MMORPG, social structures make more sense to me than those in the physical world."	4 items α=.837					
	2 Easy Exit	Thoughts about how easy it is to quit or withdraw from the game environment when it is becoming unpleasant.	"If anything goes wrong in an MMORPG, I can easily quit and be done with it."	4 items α=.744					
	3 Content Volition	Appreciation that less interesting or fun game content can be easily ignored.	"In an MMORPG, I can avoid activities that I don't like."	2 items α=.749					
	4 Feelings of Safety	Security that social interactions in the digital world feel safer, for example because 'ignore' buttons exist.	"In an MMORPG, I feel less judged by others than in the physical world."	8 items α=.899					
	5 Self-Worth	Higher feelings of competence and social competence in the digital than in the physical world.	"In an MMORPG, I feel more competent than I do in the physical world."	3 items α=.848					
	6 Social Access	Easier access to social interactions in the game world; Finding it easier to meet new people in-games.	"In an MMORPG, I can explore social interactions in a safe way."	4 items α=.800					
	7 Transition	The wish to take in-game friendships to another context by meeting physically or playing multiple games.	"I feel good about taking MMORPG friendships to an out-of-game context."	3 items α=.744					
Activity	8 Advancement	Completing activities to level or improve the in-game character, such as acquiring equipment or doing daily quests.	"Complete as many daily and weekly quests as possible."	3 items α=.722					
	9 Collection	Collecting vanity items that do not improve character strength, such as fashion, mounts, pets or achievements.	"Collect outfits and accessories for your avatar."	6 items α=.823					
	10 High Challenge	Engaging in high challenge in-game activities, e.g., difficult raids and dungeons or PvP activities.	"Join a random group for a difficult dungeon."	5 items α=.778					
	11 Low Challenge	Engaging in easy activities such as completing low-level dungeons or solo activities where performance is not visible to others.	"Run old or lower level raids on your own."	6 items α=.743					
	12 Social	Chatting, guild socializing, or joining voice chats with other players.	"Chat privately with players you know very well."	10 items α=.862					
	13 Narrative	Immersing into the story of the game by obsessing over the lore or engaging in role-playing with others.	"Obsess over factions, the lore, and the story of the game."	3 items α=.514					

Table 2: Descriptions and example items for each of 13 reasons and activity categories. Item count, Cronbach's α, means, and ± standard error bars.

moderated by GSAS (i.e., y =Reason subscale, x =LSAS and m =GSAS); see Table 3 for results. See Figure 1 for overall means and standard deviations.

RQ3a. For what reasons are people with social anxiety playing MMORPGs?

As seen in Table 3, LSAS significantly predicts agreement with the subscales of *better world*, *feelings of safety*, *social access*, and *self-worth*. In all cases, the beta value is positive—that is, higher ratings of social anxiety predict greater agreement with the reasons. This suggests that people with higher levels of social anxiety are more likely to report that the in-game world feels less broken or makes more sense to them than the physical world, that it makes them feel more secure to engage in social interactions, that they find it easier to connect with other players there, and that engaging with others in games elicits stronger feelings of competence.

LSAS is not significantly associated with *content volition* or *easy exit*. This means that players with higher levels of social anxiety are no more or less likely to report that they play MMORPGs because they can decide what content they want to engage in and ignore the parts of the game they dislike. The same is true for reporting that it is easy for them to be done with a game if things go wrong. Socially anxious and non-socially anxious players are equally likely to report this

as a reason for choosing this genre. It should be noted that the sample rated these two reasons highly, indicating that both are descriptively the strongest reasons to play MMORPGs for all players, regardless of social anxiety (see Table 3). Finally, LSAS was not significantly associated with *transition*, suggesting that players with higher levels of social anxiety are no more or less likely to report that they may transition in-game friendships into other contexts.

RQ3b. For what reasons are people with in-game social anxiety playing MMORPGs?

As seen in Table 3, GSAS significantly predicts agreement with the subscales of *social access* and *transition*. In both cases, the beta value is negative—that is, higher ratings of in-game social anxiety predict lower agreement with the reasons. These results suggest that players with higher levels of in-game anxiety are less likely to report that they find it easier to connect with other people in the game world and they are also less likely to transition in-game friendships to an out-of-game context. There was no significant association with *better world*, *easy exit*, *content volition*, *feelings of safety*, or *self-worth*, suggesting that players with higher levels of in-game social anxiety are no more or less likely to report these reasons for choosing to play MMORPGs.

	Better World	Easy Exit	Content Volition	Feelings of Safety	Self-Worth	Social Access	Transition	Advancement	Collection	High Challenge	Low Challenge	Social	Narrative
LSAS	13.4 4.3 <.001	4.7 1.8 .075	4.6 1.6 .102	11.5 4.2 <.001	15.7 4.7 <.001	6.2 2.3 .022	2.6 0.9 .371	0.9 0.4 .719	2.3 0.9 .333	1.5 0.6 .576	2.4 1.0 .319	-2.1 1.0 .328	-0.2 0.1 .932
GSAS	3.5 1.1 .262	-0.4 1.5 .141	-3.1 1.1 .278	-0.3 0.1 .901	1.1 0.3 .747	-6.4 2.4 .019	-9.6 3.2 .001	-2.9 1.2 .243	0.0 0.0 .969	-11.6 4.4 <.001	-4.3 1.8 .073	-8.4 3.9 <.001	-0.7 0.2 .810
LSASxGSAS	-0.2 2.8 .006	0.0 0.2 .848	0.0 0.4 .675	-0.1 1.9 .059	-0.2 2.3 .023	0.0 0.4 .684	0.0 0.6 .535	0.0 2.2 .030	0.0 1.5 .130	0.0 1.5 .131	0.0 1.2 .219	0.0 0.1 .898	0.0 0.1 .910
R ²	.252	.021	.016	.173	.233	.043	.076	.032	.024	.152	.023	.198	.001
model p	<.001	.305	.438	<.001	<.001	.059	.004	.141	.247	<.001	.265	<.001	.981

Table 3: The moderated regression models for the reasons and activity scales. Significant results are highlighted in bold and coloured. Explained variance for regression models (R²) displayed are LSAS and GSAS, including the interaction.

RQ3c. Does GSAS moderate the prediction of LSAS on reasons to play MMORPGs?

As shown in Table 3, GSAS significantly moderated the prediction of LSAS on *better world* and *self-worth*. The other moderations were non-significant. These moderations follow the same pattern; that is, as reported in-game anxiety (GSAS) increases, it reduces and then nullifies the predictions of LSAS on the scales of *better world* and *self-worth* (see Figure 2). These results suggest that the demonstrated relationship between socially anxious participants feeling like the game is a better world and that they feel more competent is only true for people lower on in-game social anxiety. Using the Johnson-Neyman algorithm [38, 41], we can determine the inflection point of GSAS value at which the prediction of LSAS is no longer significant, which is 78 for self-worth and 69 for better world.

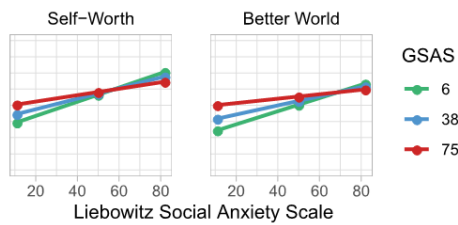


Figure 2: The moderation effects of LSAS on self-worth, and better world.

Q4. In what kinds of MMORPG activities are players with in-game and out-of-game social anxiety engaging?

To determine whether activity preferences in MMORPGs differ based on social anxiety, either within or outside of the game, we conducted moderated regressions predicting each of the Activity subscales in the Methods Section by LSAS, and moderated by GSAS (i.e., $y = \text{Activity subscale}$, $x = \text{LSAS}$ and $m = \text{GSAS}$); see Table 3 for results and Table 2 for overall means and standard deviations.

RQ4a. In what kinds of MMORPG activities are people with social anxiety engaging?

As seen in Table 3, LSAS does not significantly predict agreement with any activities (*advancement*, *collection*, *high-challenge*, *low-challenge*, *social*, or *narrative*). We do not see any indication that the likelihood of engaging in MMORPG activities is associated with social anxiety.

RQ4b. In what kinds of MMORPG activities are people with in-game social anxiety engaging?

As seen in Table 3, GSAS significantly and negatively predicts *social* and *high challenge* activities. Although there was no prediction of out-of-game social anxiety on activities, when social anxiety also translates to in-game anxiety, these players become less likely to engage in challenging in-game activities, such as difficult dungeons or PvP content. The same is true for socializing in the game, which becomes less likely with increasing in-game anxiety. There were no significant predictions on *advancement*, *collection*, *low challenge*, or *narrative* activities, suggesting that players are not more or less likely to engage in these activities based on in-game social anxiety.

RQ4c. Does GSAS moderate the prediction of LSAS on MMORPG activities?

As shown in Table 3, the only significant moderation was on *advancement*; however, the total model was not significant and neither GSAS nor LSAS predicted advancing directly.

Overall we can see that players do not differ in how they play MMORPGs (i.e., what activities they engage in), depending on their level of social anxiety and in-game anxiety when it comes to trying to improve their character (*advancement*); completing *collections* such as mounts, outfits for their character to wear, or achievements; engaging in the in-game *narrative* or role-playing; or engaging in less challenging in-game content (*low challenge*) such as lower-level dungeons. Descriptively, players are likely to engage in these activities (see Table 3), regardless of experienced anxiety. Improving their character and collecting seem to be the most popular in-game activities out of those that we asked about.

RQ5. Does social anxiety or in-game anxiety predict how threatening events in the game world are as compared to the physical world?

We asked players how threatening certain events are to them in the physical world relative to the game world. To determine how threatening MMORPGs are based on social anxiety, either within or outside of the game, we conducted moderated regressions predicting relative threat assessment by LSAS, and moderated by GSAS (i.e., $y = \text{Threat slider}$, $x = \text{LSAS}$ and $m = \text{GSAS}$); see Table 4 for results. See Figure 3 for overall means and standard deviations.

	Being insulted for performance			Being insulted for who you are			Making a mistake			Having a social interaction go wrong			Insulting for your choices			Judging for performance			Performing in front of others			Being observed by others		
	B	t	p	B	t	p	B	t	p	B	t	p	B	t	p	B	t	p	B	t	p	B	t	p
LSAS	-0.09	2.7	.008	-0.07	2.3	.023	-0.08	2.2	.028	-0.08	2.3	.020	-0.10	2.7	.008	-0.11	3.1	.003	-0.13	3.7	.000	-0.10	2.7	.007
GSAS	0.06	1.7	.087	0.03	0.8	.426	0.04	1.3	.204	0.03	1.0	.314	0.07	2.0	.047	0.10	2.7	.008	0.11	3.2	.002	0.08	2.2	.029
LSAS x GSAS	0.0	0.7	.511	0.0	1.0	.322	0.0	0.4	.723	0.0	0.08	.938	0.0	0.0	.989	0.0	0.7	.463	0.0	0.9	.355	0.0	0.4	.670
R ²	0.048			0.044			0.029			0.035			0.043			0.056			0.079			0.049		
model p	.038			.053			.174			.104			.059			.021			.003			.037		

Table 4: Moderated regression models for the threat comparison between the physical and the game world. Lower values indicate higher threat experienced in the physical world. Significant results are displayed in bold and blue. Explained variance for regression models (R²) displayed are LSAS and GSAS, including the interaction.

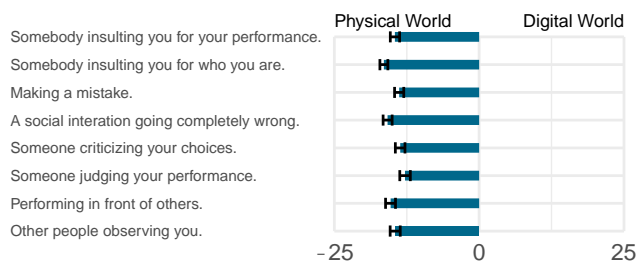


Figure 3: Whether more anxiety is felt in the physical world or the digital world for the events described. Error bars are \pm standard error.

RQ5a. How do players with social anxiety perceive the threat of the game world as compared to the physical world?

As seen in Table 4, LSAS significantly predicts greater agreement that all the events we asked about are *less* threatening in the game world than in the physical world. This includes being insulted or judged for their performance, being observed by others, making mistakes, performing in front of others, having a social interaction go wrong, as well as being insulted for who they are, and for choices they make.

RQ5b. How do players with in-game anxiety perceive the threat of the game world as compared to the physical world?

As seen in Table 4, GSAS significantly predicts greater agreement that some of the events that we asked about are *less* threatening in the physical world than in the game world, including being judged for their performance, being observed by others, performing in front of others, and being insulted for the choices they make. This does not mean that they rate the game world as more threatening than the physical world but it means they are leaning less strongly into this direction than players without in-game anxiety.

RQ5c. Does GSAS moderate the prediction of LSAS on the threat of the game world as compared to the physical world?

As seen in Table 4, there were no significant moderations, between GSAS and LSAS on the perception of how threatening situations are in the physical or game world.

RQ6. Does social anxiety or in-game anxiety predict MMORPG enjoyment?

To determine how enjoyable MMORPGs are based on social anxiety, either within or outside of the game, we conducted moderated regressions predicting enjoyment by LSAS, and moderated by GSAS (i.e., $y = \text{Enjoyment}$, $x = \text{LSAS}$ and $m = \text{GSAS}$); the overall model was not significant ($r^2 = 0.003$, $p = .906$).

RQ6a. Does LSAS predict MMORPG enjoyment?

Social anxiety does not predict how likely players are to enjoy MMORPGs ($B < .001$, $t = 0.4$, $p = .708$).

RQ6b. Does GSAS predict MMORPG enjoyment?

In-game anxiety does not predict the enjoyment of MMORPGs ($B < .001$, $t = 0.4$, $p = .689$).

RQ6c. Does GSAS moderate the prediction of LSAS on MMORPG enjoyment?

There was no moderation ($B < .001$, $t = 0.7$, $p = .490$).

Overall, there were no differences in MMORPG enjoyment ratings depending on social anxiety, either in-game or in the physical world; however, we also found enjoyment to be subject to a ceiling effect. On a 5-pt scale, the mean rating was 4.78 ($SD = 0.68$). Over 80% of our participants rated their enjoyment as a '5' with an additional 15% rating it as a '4'. This is not surprising as we specifically recruited MMORPG players, but it does confirm that they enjoy playing, and their rating does not depend on experienced social anxiety, either experienced in game or outside of games.

DISCUSSION

Summary of Results

We investigated how social anxiety translates to the in-game world of an MMORPG, as well as why socially anxious players choose to play these games and which activities they engage in. We found the following results:

- **RQ0:** We confirmed that our sample of MMORPG players experiences various levels of social anxiety.
- **RQ1:** We see that many players express social anxiety in the game world (GSAS) as well as in the physical world (LSAS), although the scores for in-game social anxiety are lower than for physical-world social anxiety.
- **RQ2:** We find that in-game social anxiety is positively associated with physical-world social anxiety and highly correlated. Additionally, we identified that there are some people who experience physical-world social anxiety, but experience low levels of game-world social anxiety.
- **RQ3:** We find that players with *physical-world social anxiety* tend to think that the game-world makes more sense and feels safer, view in-game social interaction as more accessible, and perceive a greater sense of self-worth. Players with *in-game social anxiety* tend to agree less that the game is socially accessible, and are less interested in taking their game relationships to other contexts. In-game social anxiety moderates the effect of social anxiety on self-worth and better world.
- **RQ4:** We find that physical-world social anxiety does not predict any in-game activity preferences, but that players who experience game-world social anxiety are less likely to participate in high-challenge and social activities.
- **RQ5:** We find that physical-world social anxiety predicts greater agreement that events in the physical world are *more* anxiety-inducing than the same events in the digital world. However, game-world social anxiety predicted *less strong* agreement that some physical-world events are less anxiety-inducing in the physical world than the digital world (i.e., being judged for their performance, being observed by others, performing in front of others, and being insulted for the choices they make).

- **RQ6:** We saw no differences in the enjoyment of MMORPGs for either type of social anxiety, but overall enjoyment of MMORPGs was very high.

Overall, we find that anxiety in the physical world is different from anxiety in games. It is possible to have players with different anxiety levels in different contexts. Players who experience physical-world social anxiety seem to view MMORPGs as a positive experience, for example, when it comes to socializing, and their in-game activities are not significantly different than their non-anxious peers. However, if the player also experiences anxiety in the game world, then their experience suffers. They do not find social interactions in the game-world to be as accessible as other players report them to be and they are more likely to avoid high-challenge activities. Despite this, they still very much enjoy the game.

Explanation of Findings

As seen in the results, the effects of social anxiety can carry from the physical world to the in-game world: Socially anxious players show similar patterns in-game as in the physical world, such as being more likely to avoid challenging activities and situations with the potential of being evaluated by others than non-anxious players. This behaviour is not surprising, as MMORPG environments can be very social and stable [10] and therefore reputation can matter. Not being perceived as a skilled player by others can lead to expulsion from elite raid groups or guilds.

Despite these pressures, there are players with social anxiety who do not experience social fears in the game world to the same extent that they do in the physical world. This discrepancy may be due to the unique features of the MMORPG. Unlike other game genres, MMORPGs expand beyond challenging activities and give players options (e.g., mini-games or small group activities) that are not associated with performance pressure. Additionally, we found that all players, regardless of social anxiety, found the game world less threatening than the physical world.

Furthermore, while previous work [23] argues that socially anxious players regard the in-game world to be a safe place, this is only true in part: Players with low in-game social anxiety do use the game to socialize and to express themselves, but on the other hand, players with high in-game social anxiety are less likely to socialize and engage in challenging activities. However, even though they may avoid these activities, they still enjoy the game. This may be due to alternative activities for players to engage in that require less social interaction or do not demand a high level of performance from the player. It might also be because even though they experience anxiety to some extent within the context of a game, it is still less threatening to them than how they experience the physical world.

Implications for Design

We structure our discussion through three lenses: Game design, problematic game usage, and mental health.

The Lens of Game Design

Games are designed to evoke various emotions [13], depending on genre and design intent. Likewise, games can be designed to avoid certain emotions, such as frustration or boredom, or to carefully balance between frustration and boredom to achieve a game that is “pleasantly frustrating” [34]. For social games, at a minimum, designers are concerned with ensuring that social interactions are not toxic. While negative interactions may be part of the challenge (e.g., being killed by another player in PvP), those negative experiences should not be accompanied by feelings of social exclusion, harassment, or bullying. Differences in experienced in-game social anxiety make this goal even more significant, as socially anxious players are at high risk of becoming victims of cyberbullying or being socially excluded in the game [21].

Because social anxiety can significantly change how people respond to social interactions [49], players with in-game social anxiety seem to play the game differently than non-anxious players. Game designers can increase the accessibility of their game by addressing the needs of this user group; for example, by giving players more tools to manage in-game social interactions, preventing toxic behaviours, and creating a more welcoming experience in the game, with a less strong focus on performance that is visible to other players. In games we often find a meritocracy, where players face toxicity for making a mistake while performing in front of others [46]. Game designers must find a balance between allowing players to freely socialize and associate with others and test their skill, while also protecting vulnerable players.

Communication is also an important component of in-game performance. For example, it is crucial for coordination between teammates (e.g., for dungeons or raids). Players of MMORPGs may want to participate in these activities but find it more difficult due to their social anxiety. One possible approach is to leverage in-game actions to automatically communicate important information to teammates [56, 79], instead of relying on chat commands. For example, a player’s character could indicate via a special animation that they require support, without the player needing to explicitly chat with their teammates. This is common in some game genres like Multiplayer Online Battle Arena Games but not prevalent in MMORPGs.

Furthermore, game designers should think about the presentation of performance. As shown, socially anxious players avoid highly challenging tasks that could put them under the scrutiny of other gamers. As we expected when we

created the activity items, difficult solo activities correlated highly with the scale of low challenge, while difficult duo activities correlated with the scale of high challenge. This indicates that players with social anxiety do not avoid difficult activities or challenges, but they seem to when their performance is visible to other players in those activities. Therefore, to decrease performance-based threat, game designs could decrease the visibility of player performance statistics or to allow players to opt out of being publicly displayed in those statistics or leaderboards in certain contexts. Previous work also suggests that the adjustment of such performance presentations may have a positive effect on player experience [14].

The Lens of Problematic Games Usage

Previous research links problematic game usage to social anxiety, suggesting that players use in-game environments to replace social relationships [45, 74]. It was suggested, that the social interactions facilitated by MMORPGs are why players with social anxiety prefer this genre [19, 29, 60]. We found that these results need to be broken down further: While players with social anxiety in the physical world do socialize in-game, players with in-game social anxiety are more likely to avoid in-game social interaction and challenges. Despite this finding, these players still enjoy MMORPGs. These results show that for some players who are at risk of problematic game usage, there may be something other than in-game socializing that contributes to the appeal of MMORPGs. Continuing to understand the relationship between social anxiety and gameplay will help inform when games can be used to increase well-being of players suffering from social anxiety, and when play may be harmful.

The Lens of Mental Health

There are various ways to treat social anxiety, including medication and therapy [62], such as cognitive-behavioral therapy (CBT). CBT uses cognitive strategies (e.g., restructuring thoughts, training attention) and behavioral strategies (e.g., exposure) to reduce the feelings and effects of social anxiety [42]. CBT is most effective when led by a therapist; however, many people with social anxiety avoid seeking help, perhaps due to the inherently social tasks involved with this treatment type [6].

Researchers and clinicians have begun to explore the benefits of new technologies, such as immersive media [90] and also special game mechanics to supplement treatments for social anxiety [47]. In fact, Thorens et al. [86] identify MMORPGs as specifically appealing for health interventions, due to their various structural characteristics, such as the built-in social interactions, reward features, and never-ending nature. These game mechanics could become a helpful tool to improve exposure therapies for social anxiety [8].

Limitations and Future Research

Future research should investigate culturally diverse samples, such as Asian cultures, which are associated with different expressions of social anxiety [50]. A closer look at the differential effects for adolescents and research about the development and maintenance of social anxiety inside game-worlds is also warranted. Further, future research should compare the results of this study with other genres, such as First-Person Shooter (FPS) games or Multiplayer Online Battle Arena (MOBA) games, to help understand the effects of social anxiety inside of different game contexts.

CONCLUSION

Socializing is an important aspect of why people play games online [29]. Yet for some, socialization is difficult due to fear and anxiety around social interactions and performing in front of others [81]. We investigated this by creating a new measurement tool, the Gaming Social Anxiety Scale (GSAS) based on the gold standard for self-assessment of social anxiety [60], the Liebowitz Social Anxiety Scale (LSAS). We used these two tools alongside questionnaires that explored possible reasons for play, in-game activities players could engage in, and the relative threat of situations in the game world versus the physical world. Our work provides valuable insight into *why* and *how* players who experience social anxiety are choosing to play MMORPGs:

- We observed that players with physical-world social anxiety were likely to experience game-world social anxiety; however, there are players for whom social anxiety is high, but in-game social anxiety is low.
- We find that players with social anxiety find that it is easier to connect with others in game, perceive the game world as less broken, and are likely to feel more socially competent in MMORPGs than in the physical world.
- We further find that social anxiety does not predict player preferences for different activities, but that those with gaming social anxiety are more likely to avoid challenging content and social activities.
- We find that overall, players find events in the physical world to be more threatening than the same events in the digital world.

We establish the construct of in-game social anxiety, and develop a measurement tool. By enabling game developers to identify and design for players with in-game social anxiety, we promote the development of games that foster social inclusion through play.

ACKNOWLEDGMENTS

We thank NSERC and SWaGUR for funding. We thank all members of the Interaction Lab at the University of Saskatchewan for support and we thank our participants for sharing their perspectives and contributing to research.

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