

SOCIAL FACILITATION WITH AN ONLINE GAMING AUDIENCE

by

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## **DEDICATION**

I dedicate this thesis to my beautiful wife, Heidi. Thank you for encouraging me to reach for my dreams.

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## **ABSTRACT**

The study examined whether social facilitation took place when examining video game performance with an online audience present. Using a survey design, participants reported on their mastery of a set of video games and then predicted their performance on those games when an audience was present versus not present. Self-reported mastery and predicted performance values were positively correlated in both social contexts. Additionally, most participants estimated decreased performance when playing with an online audience. We did not find evidence that those who predicted an audience would help performance showed higher mastery than those who thought an audience would hurt performance. Finally, findings showed that narcissism moderated the relationship between mastery and performance for both the audience and no-audience contexts. This study is important to society given the growing prevalence of online observation of performance. Overall, social facilitation theory can be useful for understanding the world of the internet.

## I. INTRODUCTION

### **Importance**

Social Facilitation Theory predicts that a person with mastery of a task will perform better on that task while being watched by a physical audience. However, there is little to no research if this phenomenon occurs with an online audience. The internet contains multiple websites for audiences to tune in to watch live performances of gamers. Those audiences can be facilitating that performer's behavior online. If Social Facilitation occurs online, video gaming is a good way to test if Social Facilitation impacts performance online.

The pandemic COVID-19 has made more people use online resources for school, work, and leisure activities. Now is the time to see if Social Facilitation theory can occur online more than ever. The internet has plenty of social interaction encounters that are perfect for research. If social facilitation affects individuals online, these are good enough reasons to study the impact of this phenomenon further. Findings from this study can help a lot of people such as those who use social media, play video games, or work online.

Video gaming was chosen for this study because there are years of data online on video game streamers. Information from video gamer streamers may provide everything needed to see if Social Facilitation occurs online. They have an online audience, and they have mastery of the specific video game that they are playing. Video games, such as League of Legends, have ways to show a person's mastery of their gameplay. The ranks, which indicate levels of difficulty, can change from Iron to Challenger (Iron being the lowest rank, Challenger as the highest). There are many

League of Legends streamers who actively play in front of online audiences. Can their live streaming in front of an online audience cause a rise or fall in their rankings? This study aims to see if there is a connection.

Social Facilitation studies have focused on a physical audience, but what about online audiences? Can online audiences enhance or inhibit one's performance just with their presence alone? The objective of this study is to see if they can.

This study will go over video gaming, Social Facilitation, narcissism, and social anxiety. The main question is whether the presence of an audience enhances or inhibits video gaming performance as a function of a person's mastery of video a game.

## **Gaming**

Video gaming has become a growing phenomenon in entertainment, and this economy for the last few decades has drawn the interest of researchers. For entertainment, people who play video games or/and are interested in gaming can participate in video gaming streaming as a viewer or streamer. Video game streaming is where an individual may stream their video game performance to an online live audience. An individual who plays the game while streaming to an online live audience is a streamer. Those who watch the streamers are viewers. Viewers and streamers can interact with one another by chat, donation messages, and more. Video game streaming platforms such as popular Twitch and YouTube hold streaming services for anyone to partake in. YouTube is a website that has an assortment of videos, but over the last few years, it is now also a streaming site. People can go "live" on the YouTube website and stream content to an active online audience in real-time.

Indeed, video game streaming has become another form of entertainment for the

world rivaling movie streaming such as Netflix. Twitch has 5 million streamers alone as of March 2020 and 1.2 billion hours watched (Twitchtracker.com, 2020). The biggest distinction between movie streaming services such as Netflix and Twitch is that Twitch allows the streamers and viewers the opportunity to interact in various ways. Those ways of interacting include chatting between streamers, viewers, and donations. Donations are ways the audience can pay the streamers a tip to watch their performance. Donations can be tied with a message that the streamer will read out loud to their audience and/or appear on the screen for everyone to read.

Video gaming research has grown over the years. The main concern has been violence in gaming (Markey & Ferugson, 2017) Nevertheless, gaming is just another form of entertainment for participants to enjoy. Understanding gaming behavior can provide the research community insight into video gaming behavior and performance. I am interested in exploring social facilitation effects on streamers while they are being viewed by an online audience.

Video gaming is a \$138.4 billion dollar industry today (www.statista.com). Thus, gaming is much more than entertainment, it's also a business. The gaming industry has become an important source of income for developers and gamers alike (Johnson & Woodcock, 2019). Some video game streamers can make 50,000 or more annually. The industry is so profitable, that Atari hotels are in the works of bringing video gaming to a stay at hotel audience while they travel (atarihotels.com). In addition, there are various gaming stations for hotel visitors to engage in. Thus, the market has a demand for gaming services, and it is important to understand how gaming influences our society.

Twitch streamers who play video games with others watching are the focus of

this research. A study found that streamers who have less than 500 viewers will engage with chat socially and those with 500 plus will focus on themselves (Hilvert-Bruce et al., 2018). Thus, the online audience can alter a streamer's behavior on who and what to focus on while streaming, perhaps implying that social facilitation effects are already influencing these streamers' behaviors and performance.

## **Social Facilitation**

### *Co-action Effects*

The groundwork for social facilitation theory started with comparing cyclist speed records (Triplett, 1898). He found that cyclists had increased speeds if they raced against their peers instead of racing the clock while alone. He took this finding and created it in a lab to test this. In the lab experiment, children needed to practice reeling in a fishing rod in classes. He found that while in presence of others, they worked faster. This is called the co-action effect.

### *Audience Effects*

Another important step in understanding social facilitation is the importance of audience effects. As Triplett focused on peers doing the same task in the same vicinity, one study found that a passive audience can facilitate performance as well (Dashiell, 1935). They had participants do multiplication tables while in front of an audience and found their completion rate increased. If performance can go up while in the presence of a passive audience, then there might be an opposite effect. One study did just that where they found the performance in the alone condition was better than the watched condition (Pessin 1933). In Pessin's study, participants had to learn non-sense words in a series of trials. Those who learned alone did so in fewer trials than those while in the presence of

an audience. Dashiell showed how an audience can strengthen performance while Pessin's study showed an audience can weaken one's performance.

### *Enhance and Inhibition*

Social facilitation is the main ground theory for this study. Social facilitation is the enhancement or impairment of one's ability in performing a task while in front of a physical audience (Zajonc, 1966). Zajonc investigated how the sheer presence of others can inhibit or facilitate one's performance on difficult tasks. One of Zajonc's experiments investigated the presence of audience enhancing or inhibiting responses. If an individual's behavior is enhanced, they emit dominant responses. If an individual's behavior is inhibited, they emit subordinate responses. This study investigated how an individual's behavior is modified due to the presence of the audience. However, just as importantly, whether the performance is enhanced or inhibited, also depends on an individual's mastery or dominance of the task. Thus, a person performs better on a task that they have mastered in front of an audience. By contrast, a person performs worse on a task they have NOT mastered in front of an audience. If social facilitation is possible with a physical audience, perhaps I reasoned it also occurs with a virtual online audience.

This study is crucial. Zajonc's social facilitation theory explains that one's mastery of the task is also key to explaining whether the presence of an audience inhibits or facilitates one's performance. Little to no mastery of the task while in presence of an audience will lead to inhibiting behavior. Mastery of a task in the presence of an audience, on the other hand, enhances performance. Those were Zajonc's findings. My goal is to test whether an online audience has the same effects as a live physical audience. We are in an ever-growing world of technology use. If social facilitation can happen with

an online presence, the world will better understand the importance of how live streaming affects gaming performance. Social facilitation effects may be impacting Twitch live streamers daily. If that is the case, then with my research, the world will have a better understanding of how an online audience is able to facilitate behavior.

This study will focus on measuring social facilitation effects on participants who report playing video games with and without an online audience. I will also explore social anxiety and narcissism as moderating variables for social facilitation. The literature does not report current links between social facilitation theory and these personality traits. I ask whether task performance in front of an online audience is more inhibited or enhanced based on their social anxiety and narcissism.

### **Social Anxiety**

Social anxiety might be a moderator variable with social facilitation. Those who feel socially anxious may feel uneasy in the presence of an audience, and thus have a higher chance of inhibited performance. However, one study showed a small positive correlation between social anxiety and performance on the task (Fouts, 1979).

Performance increased among those with social anxiety while doing the simple task of pulling a lever while being watched by an audience. Social facilitation predicts higher performance on tasks for which one has a high mastery (e.g. pulling levers) in front of an audience. At least, on very simple tasks, Social Anxiety may not affect performance.

Another study showed that those who have symptoms of social anxiety are more likely to develop online gaming addiction (Vanzoelen, 2016). Perhaps those high in social anxiety feel trapped in real-life situations and use video gaming to express themselves socially. Participants in this study have social anxiety, behavioral problems,

and depression outside of online video gaming. However, the questionnaire in the study shows that they prefer an online gaming environment. This study suggests that even though someone is socially anxious in real life, in gaming, they may overcome their boundaries with others. Even if one is socially anxious in real life, they may bypass their social anxiety in the presence of an online audience. Thus, social anxiety may be a moderator variable in social facilitation theory. This is only possible if social facilitation does take place online. As a reminder, social anxiety has nothing to do with the original Social Facilitation Theory.

Another study showed how online gaming can be an outlet for someone's "true self" (Lee & Leeson, 2015). The study showed that gamers' time spent playing MMORPGs (Massively Multiplayer Online Role-Playing Game) can be used as an indicator of their psychological and social well-being. With their survey in the study, participants who have high social anxiety will prefer in-game social interactions over face-to-face interactions. Gaming can be used as an outlet for those who are high in social anxiety. Even if one is socially anxious in real life, their in-game social self tells a different story. This sets up the ground for the possibility of social anxiety being a moderator effect in the Social Facilitation Theory process. Online video games have everything for social facilitation to take place such as mastery of the game, difficulty levels, audience presence, and performance details. If social anxiety can moderate this theory, the next question will be in which direction.

Indeed, a study by Cornwall et al. (2011) showed that individuals with a social anxiety disorder (SAD) compared with those without it showed significantly more fear when presenting a speech virtually and online to an audience. The results of this study

showed that Social Anxiety may interfere with performance on a task while being viewed by an audience.

Overall, social anxiety is worth looking into to see if it can moderate the process of social facilitation theory. The moderation effect of social anxiety in online social facilitation can be strong. The reasoning behind this prediction is because of context. Video games are viewed as fun entertainment for most. 215 million adults play video games in the USA ([www.theesa.com](http://www.theesa.com)). This study asked if participants played video games, not if they had ever done a stressful online speech (Cornwall et al., 2011).

### **Narcissism**

Narcissism is defined essentially as the love of oneself. Narcissism may be another moderator variable that takes place when social facilitation occurs. It may come into play in enhancing behavior. Liu et al. (2013) found that adolescents who perceived themselves as narcissistic were more likely to bring attention to themselves and displayed a higher chance of giving away their personal information while online. Thus, those high in narcissism may seek an audience to bring attention to themselves and the increased size of the audience may facilitate their performance. Thus, this study will test whether social facilitation behavioral effects may be enhanced by narcissistic tendencies.

Another study linked narcissism traits with types of games. Participants high in rivalry preferred lone fighter games and those high in admiration preferred being the role of a leader (Stopfer, 2015).

Ultimately, social anxiety and narcissism traits may moderate the social facilitation phenomenon. One study suggests that personality traits can be used to identify gaming preferences (Potard, 2020). Potard's study showed that difficult games attract

players with low leadership/authority. Narcissistic players may prefer to be leaders, based on findings of the previous study, but based on the Potard (2020) study, they prefer casual games over challenging games. Casual games are easier to display one's mastery so those who are high in narcissism traits may want to show how good they are in easier games. Additionally, the findings by Potard (2020) show that sports games attract leaders and roleplaying games attract those with exploitative and entitlement traits. Narcissism corresponds with exploitative and entitlement traits (Menon & Sharland, 2011). In sum, the difficulty in games attracts certain personality traits. Social facilitation is based on the presence of an audience and an individual's mastery of the task. The personality traits of Social Anxiety and Narcissism may come into play with these two things to impact performance. Thus, social anxiety and narcissism are worth examining in this research.

### **Hypothesis**

Mastery will be positively linked with Performance. Those with higher mastery should perform better. However, an audience facilitates performance. Thus, in the presence of an online audience, performance will be much higher for those higher with mastery and much lower for those lacking in mastery. The correlations will be stronger between Mastery and Performance when an audience is present. An audience should exacerbate these outcomes. Performance differences in online games should demonstrate that social facilitation is occurring online. I also hypothesize that narcissism and social anxiety will moderate performance. In summary, below are the hypotheses restated:

1. Self-reported mastery and predicted performance will be positively correlated.
2. According to social facilitation theory, performance will be more improved on tasks for which mastery is high, and impaired on tasks for which mastery is low

when an audience is present than when an audience is not present. Thus, predicted performance will be more strongly correlated with mastery in the audience compared to the no audience condition.

3. One study found that those high in narcissism appeal to multiple leadership tendencies such as being charismatic and authentic (Steffens & Haslam, 2020). Narcissists seek attention and validation, and a leadership role will help fill that need for them. I predict that Narcissism will moderate the relationship between mastery and performance such that performance will be enhanced when Narcissism is present.
4. A study by Cornwall et al. (2011) showed that those with social anxiety disorder (SAD) compared with those without showed significantly more fear when presenting a speech online to virtual reality audience. Those who are socially anxious should prefer to avoid online audiences. Thus, I predict that Social Anxiety is a moderator variable and will moderate the relationship between mastery and performance, such that performance will be inhibited when an audience is present.

## II. METHOD

### Participants

Participants were solicited for their participation in this study from the Texas State University SONA system. The participants were sampled from the Introduction to Psychology (PSY 1300) course during Summer II and Fall 2021. No participants were excluded unless they didn't consent to participate. Extra credit was offered to student participants for participating in this study. Fifty-four participants responded to the survey. Fourteen were removed due to not fully responding to all sections of the survey. Another 10 were removed for partially responding to all the sections. 30 participants remain for data analysis. After the survey was completed, the participants were briefed and done with the study.

**Table 1.**  
*Participant Demographics*

Baseline Characteristic	<i>n</i>	%
Gender		
Male	9	30
Female	19	63.3
Non-binary	2	6.7
Age		
18-22	19	63.3
22-27	6	20
28-32	2	6.7
38+	3	10.0
Ethnicity		
White	8	26.7
Black or African American	6	20
American Indian or Alaska Native	0	0
Asian	2	6.7
Native Hawaiian or Pacific Islander	0	0
Hispanic or Latino(a)	14	46.7
Other	0	0

## **Procedure and Measures**

### *Participants*

Participants were gathered from Texas State Sona Systems (<https://txstate.sona-systems.com/>). Participants were administered a Qualtrics survey containing an informed consent and nine blocks of video game questions, the Liebowitz Social Anxiety Scale, the Dark Triad scale, and the Demographic questions (<https://www.qualtrics.com>).

### *Mastery*

There were sets of questions for each of the following nine video games: Super Smash Brothers, League of Legends, Call of Duty, Street Fighter, World of Warcraft, Overwatch, Pokemon, Mario Kart and Dragonball Z Fighters. The set of questions for each game consisted of the same seven questions. Question one asked if the participant had played the game. It was a simple yes-no question. Question two asked the participants their reported mastery of the game using the Likert scale from 1. Excellent, 2. Good, 3. Above Average, 4. Below Average, 5. Fair, to 6. Novice.

### *Difficulty*

Question three asked participants to rate the difficulty of the game using the Likert scale, 1. Very Easy, 2. Easy, 3. Somewhat easy, 4. Somewhat difficult, 5. Difficult, and 6. Very difficult. Very easy is the lowest difficulty while very difficult is the highest difficulty that one can report.

### *Performance Measure*

Additionally, four questions about their performance in four different ways of playing the game were asked using the Likert 0-6 scale from 0=Do not play; 1=Very poor, 2=Poor; 3=Fair; 4=Good; 5=Very good; 6=Excellent. Participants' performance

was assessed in the following four different ways of playing the game: 1. You vs bot, 2. You vs bot with one person watching you online, 3. You vs human, and 4 You vs real human with one person watching you.

#### *Liebowitz Social Anxiety Scale*

The Liebowitz Social Anxiety Scale, a self-reported measure of social anxiety (Baker, 2002) was administered. Participants were asked questions about how much they feared 22 situations and how much they wished to avoid 22 situations. The scale for avoidance is scaled 0-3. 0 is none, 1 for occasionally, 2 for often, and 3 for usually. The scale for fear is scaled 0-3. 0 is none, 1 for mild, 2 for moderate, and 3 for severe. Sample questions from LSAS are “telephoning in public” and “eating in public places”. The interitem reliability of LSAS for all scales is 0.79 or higher. The Fear subscale is at .91 while the avoidance subscale s a reliability of .92.

#### *Dark Triad*

The Dark Triad scale measures three concepts; Narcissism, Psychopathy, and Machiavellianism (Paulhus & Williams, 2002). Narcissism is a construct about admiring oneself over all others. Psychopathy is a lack of empathy and love for others. Machiavellianism is a personality trait that shows one with the ability to manipulate others for their own gains. Only the Narcissism scale was used in this study. The scale items focus on how one seeks admiration above all else. Narcissism also correlates positively with the Big Five Extraversion (Lee, 2005). The inter-item reliability for Narcissism is  $r = 0.89$ .

### *Demographic Questions*

Finally demographic questions were asked at the end of the survey following the LSAS and Dark Triad Scales. Questions about the participants' age, gender, and ethnicity were asked.

### III. RESULTS

#### Preliminary analyses

Only three of the nine video games asked in the survey were selected for data use: Super Smash Brothers, Call of Duty and Mario Kart. These three games contained the most data responses compared to the other six games.

Reliability tests were conducted on Mastery, Difficulty, and the four ways of playing the game across the three selected games: Mean Super Smash Brothers + Mean Call of Duty + Mean of Mario Kart/3. Additionally, reliability tests were run for Social Anxiety Avoidance, Social Anxiety Fear, and Narcissism. Mastery and Narcissism had items that were reversed before the reliability analyses were run. For example, 3 of the 9 items reversed in Narcissism. Reliability tests showed robust coefficients for Mastery .833, Difficulty .829, you vs bot alone .828, you vs bot while being watched .855, you vs real human alone .726, you vs real human while being watched .784, Social Anxiety Avoidance .904, Social Anxiety Fear .922, and Narcissism .764.

Based on the reliability analyses, six new composite mean variable scores were created: Mastery, Difficulty, and four Performance scores of four ways of playing the game. The four ways of playing a game for performance were 1. You vs bot alone, 2. You vs bot with one person watching you, 3. You vs real human alone, and 4. You vs real human with one person watching you.

After analyzing the data for Mastery and Difficulty, only Mastery was used for all data analysis. There were missing values for Difficulty, and thus, there was the possibility of a loss of N. Additionally, only social anxiety avoidance was used instead of social anxiety fear from the Liebowitz Social Anxiety Scale. Avoidance has been used as a

standalone analysis to see how participants will prefer to avoid social interactions.

Finally, unequal  $n$  was found among the four performance conditions. The conditions participant against the computer with someone watching ( $n = 24$ ) and participant against human being with someone watching ( $n = 22$ ) had  $N$ s different from the other two conditions. ( $n = 30$ ). To match  $n$  among the conditions, the average of 22 and 24 observations, respectively, were used to fill in the missing values until  $n$  of 30 was obtained for all repeated conditions. Then, one composite score representing an Audience presence was created by combining and obtaining the mean of 2. You vs bot with one person watching you, 3. You vs real human alone, and 4. You vs real human with one person watching you. This variable was called Mean Audience Performance.

A review of the key descriptive statistics shows that the reported mean of Mastery tended to be lower  $M = 2.79$  for all subjects (on the six-point Likert scale). Additionally, participants reported scoring better when playing with a robot, You vs. Bot alone ( $M = 3.91$ ,  $SD = 1.62$ ), than when playing with an audience watching, Mean Audience Performance ( $M = 3.38$ ,  $SD = 1.30$ ).

### *Tests of hypotheses*

H1:

To test the first hypothesis, I computed correlational coefficients to test the associations between mastery and performance. Mastery, the composite of three video games (Super Smash Brothers, Call of Duty, and Mario Kart) was correlated with You vs bot alone and Mean Audience Performance (you vs. bot while being watched + you vs human alone + you vs human while being watched). Mastery and BotAlone were positively correlated,  $r(29) = .638$ ,  $p < .01$ . Mastery and Mean Audience Performance

were also positively correlated,  $r(29) = .857, p < .01$ .

H2:

A  $r$  to  $Z$  transformation test of the differences between two dependent correlations was then conducted (Lee and Preacher, 2013) to test hypothesis 2.

For this test (Lee and Preacher, 2013), the correlations among Mastery and BotAlone  $r = 0.638$ , Mastery and Mean Audience Performance  $r = 0.857$  and BotAlone and Mean Audience Performance  $r = 0.842$  were used. The difference between correlation coefficients converted to  $Z$  scores was significant ( $z = -3.66, p < 0.01$ , one-tailed).

We also conducted additional follow-up analyses to further examine and test this question of whether social facilitation can be captured in the data. A variable called Audience Effect was created. Audience Effect variable is the difference of Mean Audience Performance and BotAlone performance. Those with positive values had enhanced performance and those who have negative values had inhibited performance. Then an independent sample  $t$ -test was created to compare mastery scores of those with enhanced performance group vs inhibited performance group.

Overall, the data suggest that the audience hurts performance (Mean Difference Between Audience Performance ( $M = 3.38, SD = 1.30$ ) and No Audience Performance ( $M = 3.91, SD = 1.62$ )  $= -.53, t(28) = 3.27, p = .003$ ). According to social facilitation theory, however, these data should be looked at through the lens of mastery. Specifically, an audience should increase performance (compared to no audience) for those with high mastery of a task and should decrease performance (compared to no audience) for those with low mastery of a task. To test this, we examined whether individuals who thought an

audience would boost their performance showed significantly higher mastery than those who thought an audience would hurt their performance. We used an independent samples t-test to compare average mastery between the group that thought the audience would help their scores (facilitation group;  $n=6$ ) to those who thought the audience would hurt (decrement group;  $n=23$ ). There was no significant difference in self-reported mastery between the two groups ( $\text{Mean}_{\text{Facilitation}}=2.89$ ,  $\text{SD}=2.05$ ;  $\text{Mean}_{\text{Decrement}}=2.77$ ,  $\text{SD}=1.30$ ,  $t(27)=.179$ ,  $p=.86$ ). Similarly, there was no correlation between self-reported mastery and the magnitude of the audience effect (i.e., the influence of audience on performance;  $r(27)=.094$ ,  $p=.63$ ). These results suggest that social facilitation, at least as typically conceptualized, was not clearly present in this data set.

**Table 2**

*Descriptive Statistics for all variables. Variables in bold were used in testing hypotheses. Key variables used in analyses are in bold.*

Variable	Mean	SD
<b>Mastery</b>	<b>2.7932</b>	<b>1.44065</b>
Difficulty	3.0599	1.20191
<b>You vs. Bot alone</b>	<b>3.9090</b>	<b>1.62065</b>
You vs. Bot being watched	3.2561	1.62324
You vs. Human alone	3.6335	1.34885
You vs. Human being watched	3.2421	1.32485
<b>Mean Audience</b>	<b>3.3772</b>	<b>1.30163</b>
<b>Performance: You vs. Bot being watched + You vs. Human alone + You vs. Human being watched</b>		
<b>Social Anxiety Avoidance</b>	<b>2.1866</b>	<b>.51113</b>
Social Anxiety Fear	2.1361	.55586
Social Anxiety A/F Both	2.1615	.50744
<b>Narcissism</b>	<b>3.2577</b>	<b>.55560</b>
<b>MC MasteryXNarcissism</b>	<b>.1608</b>	<b>.81876</b>
<b>MC MasteryXSocial Anxiety Avoidance</b>	<b>.0373</b>	<b>.61290</b>

*Note.*  $N = 30$ ; MC = mean-centered

**Table 3**

*Descriptive Statistics and Correlation Coefficients for Mastery, You vs. Bot alone, You vs. Bot being watched, You vs. Human being alone, You vs. Human being watched, and Mean Audience Performance*

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
<b>Mastery</b>	2.793	1.441	----	.638**	.747**	.802**	.794**	.857**
You vs Bot alone	3.909	1.621	.638**	-----	.769**	.765**	.760**	.842**
You vs Bot while being watched	3.256	1.623	.747**	.769**	----	.615**	.795**	.898**
You vs Human while being alone	3.6335	1.349	.802**	.765**	.615**	----	.818**	.879**
You vs Human while being watched	3.2421	1.325	.794**	.760**	.795**	.818**	----	.952**
<b>Mean Audience Performance:</b> <b>You vs. Bot being watched</b> <b>+ You vs. Human alone</b> <b>+ You vs. Human being watched</b>	3.3772	1.302	.857**	.842**	.898**	.879**	.952**	----

*Note.* \* $p < .05$ , \*\*  $p < 0.001$  level (2-tailed);  $N = 30$

H3:

To test hypothesis 3 that Narcissism was a moderating variable, I created an interaction variable consisting of the product of mean-centered Mastery and mean-centered Narcissism. The aim was to test if the product variable was significant and if it contributed a proportion of variance (R squared) to the model (Baron & Kenny, 1986). Hair et al., (2010) and Field (2005) recommend a minimum of 10 cases or observations per predictor as a rule of thumb to meet statistical power criteria. Thus, the three variables Mastery, Narcissism, and their product (Mastery x Narcissism) were regressed on the Mean Audience Performance. Additionally, the assumptions for linearity, no

multicollinearity, statistical independence, homoscedasticity, and normality were tested.

The tests of assumptions showed the scatterplot did show linearity. All VIF values were under 10 and all tolerance scores were above .2 (most around .9). Durbin Watson is close to 2 with a 2.235. Homoscedasticity was not violated as the data in the scatterplot was random with no funneling. Dots are close to the line for normality.

Results show that mastery ( $p < .001$ ) was significant in the first block, but narcissism was not significant ( $p < .987$ ), ( $F(3, 25) = 33.205, p < .000$ , with an  $R^2$  of .735. The product of Narcissism and Mastery (MMCxNMC) together in block 2 was significant ( $p < 0.009$ ) and contributed to a change in R squared = 0.065.

**Table 4**

*Regressions of Mastery, Narcissism, MMCxNMC, on Mean Audience Performance*

Model	R	R <sup>2</sup>	RΔ	Unstandardized		Standardized	95% CI	
				B	SE	β	LL	UL
1. (Constant)	.857	.735	.735	3.377**	.129	----	3.112	3.643
Mastery	----	----	----	.775**	.093	.858**	.583	.967
Narcissism	----	----	----	-.004	.242	-.002	-.501	.493
2. (Constant)	.894	.799	.065	3.443**	.117	----	3.202	3.684
Mastery	----	----	----	.757**	.083	.838**	.586	.928
Narcissism	----	----	----	.089	.217	.038	-.358	.536
MMCxNMC	----	----	----	-.409*	.257	-.257*	-.706	-.112

Note. CI = confidence interval; \* $p < .05$ , \*\* $p < 0.001$  level (2-tailed);  $N = 30$

Additionally, the three variables Mastery, Narcissism, and their product (Mastery x Narcissism) were regressed on the Bot Alone condition to test if Narcissism moderated between Mastery and performance when no audience was present. Additionally, the assumptions for linearity, no multicollinearity, statistical independence, homoscedasticity, and normality were tested.

The tests of assumptions showed the scatterplot did show linearity. All VIF values were under 10 and all tolerance scores were above .2 (most around .9). Durbin Watson is

close to 2 with a 2.350. Homoscedasticity was not violated as the data in the scatterplot was random with no funneling. Dots are close to the line for normality.

Results show that mastery ( $p < .001$ ) was significant in the first block, but narcissism was not significant ( $p < .771$ ), ( $F(3, 25) = 13.01, p < .000$ , with an  $R^2$  of .408. The product of Narcissism and Mastery (MMCXNMC) together in block 2 was significant ( $p < 0.01$ ) and contributed to a change in R squared = 0.201.

**Table 5**  
*Regressions of Mastery, Narcissism, MMCxNMC, on BotAlone*

Model	R	R <sup>2</sup>	RΔ	Unstandardized		Standardized	95% CI	
				B	SE	β	LL	UL
1. (Constant)	.639	.408	.408	3.909**	.240	-----	3.415	4.403
Mastery	----	----	----	.728**	.173	.647**	.371	1.08
Narcissism	----	----	----	-.132	.450	-.045	-1.06	.793
2. (Constant)	.781	.610	.201	4.054**	.203	----	3.64	4.472
Mastery	----	----	----	.689**	.144	.613**	.393	.986
Narcissism	----	----	----	0.72	.377	-.025	-.704	.849
MMCxNMC	----	----	----	-.899*	.250	-.454*	-1.42	-.383

Note. CI = confidence interval; \* $p < .05$ , \*\* $p < 0.001$  level (2-tailed);  $N = 30$

H4:

To test hypothesis 4 that Social Anxiety Avoidance is a moderating variable, I used the same procedure I used for testing hypothesis 3. I created an interaction variable consisting of the product of mean-centered Mastery and mean-centered Social Anxiety Avoidance. Then, the three variables Mastery, Social Anxiety Avoidance, and their product (Mastery x Social Anxiety Avoidance) were regressed on the Mean Audience Performance. Additionally, the assumptions for linearity, no multicollinearity, statistical independence, homoscedasticity, and normality were tested.

The tests of assumptions showed that the scatterplot did show linearity. VIF scores are all below 10 and tolerance scores were well above .02 (around .9). Durbin

Watson is 1.869 which is close to 2. Homoscedasticity was met with data appearing normal with no signs of funneling. Test of normality showed the data spiraling around the line. The findings showed that only Mastery was significant ( $p < .001$ ) in block 1. The product (MMCxSAAMC) and SAA did not provide any significant change in the proportion of variance or any significance (see Table 6) when added to the model. Social Anxiety Avoidance was not a moderator variable in this regression model. There was very little change in R squared with .004 once all predictors were added. Thus, hypothesis 4 was not confirmed. Social Anxiety Avoidance did not provide any meaningful changes in the relationship that occurred with mastery and performance while in presence of an audience.

**Table 6**

*Regressions of Mastery, Social Anxiety Avoidance, MMCxSAAMC, on Mean Audience Performance*

Model	R	R <sup>2</sup>	RΔ	Unstandardized		Standardized	95% CI	
				B	SE	β	LL	UL
3. (Constant)	.858	.735	.735	3.377**	.129	-----	3.112	3.642
Mastery	----	----	----	.776**	.091	.859**	.594	.963
Social Anxiety Avoidance	----	----	----	-.066	.257	-.026	-.594	.463
4. (Constant)	.860	.740	.004	3.383**	.131	----	3.113	3.652
Mastery	----	----	----	.798**	.099	.883**	.594	1.002
Social Anxiety Avoidance	----	----	----	-.076	.261	-.030	-.614	.461
MMCxSAAMC	----	----	----	-.145	.233	-.068	-.625	.335

*Note. CI = confidence interval; \* $p < .05$ , \*\*  $p < 0.001$  level (2-tailed);  $N = 30$*

Additionally, the three variables Mastery, Social Anxiety Avoidance, and their product (Mastery x Social Anxiety Avoidance) were regressed on the Bot Alone Performance to test if Social Anxiety moderated the relationship between Mastery and performance when an audience was not present. Additionally, the assumptions for linearity, no multicollinearity, statistical independence, homoscedasticity, and normality

were tested.

The tests of assumptions showed that the scatterplot did show linearity. VIF scores are all below 10 and tolerance scores were well above .02 (around .9). Durbin Watson is 1.919 which is close to 2. Homoscedasticity was met with data appearing normal with no signs of funneling. Test of normality showed the data spiraling around the line. The findings showed that only Mastery was significant ( $p < .001$ ) in block 1. The product (MMCxSAAMC) and SAA did not provide any significant change in the proportion of variance or any significance (see Table 7) when added to the model. Social Anxiety Avoidance was not a moderator variable in this regression model. There was very little change in R squared with .02 once all predictors were added. Thus, hypothesis 4 was not confirmed. Social Anxiety Avoidance did not provide any meaningful changes in the relationship that occurred with mastery and performance while in presence of an audience.

**Table 7**  
*Regressions of Mastery, Social Anxiety Avoidance, MMCxSAAMC, on BotAlone*

Model	R	R <sup>2</sup>	RΔ	Unstandardized		Standardized	95% CI	
				B	SE	β	LL	UL
1. (Constant)	.640	.410	.410	3.909**	.240	-----	3.42	4.402
Mastery	----	----	----	.714**	.170	.634**	.365	1.062
Social Anxiety Avoidance	----	----	----	.191	.478	-.060	-.792	1.174
2. (Constant)	.655	.430	.020	3.924**	.241	----	3.427	4.420
Mastery	----	----	----	.775**	.183	.689**	.399	1.152
Social Anxiety Avoidance	----	----	----	.162	.481	-.051	-.828	1.15
MMCxSAAMC	----	----	----	-.397	.429	-.158	-1.28	.487

Note. CI = confidence interval; \* $p < .05$ , \*\* $p < 0.001$  level (2-tailed);  $N = 30$

#### IV. DISCUSSION

Findings show that **mastery and performance were positively and significantly correlated**. For one to perform better, they must have high mastery of the task. Mastery was positively correlated with both the alone performance and Mean Audience Performance. Results show that with and without an audience, mastery correlated with performance.

The second hypothesis tested showed that **Mastery had a significantly stronger relationship with the Mean Audience Performance condition than it did with the BotAlone condition. The difference between correlation coefficients converted to Z scores was significant**. However, the additional test that examined the difference in scores showed that the audience inhibited performance for most of the participants. Additionally, mastery was not significantly higher for those with enhanced performance compared to those with inhibited performance suggesting that social facilitation is not explaining this data. More research is needed to definitely test if social facilitation might be taking place in online gaming.

The last two hypotheses investigated Narcissism and Social Anxiety Avoidance as being possible moderator variables in the social facilitation. **Narcissism was a significant moderator variable when an audience was present, but so it was also when an audience was not present**. Narcissism moderated the relationship between mastery and performance both while in presence of an audience and without one. A larger audience may help fuel their sense of self-importance, but Narcissist individuals may be capable of doing this without an audience too. A narcissist can always love oneself even while alone. They may still feel good about themselves while playing online

games with or without an audience.

There was no significant data for Social Anxiety Avoidance being a possible moderator variable in social facilitation. Even with and without an audience, there were no significant data. Video games may be a safe haven for those who are high in social anxiety avoidance. In this study, there was a high level of social anxiety avoidance between the participants. Asking questions on video gaming may be less stressful than asking questions on giving a speech for example. Previous literature mentions how those who are high in social anxiety prefer online game interactions (between other gamers while playing the game) over face-to-face interactions (Lee & Leeson, 2015). Changing the activity of playing video games to something more socially inducing may be the key here. More research is needed to see how social anxiety can possibly enhance or inhibit one's performance in front of an audience.

In sum, the analysis did not find a social facilitation phenomenon in the data. The  $r$  to  $Z$  transformation test did not confirm one by itself, and the second test, the difference in score analysis test, did not confirm that social facilitation had taken place or validate the findings of the  $r$  to  $Z$  test. In fact, the majority of the participants reported inhibited performance playing online games. Moreover, reported mastery was indeed generally lower or reported lower among the participants in this study. These limitations are addressed next.

## **Limitations**

### *Time of Data Collection*

For safety precautions due to the COVID pandemic, this study was changed from an in-person experiment to an online survey. The goal of the study was to investigate if

social facilitation took place with an online audience. Time was needed to switch the original experimental design to a survey design. The safety of researchers and participants came first. Using a survey design over an experimental design solved the issue of doing the study safely but provided various limitations. The following survey limitations are within the actual survey design itself; self-reported measures that were used, missing survey data and target audience not being reached fully.

### *Experiment vs Correlational Survey Design*

The main appeal of using an experimental design over a correlational survey design is being able to control what one wants to research. In this study alone, there are several variables such as Mastery, Difficult, audience conditions and performance levels to keep track of. An experimental design allows one to control all variables. Experimental design still has threats to internal validity, but there are ways to reduce them through control of independent variables and the use of random assignment. One can randomly assign a participant to a control or treatment group for an experiment, and thus control variables that one is not able to control with a correlational design. An experimental design would have provided greater certainty that social facilitation is taking place compared to a survey correlational design.

### *Method*

This survey has multiple self-reported questions such as mastery of games, the difficulty of games, performance in scenarios, narcissism questions, and social anxiety questions. A limitation of self-reported questions from this survey is that those who answered them can be dishonest. For example, someone may say they have high mastery about a video game when in fact they may not. Self-reported questions run the risk of

self-report bias, dishonesty, and trying to be socially desirable.

### *Missing Data*

Many participants did not fully fill out the survey, fill them in part, or were in a rush to finish them and left them blank. The missing data limited the sample size as it was barely enough to run the statistical analyses. A bigger sample size and more questions answered would have added power to the analyses.

### *Sampling bias*

Participants were all selected from the Texas State Psychology pool of undergrads. With the data, not every student had played every game listed in the survey. In fact, mastery was generally low in this sample, and this sample may not reflect gamers with higher mastery in games. Additionally, these participants reported better performance playing robots than playing while an audience was watching. One suggestion is for data to be collected from a STEM department such as computer science where there are more degrees and courses designed for video games specifically. Hosein, A. (2019) found that female students who played video games were likely to choose a degree in physical science, technology, engineering, and mathematics (PSTEM).

## **Future Directions**

### *Survey to Experiment*

There are several ways this research can proceed in the future. One, this study should be done as an experiment instead of a survey. Participants should be placed in a room to perform a video game task with and without an online audience watching, and all variables must be controlled to test for social facilitation. The justification for controlling all variables is to test with greater certainty of testing causality in Social Facilitation.

Social Facilitation needs mastery and an audience present to occur. To see if social facilitation takes place the online audiences and mastery variables can be controlled very carefully in an experimental design.

### *Replace Self Report Scales with Observations*

Instead of relying on self-reported questions of mastery, find an activity that has objective information on one's skill level. Having objective observational data may provide more reliable data to test if online social facilitation may take place. For example, one video game example is League of Legends (LoL). It has a ranking system inside the game and has a table for scores after each game. One study took high-ranking LoL players and average-ranking LoL players and investigated to see who has faster reaction timing in a cognitive experiment (LI, X. et al, 2020). The LoL players were ranked by their in-game ranking system. If players in this experiment self-report their rank, there would have been self-reported bias. Therefore, I suggest using in-game rankings or methods of measuring mastery. The other useful tool that video games actively have is a way to collect data on performance. When a League of Legends game ends, there are graphs and tables that show an individual, team, or enemy team's statistics. This can be worth researching on for the future of online social facilitation.

### *Work-Related Activities*

Besides video games, there are lots of activities performed online whose performance may be facilitated by an online audience. This is important for future research as this can be the foundation of understanding the effect an audience may have for a performer. For example, working from home (Zoom meetings), Facebook/Youtube live shows and remote companies looking at their cameras at many locations may be

impacted by social facilitation. One example is Twitch streamers with a high viewer count ([www.twitch.com](http://www.twitch.com)). Those who have high mastery of a video game and in the presence of an online audience can be facilitating their performance. Top streamers such as League of Legends tyler1 have shown that he excels in Master Rank on the game with his online audience (<https://www.twitch.tv/loityler1>). Social Facilitation needs to be explored in all avenues online where there is mastery of activity and an audience present. An online audience can be the driving force behind the world's behavior online.

#### *Narcissistic Individuals on the Internet*

Future studies should continue to explore to what extent Narcissism can moderate to people's behavior online. One study idea is that YouTubers with a large following in subscribers (their audience) may be using their narcissistic traits to drive their success. This current study showed how those who answered high in narcissism have higher mastery and perform better regardless of whether an audience was present or not. Narcissistic people value self-importance and their superiority over others (Rosenthal et al., 2022). Another study can examine if narcissistic individuals prefer large online audiences over small or no online audiences while performing some activities such as video gaming. One of the many contributing factors in popular video game streamers (streamers = people who play in front of a camera for an online audience) is their mastery of the said game. One can draw a larger audience by being a higher rank in the game than those who are lower or have no rank ([www.twitch.com](http://www.twitch.com)).

#### *Distraction Conflict Theory and Evaluation Apprehension Theory*

One needs to be cautious while researching social facilitation as there are two theories that can be at play. First, distraction conflict theory says the person doing the

activity with an audience might be distracted by the task at hand (Barron, 1986). Those who have a simple task at hand will be facilitated by their arousal. On the other hand, a difficult task will be hindered by that very same type of arousal. If the performer is more focused on the task at hand rather than the audience, this is distraction conflict theory, not social facilitation. Evaluation Apprehension Theory says that an individual will be focused on how others perceive their performance (Cottrell, 1968). One can feel as if they are going to be judged on their performance while in front of others. To look at social facilitation, one needs to see if it's the actual audience presence that will change one's performance.

## **V. CONCLUSION**

Social facilitation evidence was not found in this study. However, the importance of an online audience should not be overlooked. Both video gamers and anyone who uses the internet are constantly in the presence of online audiences. Understanding the effect that online audiences may have on the “performer” will ultimately help us appreciate each other more. In the world of post covid and the ever-growing space of the internet, Psychology will continue to pave the way for a better future.

## APPENDIX SECTION

# Gaming Audience

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### Start of Block: Block 1 - Consent

#### **INFORMED CONSENT**

Charles Cox, a graduate student at Texas State University, is conducting a research study to investigate video gaming with an audience. You are being asked to complete this survey because you are a student at Texas State University.

Participation is voluntary. The survey will take approximately 20 minutes or less to complete. You must be at least 18 years old to take this survey.

This study involves no foreseeable serious risks. We ask that you try to answer all questions; however, if there are any items that make you uncomfortable or that you would prefer to skip, please leave the answer blank. Your responses are confidential.

Possible benefits from this study are List any benefits to participant or society

Reasonable efforts will be made to keep the personal information in your research record private and confidential (if not collecting identifiable information at any point in the project remove this statement). Any identifiable information obtained in connection with this study will remain confidential and will be disclosed only with your permission or as required by law. The members of the research team and the Texas State University Office of Research Integrity and Compliance (RIC) may access the data. The RIC monitors research studies to protect the rights and welfare of research participants.

Your name will not be used in any written reports or publications which result from this research. Data will be kept for three years (per federal regulations) after the study is completed and then destroyed.

You will receive extra credit in your class.

If you have any questions or concerns feel free to contact Charles Cox or his faculty advisor Roque Mendez:

**Charles Cox, graduate student**  
**Psychology Department**  
**512-800-1107**  
**ccc192@txstate.edu**

**Roque Mendez, Professor**  
**Psychology Department**  
**512-245-2023**  
**rm04@texstate.edu**

This project [insert IRB Reference Number or Exemption Number] was approved by the

Texas State IRB on [insert IRB approval date or date of Exemption]. Pertinent questions or concerns about the research, research participants' rights, and/or research-related injuries to participants should be directed to the IRB chair, Dr. Denise Gobert 512-716-2652 – (dgobert@txstate.edu) or to Monica Gonzales, IRB Regulatory Manager 512-245-2334 - (meg201@txstate.edu). If you would prefer not to participate, please do not fill out a survey. If you consent to participate, please complete the survey.

- Yes, I consent to participate (1)
- No, I do not consent to participate (2)

**End of Block: Block 1 - Consent**

---

**Start of Block: Super Smash Brothers**

Q1 Do you play Super Smash Brothers?

- Yes (1)
  - No (2)
- 

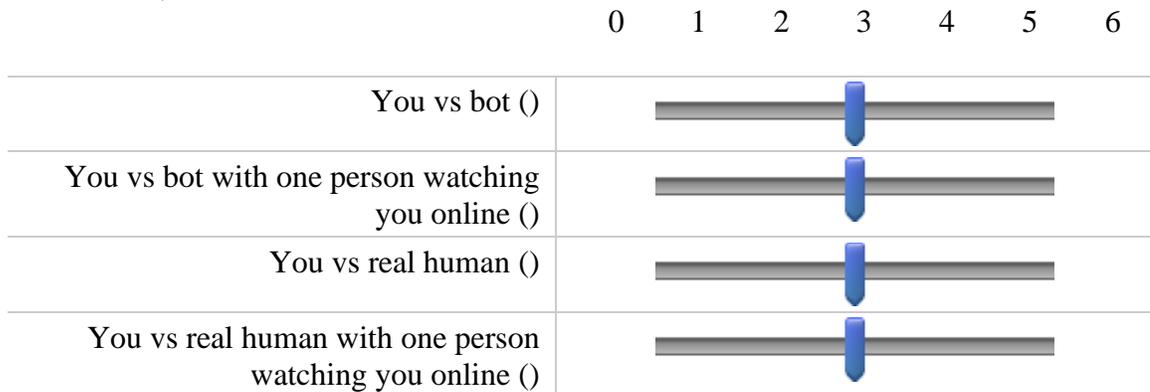
Q2 What is your mastery of the game?

- Excellent (1)
- Good (2)
- Above Average (3)
- Below Average (4)
- Fair (5)
- Novice (6)

Q3 Rate the difficulty of this game to you.

- Very easy (1)
- Easy (2)
- Somewhat easy (3)
- Somewhat difficult (4)
- Difficult (5)
- Very difficult (6)

Q4 Listed below are four different ways of playing Super Smash Brothers (e.g. "bot" means playing with robot/computer AI). Indicate whether you have played each variation or not (with 0 meaning you have not played this way), and if so, by sliding the indicator needle from 1 to 6 to mark the extent of your performance on each variation that you have played (0=Do not play; 1=Very poor; 2=Poor; 3=Fair; 4=Good; 5=Very good; 6=Excellent).



End of Block: Super Smash Brothers

Start of Block: League of Legends

Q1 Do you play League of Legends?

- Yes (1)
  - No (2)
- 

Q2 What is your mastery of the game?

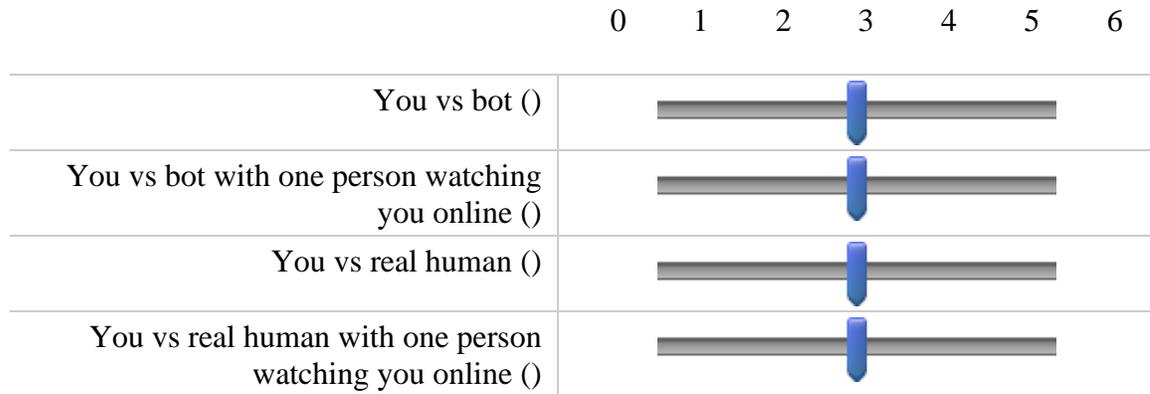
- Excellent (1)
  - Good (2)
  - Above Average (3)
  - Below Average (4)
  - Fair (5)
  - Novice (6)
- 

Q3 Rate the difficulty of this game to you.

- Very easy (1)
  - Easy (2)
  - Somewhat easy (3)
  - Somewhat difficult (4)
  - Difficult (5)
  - Very difficult (6)
- 

Q4 Listed below are four different ways of playing League of Legends (e.g. "bot" means playing with robot/computer AI). Indicate whether you have played each variation or

not (with 0 meaning you have not played this way), and if so, by sliding the indicator needle from 1 to 6 to mark the extent of your performance on each variation that you have played (0=Do not play; 1=Very poor; 2=Poor; 3=Fair; 4=Good; 5=Very good; 6=Excellent).



**End of Block: League of Legends**

**Start of Block: Call of Duty**

Q1 Do you play Call of Duty?

- Yes (1)
- No (2)

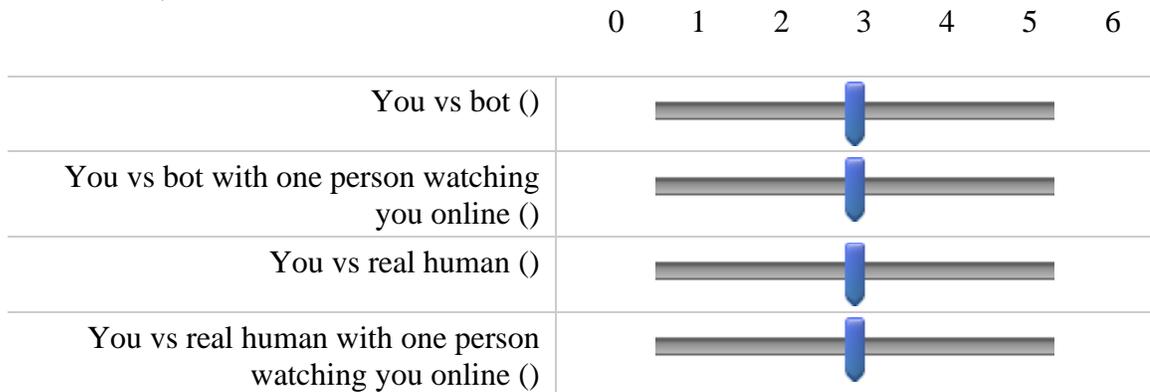
Q2 What is your mastery of the game?

- Excellent (1)
- Good (2)
- Above Average (3)
- Below Average (4)
- Fair (5)
- Novice (6)

Q3 Rate the difficulty of this game to you.

- Very easy (1)
- Easy (2)
- Somewhat easy (3)
- Somewhat difficult (4)
- Difficult (5)
- Very difficult (6)

Q4 Listed below are four different ways of playing Call of Duty (e.g. "bot" means playing with robot/computer AI). Indicate whether you have played each variation or not (with 0 meaning you have not played this way), and if so, by sliding the indicator needle from 1 to 6 to mark the extent of your performance on each variation that you have played (0=Do not play; 1=Very poor; 2=Poor; 3=Fair; 4=Good; 5=Very good; 6=Excellent).



End of Block: Call of Duty

Start of Block: Street Fighter

Q1 Do you play Street Fighter?

- Yes (1)
  - No (2)
- 

Q2 What is your mastery of the game?

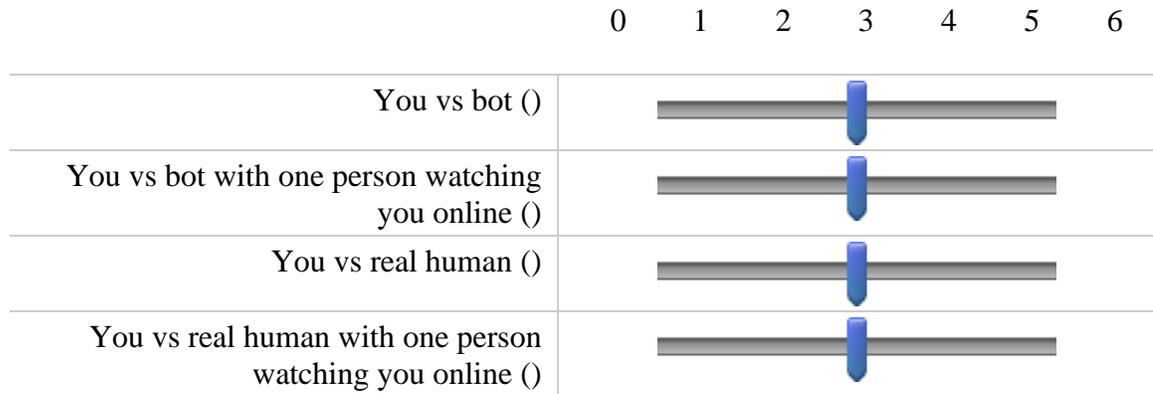
- Excellent (1)
  - Good (2)
  - Above Average (3)
  - Below Average (4)
  - Fair (5)
  - Novice (6)
- 

Q3 Rate the difficulty of this game to you.

- Very easy (1)
  - Easy (2)
  - Somewhat easy (3)
  - Somewhat difficult (4)
  - Difficult (5)
  - Very difficult (6)
- 

Q4 Listed below are four different ways of playing Street Fighter (e.g. "bot" means playing with robot/computer AI). Indicate whether you have played each variation or

not (with 0 meaning you have not played this way), and if so, by sliding the indicator needle from 1 to 6 to mark the extent of your performance on each variation that you have played (0=Do not play; 1=Very poor; 2=Poor; 3=Fair; 4=Good; 5=Very good; 6=Excellent).



**End of Block: Street Fighter**

**Start of Block: World of Warcraft**

Q1 Do you play World of Warcraft?

- Yes (1)
- No (2)

Q2 What is your mastery of the game?

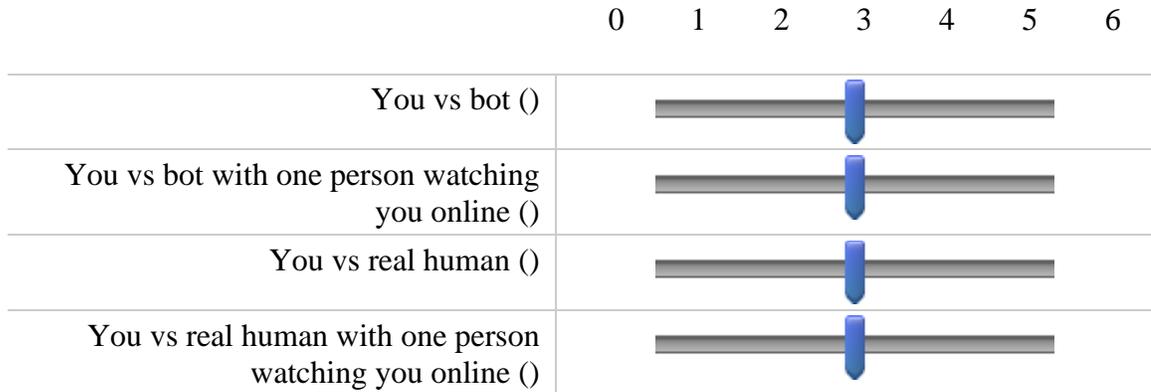
- Excellent (1)
- Good (2)
- Above Average (3)
- Below Average (4)
- Fair (5)
- Novice (6)

Q3 Rate the difficulty of this game to you.

- Very easy (1)
- Easy (2)
- Somewhat easy (3)
- Somewhat difficult (4)
- Difficult (5)
- Very difficult (6)

---

Q4 Listed below are four different ways of playing World of Warcraft (e.g. "bot" means playing with robot/computer AI). Indicate whether you have played each variation or not (with 0 meaning you have not played this way), and if so, by sliding the indicator needle from 1 to 6 to mark the extent of your performance on each variation that you have played (0=Do not play; 1=Very poor; 2=Poor; 3=Fair; 4=Good; 5=Very good; 6=Excellent).



End of Block: World of Warcraft

Start of Block: Overwatch

Q1 Do you play Overwatch?

- Yes (1)
  - No (2)
- 

Q2 What is your mastery of the game?

- Excellent (1)
  - Good (2)
  - Above Average (3)
  - Below Average (4)
  - Fair (5)
  - Novice (6)
- 

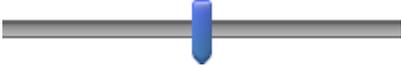
Q3 Rate the difficulty of this game to you.

- Very easy (1)
  - Easy (2)
  - Somewhat easy (3)
  - Somewhat difficult (4)
  - Difficult (5)
  - Very difficult (6)
- 

Q4 Listed below are four different ways of playing Overwatch (e.g. "bot" means playing with robot/computer AI). Indicate whether you have played each variation or not (with 0

meaning you have not played this way), and if so, by sliding the indicator needle from 1 to 6 to mark the extent of your performance on each variation that you have played (0=Do not play; 1=Very poor; 2=Poor; 3=Fair; 4=Good; 5=Very good; 6=Excellent).

0 1 2 3 4 5 6

You vs bot ()	
You vs bot with one person watching you online ()	
You vs real human ()	
You vs real human with one person watching you online ()	

End of Block: Overwatch

Start of Block: Pokemon

Q1 Do you play Pokemon(Sword and Shield or any of the past generations)?

- Yes (1)
- No (2)

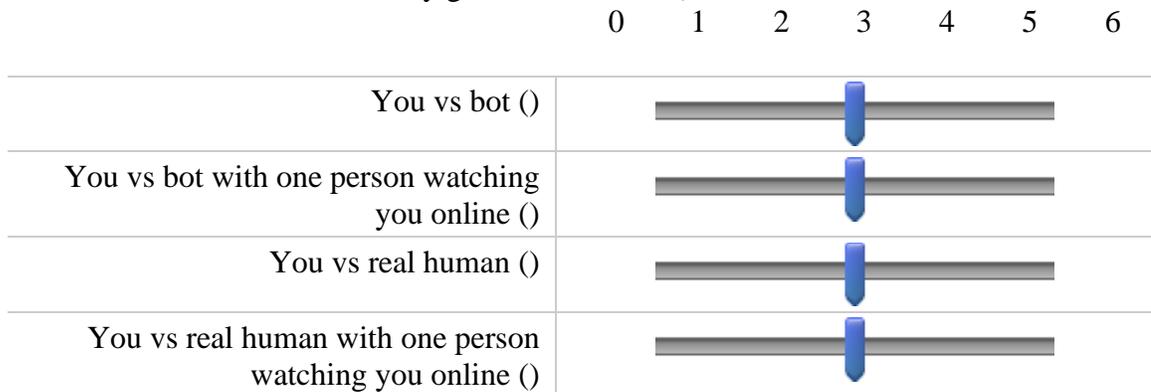
Q2 What is your mastery of the game?

- Excellent (1)
- Good (2)
- Above Average (3)
- Below Average (4)
- Fair (5)
- Novice (6)

Q3 Rate the difficulty of this game to you.

- Very easy (1)
- Easy (2)
- Somewhat easy (3)
- Somewhat difficult (4)
- Difficult (5)
- Very difficult (6)

Q4 Listed below are four different ways of playing Pokemon(Sword and Shield or any of the past generations) (e.g. "bot" means playing with robot/computer AI). Indicate whether you have played each variation or not (with 0 meaning you have not played this way), and if so, by sliding the indicator needle from 1 to 6 to mark the extent of your performance on each variation that you have played (0=Do not play; 1=Very poor; 2=Poor; 3=Fair; 4=Good; 5=Very good; 6=Excellent).



End of Block: Pokemon

Start of Block: Mario Kart

Q1 Do you play Mario Kart?

- Yes (1)
  - No (2)
- 

Q2 What is your mastery of the game?

- Excellent (1)
  - Good (2)
  - Above Average (3)
  - Below Average (4)
  - Fair (5)
  - Novice (6)
- 

Q3 Rate the difficulty of this game to you.

- Very easy (1)
  - Easy (2)
  - Somewhat easy (3)
  - Somewhat difficult (4)
  - Difficult (5)
  - Very difficult (6)
- 

Q4 Listed below are four different ways of playing Mario Kart (e.g. "bot" means playing with robot/computer AI). Indicate whether you have played each variation or not (with 0

meaning you have not played this way), and if so, by sliding the indicator needle from 1 to 6 to mark the extent of your performance on each variation that you have played (0=Do not play; 1=Very poor; 2=Poor; 3=Fair; 4=Good; 5=Very good; 6=Excellent).

0 1 2 3 4 5 6

You vs bot ()	
You vs bot with one person watching you online ()	
You vs real human ()	
You vs real human with one person watching you online ()	

End of Block: Mario Kart

Start of Block: Dragonball Z Fighters

Q1 Do you play Dragonball Z Fighters?

- Yes (1)
- No (2)

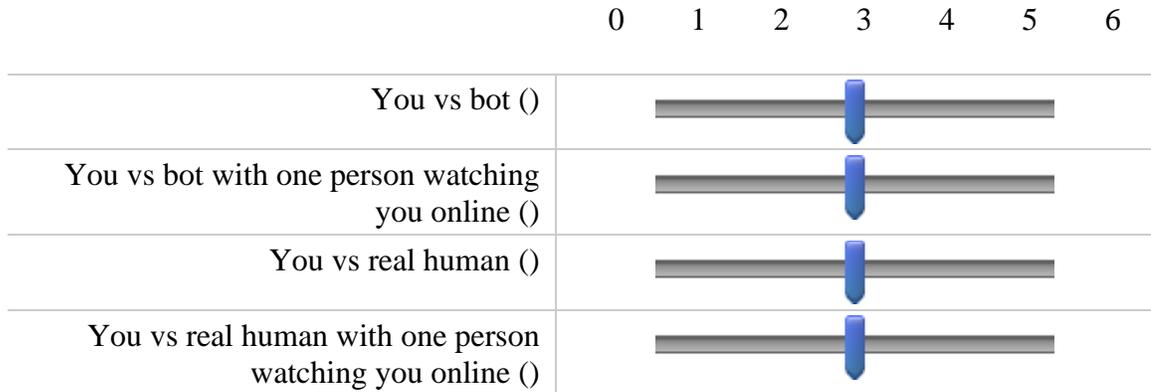
Q2 What is your mastery of the game?

- Excellent (1)
- Good (2)
- Above Average (3)
- Below Average (4)
- Fair (5)
- Novice (6)

Q3 Rate the difficulty of this game to you.

- Very easy (1)
- Easy (2)
- Somewhat easy (3)
- Somewhat difficult (4)
- Difficult (5)
- Very difficult (6)

Q4 Listed below are four different ways of playing Dragonball Z Fighters (e.g. "bot" means playing with robot/computer AI). Indicate whether you have played each variation or not (with 0 meaning you have not played this way), and if so, by sliding the indicator needle from 1 to 6 to mark the extent of your performance on each variation that you have played (0=Do not play; 1=Very poor; 2=Poor; 3=Fair; 4=Good; 5=Very good; 6=Excellent).



End of Block: Dragonball Z Fighters

Start of Block: LSAS - Avoidance

For the following items, indicate how often you avoid the social situations listed below. If you come across a social situation that you ordinarily do not experience, we ask that you imagine "what if you were faced with that situation," and then rate the degree to which you would avoid this hypothetical situation. Please base your ratings on the way that the situations have affected you in the last 1-2 weeks.

---

Please answer how often you avoid (or would avoid) each of the following social situations.

---

SAA1 Using a telephone in public

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
- 

SAA2 Participating in a small group activity

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
-

SAA3 Eating in public

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
- 

SAA4 Drinking with others

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
- 

SAA5 Talking to someone in authority

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
-

SAA6 Acting, performing, or speaking in front of an audience

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
- 

SAA7 Going to a party

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
- 

SAA8 Working while being observed

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
-

SAA9 Writing while being observed

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
- 

SAA10 Calling someone you don't know very well

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
- 

SAA11 Talking face to face with someone you don't know very well

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
-

SAA12 Meeting strangers

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
- 

SAA13 Urinating in a public bathroom

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
- 

SAA14 Entering a room when others are already seated

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
-

SAA15 Being the center of attention

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
- 

SAA16 Speaking up at a meeting

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
- 

SAA17 Taking a test of your ability, skill, or knowledge

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
-

SAA18 Expressing disagreement or disapproval to someone you don't know very well

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
- 

SAA19 Looking someone who you don't know very well straight in the eyes

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
- 

SAA20 Giving a prepared oral talk to a group

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
-

SAA21 Trying to make someone's acquaintance for the purpose of a romantic/sexual relationship

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
- 

SAA22 Returning goods to a store for a refund

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
- 

SAA23 Giving a party

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
-

SAA24 Resisting a high pressure sales person

- 0 Never (1)
- 1 Occasionally (2)
- 2 Often (3)
- 3 Usually (4)

**End of Block: LSAS - Avoidance**

---

**Start of Block: LSAS - Fear**

For the following items, assess how anxious or fearful you feel in the social situations listed below. If you come across a social situation that you ordinarily do not experience, we ask that you imagine "what if you were faced with that situation," and then rate the degree to which you would experience anxiousness or fear this hypothetical situation. Please base your ratings on the way that the situations have affected you in the last 1-2 weeks.

-----

Please answer how anxious or fearful you feel (or would feel) in each of the following social situations.

-----

SAF1 Using a telephone in public

- 0 None (1)
- 1 Mild (2)
- 2 Moderate (3)
- 3 Severe (4)

SAF2 Participating in a small group activity

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
- 

SAF3 Eating in public

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
- 

SAF4 Drinking with others

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
-

SAF5 Talking to someone in authority

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
- 

SAF6 Acting, performing, or speaking in front of an audience

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
- 

SAF7 Going to a party

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
-

SAF8 Working while being observed

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
- 

SAF9 Writing while being observed

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
- 

SAF10 Calling someone you don't know very well

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
-

SAF11 Talking face to face with someone you don't know very well

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
- 

SAF12 Meeting strangers

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
- 

SAF13 Urinating in a public bathroom

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
-

SAF14 Entering a room when others are already seated

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
- 

SAF15 Being the center of attention

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
- 

SAF16 Speaking up at a meeting

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
-

SAF17 Taking a test of your ability, skill, or knowledge

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
- 

SAF18 Expressing disagreement or disapproval to someone you don't know very well

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
- 

SAF19 Looking someone who you don't know very well straight in the eyes

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
-

SAF20 Giving a prepared oral talk to a group

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
- 

SAF21 Trying to make someone's acquaintance for the purpose of a romantic/sexual relationship

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
- 

SAF22 Returning goods to a store for a refund

- 0 None (1)
  - 1 Mild (2)
  - 2 Moderate (3)
  - 3 Severe (4)
-

SAF23 Giving a party

- 0 Never (1)
  - 1 Occasionally (2)
  - 2 Often (3)
  - 3 Usually (4)
- 

SAF24 Resisting a high pressure sales person

- 0 Never (1)
- 1 Occasionally (2)
- 2 Often (3)
- 3 Usually (4)

**End of Block: LSAS - Fear**

---

**Start of Block: Block 4 - Narcissism Questions**

Consider how well each of the following statements describe you and answer them to the best of your ability.

---

Q1 People see me as a natural leader.

- Disagree strongly (1)
  - Disagree (2)
  - Neither agree or disagree (3)
  - Agree (4)
  - Agree strongly (5)
- 

Q2 I hate being the center of attention.

- Disagree strongly (1)
  - Disagree (2)
  - Neither agree or disagree (3)
  - Agree (4)
  - Agree strongly (5)
- 

Q3 Many group activities tend to be dull without me.

- Disagree strongly (1)
  - Disagree (2)
  - Neither agree or disagree (3)
  - Agree (4)
  - Agree strongly (5)
-

Q4 I know that I am special because everyone keeps telling me so.

- Disagree strongly (1)
  - Disagree (2)
  - Neither agree or disagree (3)
  - Agree (4)
  - Agree strongly (5)
- 

Q5 I like to get acquainted with important people.

- Disagree strongly (1)
  - Disagree (2)
  - Neither agree or disagree (3)
  - Agree (4)
  - Agree strongly (5)
- 

Q6 I feel embarrassed if someone compliments me.

- Disagree strongly (1)
  - Disagree (2)
  - Neither agree or disagree (3)
  - Agree (4)
  - Agree strongly (5)
-

Q7 I have been compared to famous people.

- Disagree strongly (1)
  - Disagree (2)
  - Neither agree or disagree (3)
  - Agree (4)
  - Agree strongly (5)
- 

Q8 I am an average person.

- Disagree strongly (1)
  - Disagree (2)
  - Neither agree or disagree (3)
  - Agree (4)
  - Agree strongly (5)
- 

Q9 I insist on getting the respect I deserve.

- Disagree strongly (1)
- Disagree (2)
- Neither agree or disagree (3)
- Agree (4)
- Agree strongly (5)

**End of Block: Block 4 - Narcissism Questions**

---

**Start of Block: Block 5 - Basic Questions**

**B1 What is your gender?**

- Male (1)
  - Female (2)
  - Non-binary (3)
- 

**B2 What is your age range?**

- 18-22 (1)
  - 23-27 (2)
  - 28-32 (3)
  - 33-37 (4)
  - 38+ (5)
- 

**B3 What is your ethnic background?**

- White (1)
- Black or African American (2)
- American Indian or Alaska Native (3)
- Asian (4)
- Native Hawaiian or Pacific Islander (5)
- Hispanic or latino(a) (6)
- Other (7)

End of Block: Block 5 - Basic Questions

---

Start of Block: End of Survey

Thank you for participating in this survey!

End of Block: End of Survey

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## REFERENCES

- Atari Announces World-Class Video Game-Themed Atari Hotels.* (2020, January 26). Atari Hotels. <https://atarihotels.com/news/atari-announces-world-class-video-game-themed-atari-hotels-first-atari-hotel-to-begin-construction-in-phoenix-in-mid-2020/>
- Baker, S. L., Heinrichs, N., Kim, H.-J., & Hofmann, S. G. (2002). The Liebowitz social anxiety scale as a self-report instrument: A preliminary psychometric analysis. *Behaviour Research and Therapy*, 40(6), 701–715. [https://doi-org.libproxy.txstate.edu/10.1016/S0005-7967\(01\)00060-2](https://doi-org.libproxy.txstate.edu/10.1016/S0005-7967(01)00060-2)
- Baron, R. S. (1986). *Distraction-conflict theory: Progress and problems.* In *Advances in experimental social psychology* (Vol. 19, pp. 1-40). Academic Press.
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173–1182. <https://doi-org.libproxy.txstate.edu/10.1037/0022-3514.51.6.1173>
- Clement. (2012). *Global video games market value 2021 | Statista.* Statista; Statista. <https://www.statista.com/statistics/246888/value-of-the-global-video-game-market/>
- Cornwell, B. R., Heller, R., Biggs, A., Pine, D. S., & Grillon, C. (2011). Becoming the center of attention in social anxiety disorder: Startle reactivity to a virtual audience during speech anticipation. *The Journal of Clinical Psychiatry*, 72(7), 942–948. <https://doi-org.libproxy.txstate.edu/10.4088/JCP.09m05731blu>

- Cottrell, N. B., Wack, D. L., Sekerak, G. J., & Rittle, R. H. (1968). Social facilitation of dominant responses by the presence of an audience and the mere presence of others. *Journal of personality and social psychology*, 9(3), 245.
- Dashiell, J. F. (1935). *Experimental studies of the influence of social situations on the behavior of individual human adults*.
- Field, A. (2005). *Discovering Statistics Using SPSS*. Thousand Oaks, CA.: Sage Publications.
- Fouts, G. T. (1979). Social anxiety and social facilitation. *Psychological Reports*, 44(3, Pt 2), 1065–1066. <https://doi-org.libproxy.txstate.edu/10.2466/pr0.1979.44.3c.1065>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis*.
- Hilvert-Bruce, Z., Neill, J. T., Sjöblom, M., & Hamari, J. (2018). Social motivations of live-streaming viewer engagement on Twitch. *Computers in Human Behavior*, 84, 58–67. <https://doi.org/10.1016/j.chb.2018.02.013>
- Hosein, A. (2019). Girls' video gaming behaviour and undergraduate degree selection: A secondary data analysis approach. *Computers in Human Behavior*, 91, 226–235. <https://doi-org.libproxy.txstate.edu/10.1016/j.chb.2018.10.001>
- Johnson, M. R., & Woodcock, J. (2019). 'It's like the gold rush': The lives and careers of professional video game streamers on Twitchtv. *Information, Communication & Society*, 22(3), 336–351. <https://doi-org.libproxy.txstate.edu/10.1080/1369118X.2017.1386229>

- Lee, B. W., & Leeson, P. R. C. (2015). Online gaming in the context of social anxiety. *Psychology of Addictive Behaviors, 29*(2), 473–482. <https://doi-org.libproxy.txstate.edu/10.1037/adb0000070>
- Lee, K., & Ashton, M. C. (2005). Psychopathy, Machiavellianism, and Narcissism in the Five-Factor Model and the HEXACO model of personality structure. *Personality and Individual Differences, 38*(7), 1571–1582. <https://doi-org.libproxy.txstate.edu/10.1016/j.paid.2004.09.016>
- Lee, I. A., & Preacher, K. J. (2013, September). Calculation for the test of the difference between two dependent correlations with one variable in common [Computer software]. <http://quantpsy.org/corrtest/corrtest2.htm>
- Lenhard, Wolfgang. (n.d.). *Online-Calculator for testing correlations: Psychometrica*. [www.psychometrica.de](http://www.psychometrica.de). <https://www.psychometrica.de/correlation.html>
- Li, X., Huang, L., Li, B., Wang, H., & Han, C. (2020). Time for a true display of skill: Top players in League of Legends have better executive control. *Acta Psychologica, 204*. <https://doi-org.libproxy.txstate.edu/10.1016/j.actpsy.2020.103007>
- Liu, C., Ang, R. P., & Lwin, M. O. (2013). Cognitive, personality, and social factors associated with adolescents' online personal information disclosure. *Journal of Adolescence, 36*(4), 629–638. <https://doi-org.libproxy.txstate.edu/10.1016/j.adolescence.2013.03.016>
- Markey, P. M., & Ferguson, C. J. (2017). Teaching us to fear: The violent video game moral panic and the politics of game research. *American Journal of Play, 10*(1), 99–115.

- Menon, M., & Sharland, A. (2011). Narcissism, exploitative attitudes, and academic dishonesty: An exploratory investigation of reality versus myth. *Journal of Education for Business*, 86(1), 50–55. <https://doi-org.libproxy.txstate.edu/10.1080/08832321003774772>
- Paulhus, D. L., & Williams, K. M. (2002). The Dark Triad of personality: Narcissism, Machiavellianism and psychopathy. *Journal of Research in Personality*, 36(6), 556–563. [https://doi.org/10.1016/S0092-6566\(02\)00505-6](https://doi.org/10.1016/S0092-6566(02)00505-6)
- Pessin, J. (1933). The comparative effects of social and mechanical stimulation on memorizing. *The American Journal of Psychology*, 45(2), 263-270.
- Potard, C., Henry, A., Boudoukha, A.-H., Courtois, R., Laurent, A., & Lignier, B. (2020). Video game players' personality traits: An exploratory cluster approach to identifying gaming preferences. *Psychology of Popular Media*, 9(4), 499–512. <https://doi-org.libproxy.txstate.edu/10.1037/ppm0000245>
- Psychology Research Participation System at Texas State*. (n.d.). Txstate.sona-Systems.com. Retrieved June 22, 2022, from <https://txstate.sona-systems.com/>
- Rosenthal, S. A., Montoya, R. M., Hooley, J. M., & Jurgens, C. T. (2022). The Narcissistic Grandiosity Scale: A meta-analytic examination of item convergent and discriminant validity. *Psychological Assessment*. <https://doi-org.libproxy.txstate.edu/10.1037/pas0001151.supp> (Supplemental)
- Qualtrics. (2015). *Qualtrics XM - Experience Management Software*. Qualtrics. <https://www.qualtrics.com>

- Steffens, N. K., & Haslam, S. A. (2020). The narcissistic appeal of leadership theories. *American Psychologist*. <https://doi-org.libproxy.txstate.edu/10.1037/amp0000738.supp> (Supplemental)
- Stopfer, J. M., Braun, B., Müller, K. W., & Egloff, B. (2015). Narcissus plays video games. *Personality and Individual Differences*, 87, 212–218. <https://doi-org.libproxy.txstate.edu/10.1016/j.paid.2015.08.011>
- Triplett, N. (1898). The dynamogenic factors in pacemaking and competition. *The American Journal of Psychology*, 9(4), 507–533. <https://doi-org.libproxy.txstate.edu/10.2307/1412188>
- Twitch Tracker. (2021). *Twitch Statistics & Charts*. TwitchTracker. <https://twitchtracker.com/statistics>
- Urbanemujoe. (n.d.). *2022 Essential Facts About the Video Game Industry*. Entertainment Software Association. <https://www.theesa.com/resource/2022-essential-facts-about-the-video-game-industry/>
- Vanzoelen, D., & Caltabiano, M. L. (2016). The role of social anxiety, the behavioural inhibition system and depression in online gaming addiction in adults. *Journal of Gaming and Virtual Worlds*, 8(3), 231–245. [https://doi-org.libproxy.txstate.edu/10.1386/jgvw.8.3.231\\_1](https://doi-org.libproxy.txstate.edu/10.1386/jgvw.8.3.231_1)
- Zajonc, R. B., & Sales, S. M. (1966). Social facilitation of dominant and subordinate responses. *Journal of Experimental Social Psychology*, 2(2), 160–168. [https://doi-org.libproxy.txstate.edu/10.1016/0022-1031\(66\)90077-1](https://doi-org.libproxy.txstate.edu/10.1016/0022-1031(66)90077-1)