

# Gender Stereotypes in Video Gaming: Impacts of Anxiety Levels, Verbal Communication, and Performance

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## ABSTRACT

With the emerging demand for video games as entertainment, it is important to examine human behavior when designing and developing games. Past research has shown support that gender stereotypes imposed on female gamers are prevalent within this space. Another study showed that when female players perceive being in an all male performative environment, they are prone to stereotype threat which hinders their own performance. To continue the efforts of exploring the detrimental effects of this problem, a pilot study was devised using a 2x2 factorial within subject design with team compositions (male vs female) and atmosphere (negative vs positive interactions) as the independent variables. Ten female participants played a first-person-shooter game called Valorant by Riot Games across two consecutive days where they would play in both team compositions for gender. At the end of each game, participants took a questionnaire to self-rate their game experience, anxiety levels and desirability to communicate during gameplay. Additionally, researchers observed game performance, frequency of in-game communication and confederate engagement. Researchers hypothesized that participants who played in the all high ranking male team with negative interactions would communicate less frequently and have lower desirability to communicate, have worse game performance, less engagement with the confederates, higher levels of anxiety and overall worse game experience than other conditions. Statistical analyses revealed the atmosphere factor (positive vs negative) significantly influenced performance outcomes (e.g., kills and ranking) and subjective experiences (e.g., game experience, team interactions, feelings of respect, safety, disrespected, discouraged, and supported). However, there was no significant main effect for team composition and no significant interaction effect between team composition and atmosphere. Continued research of this problem space is crucial to ensure video games are inclusive and enjoyable for all.

**Keywords:** Gender stereotypes and video gaming

## INTRODUCTION

Video games are a popular form of entertainment and should be enjoyed by everyone. Past research has shown that gender stereotypes and discrimination are imposed on female gamers (Kelly et al., 2022). This is a prominent issue discussed in the video gaming community, and researchers have begun diving deeper in the academic setting. Past researchers have suggested that gender

discrimination could discourage female gamers to participate and engage in competitive gaming (Lucas and Sherry, 2004). In addition to motivation to play, past researchers explored the prevalence of stereotype threat and found it could negatively affect performance in female participants (Vermeulen et al., 2016). An experimental study found that the presence of stereotype threat negatively affects working memory tasks and anxiety levels in female middle schoolers within educational settings (Liu and Zhao, 2022). Lastly, other past researchers have suggested that gender discrimination and frequent harassment could cause female gamers to hide their identity online (McLean and Griffiths, 2019). Overall, these are all relevant issues within the gaming community and uncover how gender stereotypes and discrimination could play a negative role in hindering the enjoyment and engagement for female gamers, ultimately affecting their in-game behavior. However, there is not enough research that shows whether female gamers hide their identity in game genres where verbal communication is crucial to winning the game and if a negative or positive team interaction affects motivation for using the in-game microphone. A game genre where verbal communication is important would be first-person-shooter (FPS) games, where knowing the enemy location and communicating to the team is necessary. An FPS game is high pace and requires constant movement, causing players to be alert at all times. There is a need for communicating with the team on information about the enemy and coordinating when to make game play moves. Thus, there is no time to type out callouts using text chat, so these games tend to be designed with an in-game microphone for optimal communication. Another gap in past research is that stereotype threat was not studied in this particular genre and past researchers have yet to dive deep on anxiety levels for females in a gaming context when they are exposed to stereotype threats. Therefore, the objective of this pilot study was to understand how female players' game performance, in-game communication behavior, and subjective experience would be impacted when they perceive they are playing with all high male teammates and female teammates, in response to negative or positive interactions.

## METHODS

This study chose a popular FPS game called Valorant by Riot Games because of its strategic, intense, fast paced nature with other online players. This makes using an in-game microphone the most optimal way to communicate with teammates. A full Valorant normal game mode is roughly 35–55 minutes where two teams compete to win 13 matches first. Teams are randomly assigned a side of either attacking or defending where the objective is either to plant a bomb or diffuse it, wiping out the enemy team before they get the chance to. Once the game reaches 12 rounds, the teams switch sides from attacking to defending. Team switching is broken up in the first half and second half. A Valorant team for a normal unranked game mode is composed of 5 players where they go against another team of 5 players. When a player queues to play solo, they are randomly assigned a new cohort of online players to play with and go against every game. Players could

queue with their friends, however the enemy team is always a new random cohort of online players. For this pilot study set up, one of the players was the female participant, while the other four were confederates. The premade team of 5, with the participant and confederates, queued a normal casual game where they would be matched with online random players. The focus was to observe the participant where researchers controlled the team composition and atmosphere. This study was fully remote where participants used their personal computers. Participants played two Valorant online normal unranked games spread across two consecutive days with a premade team of confederates. They were assigned both team composition for gender across two days (i.e., female participants were to play in both the male and female condition). However, participants were randomly assigned the atmosphere factor (i.e., all negative or all positive interactions). Before logging on, participants were told their assigned teammates were all male high ranks or all female high ranks. Participants were unaware that they were randomly assigned to one of the atmosphere conditions of either positive or negative interactions. Depending on their assigned condition, the confederates would read a predefined script to enforce a positive or negative atmosphere.

### **Sampling**

An a-priori sample size computed using G-power software indicated a needed sample size of 279 participants. However, obtaining that sample size was not feasible due to time constraints and difficulty in recruiting female gamers. Thus, an exploratory study with a sample size of 10 female Valorant players was pilot tested. The inclusionary criteria were active players between the ages of 18–30 in California, U.S. Players using other servers would cause ping and lag, which would be problematic to game play. Furthermore, casual and competitive players were included, between low to high ranks (e.g., unranked, iron, bronze, silver, gold, platinum, diamond, ascendant, immortal, radiant). Furthermore, more than half the participants, 6 out of 10 reported playing solo queue. All participants reported playing a premade team with some random players, with 9 out of 10 participants using their in-game microphones to communicate with their teammates. The female participants were required to have their own computer setup, a working headset with microphone, access to Valorant, Discord, and high-speed internet.

### **Experimental Design**

This study used a 2×2 factorial within subject design. The independent variables were team compositions (male team, female team) and atmosphere (negative interactions, positive interactions). The dependent variables were split into quantitative and qualitative metrics. Quantitative data included game performance, collected at the end of each game on the scoreboard, including average combat score, which is a cumulative score that reflects the player's contributions (e.g., kills, damage, first kills, first deaths, and spike actions), kills, death, assist, and ranking. Additionally, frequency of

communications (e.g., in-game mic and text chat count) and frequency of confederate interactions (i.e., voice or text chat engagement towards the confederate count). The qualitative data consist of a post-game questionnaire, capturing subjective feedback on overall game experience, anxiety levels (Zung, 1971), and desirability for using verbal communication.

### Analysis of Data

Descriptive statistics to compute mean, median, and standard deviation for all dependent variables. Categorical data analysis was used on post study subjective questionnaires. Furthermore, researchers used non parametric tests (permutation ANOVA analysis) for the two treatments and their varying levels with the corresponding dependent variables. Researchers modified and incorporated the self-rated anxiety levels to get a score on anxiety alongside the desirability to use verbal communication using an agreeable likert scale in the post study questionnaire (Zung, 1971). Instead of the normal 20-item questionnaire, researchers reduced it down to 10 items and multiplied raw scores by 2, then converted it into anxiety scores.

## RESULTS

The descriptive statistics for all the dependent variables (DV) are presented in Table 1. Voice chat was calculated by the amount of times participants' microphone was turned on and off, with auditory input. Text chat was calculated by the amount of times participants' entered a line of text input. Confederate engagement was calculated by the amount of times participants used voice chat to say something towards the confederate. None of the participants used text chat to interact with confederates. AVG combat score, kills, death, assist, and ranking was recorded from the post-game scoreboard. AVG combat is calculated by player's contributions in kills, damage, first kills, first deaths, and spike actions. All players during the game are orderly ranked on a leadership board of 10. The ranks are ordered from 1 being the highest performer to 10 being the lowest performer.

**Table 1:** Quantitative data by team composition and atmosphere (N = 5 for each combination) (\*significance at 5%, \*\*significance at 10%).

Variable	Atmosphere	Team Composition					
		All Female		All Male		Overall	
		Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range
Voice chat count	Negative	15.4 (22)	0 - 53	4.6 (7.8)	0 - 18	10 (16.6)	0 - 53
	Positive	20.8 (14.7)	0 - 41	19.2 (19.6)	4 - 52	20 (16.3)	0 - 52
	Overall	18.1 (17.8)	0 - 53	11.9 (16)	0 - 52		
Text chat count	Negative	6 (5)	1 - 14	8.8 (9.1)	0 - 24	7.4 (7)	0 - 24
	Positive	9.4 (8.3)	0 - 20	7.8 (5.6)	1 - 15	8.6 (6.7)	0 - 20
	Overall	7.7 (6.8)	0 - 20	8.3 (7.1)	0 - 24		
Confederate Engagement	Negative	2.4 (2.9)	0 - 7	1.4 (2.1)	0 - 5	1.9 (2.4)	0 - 7
	Positive	1.6 (1.6)	0 - 4	1.6 (0.6)	1 - 2	1.6 (1.1)	0 - 4
	Overall	2 (2.2)	0 - 7	1.5 (1.4)	0 - 5		

Continued

**Table 1:** Continued

Variable	Atmosphere	Team Composition					
		All Female		All Male		Overall	
		Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range
AVG Combat Score **	Negative	142 (63.3)	61 - 214	170.2 (79.8)	86 - 293	156.1 (69.5)	61 - 293
	Positive	217.8 (111.1)	61 - 338	256.4 (66.8)	161 - 318	237.1 (88.7)	61 - 338
	Overall	179.9 (94.1)	61 - 338	213.3 (82.9)	86 - 318		
Kills *	Negative	11.4 (5)	5 - 18	12.4 (5.3)	5 - 19	11.9 (4.8)	5 - 19
	Positive	16.8 (8.8)	4 - 26	19.4 (4)	14 - 24	18.1 (6.6)	4 - 26
	Overall	14.1 (7.3)	4 - 26	15.9 (5.7)	5 - 24		
Death	Negative	18.6 (3.8)	12 - 21	14.8 (5)	6 - 17	16.7 (4.6)	6 - 21
	Positive	15.2 (3.8)	11 - 19	12.4 (3.2)	7 - 15	13.8 (3.6)	7 - 19
	Overall	16.9 (4)	11 - 21	13.6 (4.1)	6 - 17		
Assist	Negative	6 (1.9)	3 - 8	5 (2.6)	3 - 9	5.5 (2.2)	3 - 9
	Positive	6.8 (3.6)	3 - 10	4.6 (3.8)	0 - 10	5.7 (3.6)	0 - 10
	Overall	6.4 (2.7)	3 - 10	4.8 (3)	0 - 10		
Ranking *	Negative	8.2 (1.8)	6 - 10	7.6 (3.4)	2 - 10	7.9 (2.6)	2 - 10
	Positive	5.2 (3.7)	2 - 10	4.4 (2.4)	2 - 8	4.8 (2.9)	2 - 10
	Overall	6.7 (3.1)	2 - 10	6 (3.2)	2 - 10		

The descriptive statistics for all the dependent variables are presented in Table 2. Anxiety Levels was calculated by using an adopted scale by Zung, (1971). The score was converted to a scale of 1-4, where 1-within normal range, 2-minimal to moderate, 3-marked to severe, and 4-most extreme anxiety. Game Satisfaction captured the overall game experience on a 5-point likert scale, where 1-extremely dissatisfied and 5-extremely satisfied. Team Interactions captured the overall team sentiment on a 5-point likert scale, where 1-very negative and 5-very positive. Respected, safe, tilted, disrespected, discouraged, supported, sexually harassed, discriminated for my gender, desirability to use voice chat, text chat, ping system, and emotes/sprays were on a 5-point likert scale, where 1-strongly disagree and 5-strongly agree.

**Table 2:** Qualitative data by team composition and atmosphere (N = 5 for each combination) (\*significance at 5%, \*\*significance at 10%).

Variable	Atmosphere	Team Composition					
		All Female		All Male		Overall	
		Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range
Anxiety Rating	Negative	1.4 (0.6)	1 - 2	1.4 (0.6)	1 - 2	1.4 (0.5)	1 - 2
	Positive	1.2 (0.5)	1 - 2	1.4 (0.6)	1 - 2	1.3 (0.5)	1 - 2
	Overall	1.3 (0.5)	1 - 2	1.4 (0.5)	1 - 2		
Game Experience *	Negative	1.8 (0.9)	1 - 3	3.2 (1.7)	1 - 5	2.5 (1.4)	1 - 5
	Positive	4 (0)	4 - 4	3.8 (0.5)	3 - 4	3.9 (0.3)	3 - 4
	Overall	2.9 (1.3)	1 - 4	3.5 (1.2)	1 - 5		

Continued

**Table 2:** Continued

Variable	Atmosphere	Team Composition					
		All Female		All Male		Overall	
		Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range
Team	Negative	1.8 (0.5)	1 - 2	1.6 (0.6)	1 - 2	1.7 (0.5)	1 - 2
Interaction *	Positive	4.4 (0.6)	4 - 5	4 (1.3)	2 - 5	4.2 (0.9)	2 - 5
	Overall	3.1 (1.5)	1 - 5	2.8 (1.6)	1 - 5		
Respected *	Negative	2 (0.8)	1 - 3	2.2 (1.1)	1 - 3	2.1 (0.9)	1 - 3
	Positive	4.2 (0.9)	3 - 5	3.8 (1.1)	3 - 5	4 (0.9)	3 - 5
	Overall	3.1 (1.4)	1 - 5	3 (1.3)	1 - 5		
Safe *	Negative	2.6 (0.6)	2 - 3	2.2 (1.4)	1 - 4	2.4 (1)	1 - 4
	Positive	4.8 (0.5)	4 - 5	3.8 (0.9)	3 - 5	4.3 (0.8)	3 - 5
	Overall	3.7 (1.3)	2 - 5	3 (1.3)	1 - 5		
Tilted **	Negative	3.4 (1.2)	2 - 5	2.6 (1.6)	1 - 4	3 (1.3)	1 - 5
	Positive	1.4 (0.9)	1 - 3	1.8 (1.1)	1 - 3	1.6 (1)	1 - 3
	Overall	2.4 (1.4)	1 - 5	2.2 (1.3)	1 - 4		
Disrespected *	Negative	4.2 (0.9)	3 - 5	3 (2)	1 - 5	3.6 (1.6)	1 - 5
	Positive	1 (0)	1 - 1	1.8 (1.1)	1 - 3	1.4 (0.8)	1 - 3
	Overall	2.6 (1.8)	1 - 5	2.4 (1.7)	1 - 5		
Discouraged *	Negative	4.2 (0.9)	3 - 5	3 (1.6)	1 - 5	3.6 (1.4)	1 - 5
	Positive	1.4 (0.9)	1 - 3	1.8 (1.1)	1 - 3	1.6 (1)	1 - 3
	Overall	2.8 (1.7)	1 - 5	2.4 (1.4)	1 - 5		
Supported *	Negative	1.8 (0.9)	1 - 3	2.2 (0.9)	1 - 3	2 (0.8)	1 - 3
	Positive	4.4 (0.6)	4 - 5	4 (1)	3 - 5	4.2 (0.8)	3 - 5
	Overall	3.1 (1.5)	1 - 5	3.1 (1.3)	1 - 5		
Sexually harassed	Negative	1.4 (0.9)	1 - 3	1.2 (0.5)	1 - 2	1.3 (0.7)	1 - 3
	Positive	1 (0)	1 - 1	1.4 (0.9)	1 - 3	1.2 (0.6)	1 - 3
	Overall	1.2 (0.6)	1 - 3	1.3 (0.7)	1 - 3		
Discriminated for my gender **	Negative	1.4 (0.9)	1 - 3	2 (1.5)	1 - 4	1.7 (1.2)	1 - 4
	Positive	1 (0)	1 - 1	1 (0)	1 - 1	1 (0)	1 - 1
	Overall	1.2 (0.6)	1 - 3	1.5 (1.1)	1 - 4		
Desirability to use voice chat	Negative	3.6 (1.6)	1 - 5	4.4 (0.6)	4 - 5	4 (1.2)	1 - 5
	Positive	4.2 (1.4)	2 - 5	4.2 (0.9)	3 - 5	4.2 (1)	2 - 5
	Overall	3.9 (1.4)	1 - 5	4.3 (0.7)	3 - 5		
Desirability to use text chat **	Negative	2.8 (1.5)	1 - 5	2.8 (1.4)	1 - 4	2.8 (1.3)	1 - 5
	Positive	4 (1.3)	2 - 5	4.2 (1.4)	2 - 5	4.1 (1.2)	2 - 5
	Overall	3.4 (1.4)	1 - 5	3.5 (1.4)	1 - 5		
Desirability to use ping system	Negative	4.2 (0.5)	4 - 5	4.6 (0.6)	4 - 5	4.4 (0.5)	4 - 5
	Positive	4.8 (0.5)	4 - 5	4.6 (0.9)	3 - 5	4.7 (0.7)	3 - 5
	Overall	4.5 (0.5)	4 - 5	4.6 (0.7)	3 - 5		
Desirability to use emotes/spray	Negative	3.2 (1.5)	1 - 5	3 (0.8)	2 - 4	3.1 (1.1)	1 - 5
	Positive	3.2 (1.5)	1 - 5	3 (1.5)	1 - 5	3.1 (1.4)	1 - 5
	Overall	3.2 (1.4)	1 - 5	3 (1.1)	1 - 5		

There was a significant main effect of the atmosphere on game performance for kills,  $F(1, 9) = 5.32$ ,  $p = .03$ , such that participants had fewer kills under negative interactions compared to positive interactions. Similarly, ranking was significantly lower under negative interactions,  $F(1, 9) = 5.82$ ,  $p = .03$ .

Additionally, the atmosphere significantly influenced subjective experience. Negative interactions lowered game experience,  $F(1, 9) = 10.89$ ,  $p = .01$ ; team interaction,  $F(1, 9) = 54.35$ ,  $p < .001$ . Similarly, participants reported feeling less respected,  $F(1, 9) = 20.06$ ,  $p < .001$ ; less safe,  $F(1, 9) = 24.90$ ,  $p < .001$ ; more disrespected,  $F(1, 9) = 16.41$ ,  $p = .03$ ; more discouraged,  $F(1, 9) = 15.39$ ,  $p = .005$ ; and less supported,  $F(1, 9) = 35.85$ ,  $p < .001$ .

## DISCUSSION

### Game Performance

It was hypothesized that participants in an all high ranking male team with a negative atmosphere would perform worse than participants in other conditions. A significant main effect for atmosphere was found for kills where the mean for negative atmosphere was 11.9 (SD = 4.8) and the positive atmosphere was 18.1 (SD = 6.6). Similarly, ranking was lower in the negative atmosphere ( $M = 7.9$ ,  $SD = 2.6$ ) compared to the positive atmosphere ( $M = 4.8$ ,  $SD = 2.9$ ). Additionally, there were marginally significant differences found for AVG combat score,  $F(1, 9) = 4.83$ ,  $p = .055$ .

On the other hand, there was no significant main effect for team composition and no significant interaction effect between team composition and atmosphere. While team composition did not significantly affect game performance for this pilot study, a possible explanation may be due to the limitation of small sample size. Participants were told that they would be playing with all high ranking male or female players to instill the stereotype threat observed from past studies, where those participants performed worse in a video game when stereotype threat was present (Vermeulen et al., 2016). A possible explanation for this result could be due to the setup of the study wherein the participants played in normal unranked games. Past researchers suggest that casual gaming environments may not invoke the stereotype threat (Kaye et al., 2018). Thus, their ranks were not in jeopardy and they could have felt less pressure to perform in the female team, feeling more comfortable in trying new Valorant agents than what they normally play. Contrary to the hypothesis, the results imply that a negative atmosphere was a bad condition for all teams, regardless of composition. Furthermore, a negative atmosphere could impact game performance metrics like kills and ranking. This suggests that creating a positive environment is critical for improving game performance, regardless of who is on the team.

### Frequency of Communication & Desirability to Communicate

In addition to game performance, it was hypothesized that participants in the all high ranking male team with a negative team atmosphere would communicate less frequently. There were no significant differences across team composition nor atmosphere. However, the data does trend in that direction where the mean of voice chat frequency was lower in the male team ( $M = 11.9$ ,  $SD = 16$ ) compared to the female team ( $M = 18.1$ ,  $SD = 17.8$ ). Considering the median as a measure it is noted that the median for the male

condition was 6 vs 13.5 for the female condition. This likely indicates that the typical player in the male team was less willing to communicate. The higher means is likely due to the skewed distribution and a few talkative outliers. A higher sample size could have potentially uncovered significant differences.

Additionally, it was also hypothesized that participants would report less desirability to communicate. However, only desirability to use text chat was found to be marginally significant for atmosphere,  $F(1, 9) = 4.76$ ,  $p = .07$ . Participants in the negative atmosphere ( $M = 2.8$ ,  $SD = 1.3$ ) had less desirability to use text-chat interactions than participants in the positive atmosphere ( $M = 4.1$ ,  $SD = 1.2$ ). This suggests a negative atmosphere can potentially diminish motivation to engage in text-based interaction and highlights the critical role a positive team atmosphere plays in both game performance and the desire for text-based communication.

### **Confederate Interactions**

It was hypothesized there would be less interactions with the confederate in the all high ranking male team with a negative atmosphere. Interacting with a confederate was defined by the amount of times the participant would use voice chat or text chat to say something directly towards the confederate. In this study, there were no significant differences across team composition nor atmosphere. With that said, it was observed that in this study no participant defended another player on the male team in the negative atmosphere but there were instances when participants defended another player on the female team in the negative atmosphere. An interesting insight about team dynamics that could be explored in further detail in future research.

### **Anxiety Levels**

Another hypothesis posited was that participants in the all high ranking male team in a negative atmosphere would report higher anxiety levels. A 20-item questionnaire was adopted and modified to fit Valorant's context, reducing it to 10-items. During data analysis, researchers multiplied the raw score by 2 and converted it to the anxiety score. Then, researchers converted the score to a scale of 1-4, where 1-within normal range, 2-minimal to moderate, 3-marked to severe, and 4-most extreme anxiety. Statistical analysis provided no significant differences across team composition nor atmosphere. This indicates anxiety levels were indifferent for female participants for all conditions. It is again important to note that this pilot study was composed of normal unranked games. Future research should explore anxiety levels in the context of a competitive ranked game where participants rank status is jeopardized.

### **Subjective Experiences**

The last set of hypotheses explored how team composition and atmosphere affect participants' subjective experiences. Similar with performance, it was hypothesized that participants in the all high ranking male team in a negative atmosphere would report worse subjective experiences. Instead, a significant main effect for atmosphere was uncovered. The atmosphere manipulation



was successful, as participants' perceptions of the team atmosphere were significantly different across conditions, with a mean of 1.7 ( $SD = 0.5$ ) for the negative atmosphere and 4.2 ( $SD = 0.9$ ) for the positive atmosphere  $p < .001$ . Consistent with this, participants in the negative atmosphere reported significantly worse game experience ( $M = 2.5$ ,  $SD = 1.4$ ). This indicates that those in a negative atmosphere were overall less satisfied from the game. Similarly, they reported feeling significantly less respected ( $M = 2.1$ ,  $SD = 0.9$ ), less safe ( $M = 2.4$ ,  $SD = 1$ ), more disrespected ( $M = 3.6$ ,  $SD = 1.6$ ), and more discouraged ( $M = 3.6$ ,  $SD = 1.4$ ) than those in the positive atmosphere. Additionally, feeling more tilted was marginally significant  $F(1, 9) = 7$ ,  $p = .05$  in the negative atmosphere ( $M = 3$ ,  $SD = 1.3$ ). These findings suggest that the atmosphere of a team is a key contributor to a player's personal experience. Being in a game with negative interactions, regardless of who is on the team, hinders game experience.

While there was no significant main effect for team composition and no significant interaction effect between team composition and atmosphere, a few marginal differences were found which could support the initial hypothesis. A marginally significant main effect for atmosphere was found for gender discrimination,  $F(1, 9) = 3.5$ ,  $p = .06$ , suggesting that a negative environment may slightly increase the perception of such behavior. Additionally, a marginal main effect for team composition on feeling safe,  $F(1, 9) = 3.38$ ,  $p = .09$ , indicates that participants on female teams may feel slightly safer than those on male teams. This is an early signal of an underlying difference in player experience based on team composition that is not tied to the atmosphere which future research should continue exploring. Last and most notably, marginal differences were found for interaction effect between team composition and atmosphere for game experience,  $F(1, 9) = 3.56$ ,  $p = .09$ ; and feeling disrespected,  $F(1, 9) = 3.39$ ,  $p = .09$ . This is important because it indicates that the effect of atmosphere on game experience and feelings of disrespect might vary slightly depending on the team's composition. While not powerful enough to draw prescriptive conclusions, these interactions support the initial hypothesis, highlighting a dynamic that a more powerful study with a larger sample size could potentially uncover.

### Limitations

It is important to note that this experimental study had some limitations. This was a pilot study so the sample size was small, where  $n = 10$  largely due to difficulty in recruiting female gamers. The sampling was purposefully limited to one geographic region, California. If this study expanded outside California, it would jeopardize ping and enable confounding variables such as poor internet connection. Additionally, the researchers initially intended confederates to make comments to the team every odd round, and directed comments to every player every even round. However, initial testing revealed that this rule was not feasible given the unpredictability when playing a game. There were moments where there were no opportunities to make comments because the situation did not make sense. Thus, it was decided to make this

rule less strict and have confederates make comments towards the team and directly to players whenever feasible, with the goal to try talking every round. What remained the same was requiring confederates to talk to secondary confederates first, before speaking to the participants so that the second confederate could engage back, making it realistic to a real game and to encourage participants to verbally communicate. Also, confederates were required to make a comment directly towards female participants during the first and second half of the game, totaling two direct interactions to the participant per game. Another limitation was that the confederate ranks were not truly all high ranking, despite telling participants this. The ranking for confederates ranged from silver to diamond. Thus, there would be games where confederates were not performing as high ranking players would. Lastly, the confederate team was not consistent and there were about several confederates who would rotate games due to scheduling conflict. This noise could also have impacted the matchmaking rating (MMR) when queuing against other players.

### **Future Opportunities**

Future research with similar objectives could recruit a larger sample size, explore other geographic areas, utilize competitive rank games, and have a consistent team of confederates. A larger sample size and having participants play in competitive ranked matches could not only uncover significant differences for team composition but would also help establish the effect sizes for all the differences observed in this study. Lastly, other opportunity areas for research consist of exploring how to motivate players to stay positive or speaking up against toxicity.

### **CONCLUSION**

In summary, the study sought to understand if participants in the all high ranking male team in a negative atmosphere would have worse game performance, less frequent in-game communication behavior, and worse subjective experience. It was identified that atmosphere had a significant impact on game performance metrics and subjective experience ratings. This shows that manipulating the atmosphere had more influence than team composition in this pilot study, and that having a negative atmosphere was detrimental to all conditions. Despite the limited statistical significance, the marginal differences observed for how team composition influences feelings of safety and the interaction between team composition and atmosphere affects players' gaming experience and feelings of being disrespected highlights the need for continued investigation into gender toxicity within video games. Another benefit of continuing this line of research is that it could bring visibility to a problem that has been known and prominent in the video gaming community. Ultimately, investing in this field of research could proceed to bring awareness to game developing companies so that they could make informed decisions with all players in mind.

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