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Sexism in esports: How male and female players evaluate each others' performance and agency☆

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ABSTRACT

While equality and inclusivity are promoted in the realm of esports, most gamer communities remain male-dominated, which may give rise to prejudices against female players and their skill. In this study, we conducted two experiments where we measured how participants evaluate players' performance and agency attributions. Using two distinct experimental manipulations—one utilizing videos of players playing (n = 312) and the other using narrative vignettes (n = 338)—we found that males are rated mostly based on their gaming outcomes, while females are more often judged based on pre-existing (prejudiced) preconceptions. These results contribute to the literature on gaming-related stereotypes by enhancing the understanding of societal prejudices in the evaluation of players' skills.

1. Introduction

In the domains of esports and video games, which are often seen as male-dominated spaces, we observe a glaring dichotomy. Historically viewed as bastions of male-centric culture, today esports and video games are arenas where the ideal of inclusivity often clashes with the reality of exclusionary and sexist behaviors (Fron et al., 2007; Taylor, 2012; Trepanowski et al., 2024a). These behaviors, manifesting in various forms ranging from derogatory language and harassment to dismissive attitudes, not only question the capabilities and contributions of females in gaming but also often lead to females diminishing their own estimates of their abilities and worth (Cullen, 2018; Foong et al., 2018; Taylor, 2012).

Despite recent research efforts to understand why female players are underrepresented in esports games (Kordyaka & Brunnhofer, 2021; Kordyaka et al., 2023), there is still inconclusive evidence as to what degree (if at all) this underrepresentation is due to sexist behaviors and bias. However, since preliminary research suggests that females face worse treatment and more frequent belittlement of their skills than males in gaming (Fox & Tang, 2014; Little Black Book, 2022), this invites further investigation into whether, and to what extent, female players face prejudiced treatment in gaming communities. Addressing this gap in research is critical not only for impacting female participation in gaming but also for its broader implications for esports businesses. It also substantially contributes to discussions on the observed sex disparity in esports (Kordyaka et al., 2023) and how it should be tackled. Studying whether evaluations of players' skills contain sexist prejudices can also offer insights into toxic gamer cultures (Boudreau, 2022; Laato et al., 2024; Paul, 2018) and assist in developing mitigation measures in this domain. The purpose of this research, therefore, is to investigate whether the skills and capabilities of video gamers are evaluated differently based on sex.

To this end, we conducted two studies using a 2 × 2 × 2 between-subjects design, juxtaposing the performances of females and males under identical conditions. In our first study, actors — each portraying stereotypical male or female gamers — were filmed playing over identical in-game footage in a simulated live stream. Subsequently, we measured the perceptions of volunteer participants who viewed the footage, capturing their estimates of the streamers' performance and agency. In our second study, we employed narrative vignettes to describe the competitive successes or failures of esports athletes of different sexes. The objective of these research designs was to determine whether, despite identical performance, females and males are perceived differently based on their sex, and to explore how such perceptions are influenced by the observer's sex, the type of game, the level of success, and societal sex-related perceptions.

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2. Background

2.1. Differences between male and female players in esports

A recent literature review has highlighted that esports predominantly feature male players, a trend consistently mirrored in the focus of esports research (Kordyaka & Brunnhofer, 2021; Rogstad, 2022). However, the extant research is not oblivious to this, and in fact, there have been studies focusing specifically on addressing the lack of females at casual and professional levels (see e.g., Madden et al., 2021; Yusoff & Yunus, 2021). Unlike traditional sports, where physical prowess is often paramount, esports and video games emphasize cognitive proficiency as the defining metric of success (Kordyaka & Brunnhofer, 2021; Trepanowski et al., 2024b), with physical ability contributing only slightly (e.g., Giakoni-Ramírez et al., 2022; Rambusch et al., 2007). The world's top esports players are required, depending on the game they compete in, to exhibit excellence in various cognitive areas, including visuo-spatial skills, stimulus–response mapping, visual sensitivity, cross-modal sensory precision, task-switching abilities, and the processing of stored visual information (Campbell et al., 2018; Pedraza-Ramirez et al., 2020). In addition, most esports titles, especially those focused on team vs team conflict, require social skills such as communication and leadership (Nielsen & Hanghøj, 2019). This was further supported by a recent literature review (Trepanowski et al., 2024a), which identified a wide array of skills — spanning athletic, psychological, social, and vocational abilities — as necessary for a successful esports career.

Therefore, it would seem that esports skills are mostly cognitive and social, and thus should not differ strongly between the sexes. This was suggested by Kim (2017), who claimed that while some differences between the sexes in esports do exist, this gap is not significant. Despite this, only a small number of females have reached the top of the esports world. Similarly, in another cognitive sport like esports, chess, only a small number of females reached the top level of play — roughly 1% of all chess Grandmasters are female (Maass et al., 2008). These statistics invite research into whether factors other than the listed abilities, such as cultural treatment or personality, could play a role in the observed lack of female participation in esports.

2.2. Understanding the observed disparity in cognitive sports between the sexes

The reasons behind the participation disparity in esports and related fields, such as chess, remain unclear. Scholars generally agree that both biological factors, such as a statistically higher interest in objects over people among males, and cultural factors, including the lack of role models and societal expectations about female behavior, contribute to this gap (Eagly & Wood, 2013). In esports, it is argued that any skill disparity between females and males results from an interplay of systemic and social challenges rather than being inherently sex-based. These challenges include limited access to competition, limited access to practice with top players, or less rigorous training schedules (Taylor, 2012; Trepanowski et al., 2024a). Furthermore, females often face challenges related to negotiating their sex identity within the esports realm, leading to scenarios where they either downplay their femininity or become hyper-feminine, potentially facing backlash for transgressing femininity norms (Cullen, 2018; Taylor, 2012; Taylor et al., 2009; Trepanowski et al., 2024a). Despite our growing understanding, there remains a lack of definitive knowledge regarding the existence and impact of systematic biases and prejudice against females in esports.

Societal norms deeply ingrained in traditional gender roles also shape the esports landscape. Females are typically associated with communal attributes such as being nurturing, collaborative, and empathetic, while males are linked with agency, embodying traits like competitiveness and independence (Eagly & Karau, 2002). Perceptions like these, according to previous studies (Buser et al., 2014; Niederle & Vesterlund, 2011; Petrie & Segal, 2015), may be based on real differences between males and females. For example, Buser et al. (2014) show that young males are substantially more competitive than females, although Hibbard and Buhrmester (2010) claim that this depends on the type of competitiveness, with men competing more to win, but not to excel. Regardless of whether these stereotypes are based on real sex differences, they often deter individuals from exhibiting traits deemed appropriate for the opposite sex to avoid negative social perceptions or exclusion due to sex role transgressions. For instance, males participating in feminine sports are seen in rather pejorative terms (Laberge & Albert, 1999), while females may avoid competitive scenarios to conform to care-related expectations (Ellemers, 2018). Furthermore, considering that women do indeed engage less in competition (Niederle & Vesterlund, 2011), a smaller number of them is expected in this environment, especially considering other factors, such as it being heavily male-dominated.

The interplay of nature and nurture is complex (Eagly & Wood, 2013), with sex roles of biological origin being reinforced by historical perceptions of masculinity and femininity, which continue influencing our social structures despite recent advances in recognizing the intra-individual coexistence of agency and communion within individuals, regardless of their sex (Ellemers, 2018). Engaging in behaviors typically associated with the opposite sex can significantly affect how a person is perceived. For example, in workplace scenarios, females taking on leadership roles, often seen as masculine domains, are frequently subjected to nuanced biases (Rhee & Sigler, 2015). These biases can manifest in various ways, such as males in leadership roles being more easily forgiven for deviating from traditional sex roles than females in similar positions (Rhee & Sigler, 2015). The diminished perception of females' competence mainly occurs when the level of performance is ambiguous or uncertain (e.g., Heilman & Okimoto, 2007; Rhee & Sigler, 2015). Achieving success can mitigate these perceptions, but it also brings other challenges, including derogatory comments, hostile behaviors, and perceptions of successful females as non-feminine (Heilman & Okimoto, 2007; Heilman et al., 2004).

Sex-related stereotypes and prejudice are more likely to manifest in environments where there exists an asymmetry in participation between the sexes. Fields such as computer science and care-giving, which remain male and female-dominated respectively, are testament to this. Unsurprisingly, stereotypes of tech-savvy males and nurturing females persist and begin to shape the developmental paths of children from an early age, even as early as middle school (Tellhed et al., 2023). Esports, being a male-dominated field, at least in terms of competition participation, is a prime example of such an environment. By engaging in competitive esports activities, as indicated earlier, women may transgress sex norms and expectations and thus be met with prejudiced perceptions. Such perceptions include that of being less competent, passive, or dependent compared to their male counterparts (Ivory et al., 2014; Kim, 2017; Xue et al., 2019). Often, they have to hide their sex in fear of sexism (Choe et al., 2020).

While negative stereotypes about video gaming, such as being harmful or addictive, affect females, they are spared from certain stereotypes predominantly directed at males, such as being socially inept or "couch potatoes" (Faust et al., 2013; Kowert et al., 2014; Madden et al., 2021). Males are expected to always perform well, and those underperforming are considered unmanly. In such cases, words like "woman", "girl", or "female" tend to be used as derogatory descriptions of those males (e.g., Kelly et al., 2023). This indicates that low competence and ability are expected from females in esports. As a result, leadership roles and competitive spaces in esports tend to be occupied by males, while females are more often than not relegated to supportive roles (Kim, 2017). The latter can also be explained by the Stereotype Content Model, which suggests that societal perceptions of warmth and competence may diminish or enhance an individual's perceived capabilities in competitive settings like esports (Cuddy et al., 2008). Thus, individuals characterized by warmth, who are more likely female, are met with

lower expectations. In a recent study by Yao et al. (2022), the authors have shown that when a female is presented through the lens of stereotypical masculinity, she is more often considered an adequate competition partner than when she is stereotypically feminine. Thus, it is not surprising that in competitive multiplayer online gaming, masculine traits and appearances are typically more valued (Foong et al., 2018; Fron et al., 2007; Taylor, 2012; Trepanowski et al., 2024a).

From the perspective of female gamers, such a culture can feel hostile, unwelcoming, and off-putting. It perpetuates stereotypes that can fuel negative and belittling attitudes toward females, such as perceptions of them being less competent (Ivory et al., 2014; Kim, 2017; Xue et al., 2019). For these reasons, we postulate that females participating in esports matches will be perceived as more incompetent than males, irrespective of their in-game skills. Drawing on existing research, we anticipate that this perception of performance will be influenced by societal views on a given sex. However, considering the meritocratic nature of esports, it is also plausible that such perceptions may be mitigated by actual performance, a hypothesis we aim to explore in our studies.

Moreover, these attitudes and stereotypes can affect not only perceptions of performance but also overall ability and competitiveness, or in other words — agency. Agency, a concept traditionally linked with masculinity in societal norms (Guimond et al., 2006), is crucial for success in gaming culture, where assertiveness, strategic thinking, and independent problem-solving are key. However, this association inadvertently contributes to a skewed perception of females in gaming, who are often stereotypically viewed as less agentic. This misperception is not merely a cultural artifact but has tangible consequences in the gaming world. For example, in *League of Legends*, there exists a stereotype that females play supporting roles more than carry roles (Kim, 2017; Madden et al., 2021). This expectation can influence in-game dynamics and player interactions by subtly reinforcing the belief that females are less capable of leading or significantly impacting the game's outcome. However, there is a lack of clear empirical evidence indicating how the perceived agency of a player is influenced by their sex. Thus, in addition to examining perceptions of performance in relation to sex, our study also aims to test how a player's sex influences their perceived agency.

It should be noted that agency and performance can be interpreted in conjunction with each other, not only as independent of one another. For instance, a study by Mollaret and Miaroucourt (Mollaret & Miraucourt, 2016) shows that agency and traits associated with it, such as competence, can predict evaluations of performance and success. Furthermore, as Abele (2003) shows, agency and success, in this case career-related, can influence each other. Additionally, performing well or succeeding can also be perceived as inherently agentic behavior (Abele & Wojciszke, 2014). Thus, we also aim to test an alternative approach in which, agency will be treated as a predictor of performance to find whether other introduced variables influence perceived performance directly or whether those relationships are mediated by agency.

2.3. Hypotheses formation

Following our review of previous works, we formalized five hypotheses related to the evaluation of players' abilities, measured by agency and performance. As discussed, agency serves as a good proxy measure of players' overall ability to impact the outcome of a game (Guimond et al., 2006). Performance reflects how well a player performs in the game. Thus, these two metrics are both crucial in assessing a player's overall skill and ability, serving as dependent variables in the current studies.

When discussing sexism in esports, perhaps *prima facie*, the most obvious factor for treating the two sexes differently, when the players' actual skill level is unknown, is prejudice (Boudreau, 2022; Paul, 2018). Prejudices can form for multiple reasons, but once established, they guide users' behaviors and assessments of the events they witness. Prejudices are particularly important when assessing a player's skill and performance for the first time. Since participants possess little factual knowledge to work with, we may assume that prejudice will impact their evaluation of performance. Importantly, however, those prejudices do not need to be personally held by an individual to affect their evaluation of others; their mere presence within societal discourse is sufficient to influence perceptions of the groups subjected to such prejudices (e.g., Allport et al., 1954). Thus, we propose our first hypothesis:

H1: *The more people believe that society is prejudiced against a specific sex, the more they rate the performance of people of that sex as worse.*

Previous research on gender disparities in esports has pinpointed the absence of female players from top professional esports as one potential reason for the development of prejudices (see e.g., Kordyaka et al., 2023). With all role models being male, people may instinctively form beliefs that male players are likely superior. Moreover, males may be perceived in society as more competitive, and parallels to physical sports may further reinforce the belief that male players are superior in esports. Additionally, previous research suggests that specific sexism may be exhibited by male players toward female players (Fron et al., 2007; Taylor, 2012). Since most esports players at casual levels are male (Kordyaka et al., 2023), many gamers may view esports as a male domain where female players simply cannot excel (Kordyaka & Brunnhofer, 2021; Rogstad, 2022). This perception of esports as a male domain may translate into prejudices against female players entering this arena, leading to hostile behaviors and belittling of female players' skills. Accordingly, we propose the following two hypotheses:

H2.1: *Participants' ratings of performance will be higher for male players than female players.*

H2.2: *Participants' ratings of agency will be higher for male players than female players.*

Finally, it should be noted that agency and performance (and/or success) may not be two separate constructs, as we have hinted, but rather interconnected (Abele & Wojciszke, 2014). Across many studies, it has been shown that agency influences performance, typically with higher agency linked to better performance or greater success (e.g., Feldman et al., 2018; Schoon & Cook, 2021; Snow et al., 2015). This connection is evident not only in singular actions but also over the long term, for instance in career-related processes (Kückelhaus & Blickle, 2023). For example, Feldman et al. (2018) indicate that this influence on performance may be attributed to specific sub-constructs of agency, like free will. In their research, free will positively influenced job satisfaction, which, as other studies show, is a predictor of job performance (Judge et al., 2001). Snow et al. (2015) similarly suggest that control over one's own choices leads to higher-quality performance. Although the effect may not be very strong, agency can also impact academic success in adolescents, even when controlling for demographic context (Schoon & Cook, 2021). Importantly, however, the relationship between agency and performance is likely circular, with each influencing the other. Abele (e.g., Abele (2003) and Abele et al. (2008)) has noted on multiple occasions that achieving professional success or completing various tasks can lead to stronger self-reports of agency. Thus, it is likely that in reality, it is not performance that other introduced variables predict, but rather agency, which in turn predicts performance. Therefore, we assume that agency can alternatively be treated not only as a dependent variable but also as a mediator. Considering this, we also propose the following hypotheses:

H3.1: *Ratings of player agency will mediate the relationship between rater sex and ratings of player performance*

H3.2: *Ratings of player agency will mediate the relationship between rater sex and the belief that society is prejudiced against a specific sex.*

3. Research design

With two studies employing a 2 × 2 × 2 between-subjects experimental design featuring Multivariate Analysis of Covariance (MANCOVA), we aimed to test the influence of the players' sex on how their performance and agency are perceived by others. In this study, performance is defined as the ability to carry out a specific task or action, specifically, to execute skills or strategies in a competitive context. Agency is defined as an individual's capacity to achieve personal goals, be self-directed, and attain independence.

Both studies encompassed two dependent variables: the perceived performance and perceived agency of the actors depicted as players in the game. We manipulated three independent variables: the actor's sex (female or male), the participant's sex (female or male), and variables specific to each study—either the type of game played or the level of success achieved by the actor. We also controlled for three covariates: participant age, frequency of gaming, and pre-existing gender-based perceptions of capability. To isolate sex-specific effects and explore otherwise not discernible relations between the variables, we developed multi-group path models (grouped by actor's sex) also testing for potential mediation effects.

Study one made use of fabricated video gaming streams framed as real gameplay fragments, designed to measure perceptions of performance and agency. The second study shifted the format to vignettes that depicted either a success or a failure of an esports player, aiming to replicate the findings of the first study while removing potential biases related to the medium, such as the viewer's familiarity with the game or the actor's physical appearance. Using the vignette method allowed for a more explicit representation of player performance, thus focusing more on the specific effects of sex.

4. Study 1

4.1. Participants and procedure

We conducted a study employing a 2 × 2 × 2 between-subjects experimental design, considering the factors of actors' sex (female vs. male), game (*League of Legends,* RiotGames (2009) vs. *Counter-Strike: Global Offensive,* Valve (2012)), and participants' sex (female vs. male). We included game type manipulation for exploratory purposes to enhance the generalizability of the results.

Participants were recruited using two methods to accommodate different funding sources. 116 participants came from *Prolific*, a scientific crowd-sourcing platform, while 196 were sourced from *Ariadna*, a Polish research panel. Levene's test indicated homogeneity in the samples for the dependent variables (actor's performance: $F = .86$, $p = .35$; actor's agency: $F = 01$, $p = .91$), allowing for the merging of the datasets. In total, 312 people (160 females) between 18 and 69 years old ($M = 32.58$, $SD = 11.87$) participated in the study. The sample size exceeded initial estimations calculated with *G*Power*, which indicated that 240 participants were required to find a moderate effect size $f = .25$, assuming that $\alpha = .05$ and Power = .8 with eight groups. A detailed description of the sample is provided in Table 1.

We excluded 10 participants from the analysis: eight due to suspicions regarding the authenticity of the presented footage, one for exceeding a 30-min response time, and another for being an outlier in the age category (sole participant in the 70+ age bracket). Importantly, less than 5% of participants dropped out during the study. All participants met the language and age prerequisites. At the start, participants were briefed on the study's objectives and their rights. After understanding and consent were confirmed, they underwent experimental manipulation. Each participant was randomly assigned to one of four conditions, each presenting a different two-minute video embedded within the questionnaire. We decided on such video length to minimize the chances of external distractions affecting the participants.

Table 1
Descriptive information of survey respondents.

Variable[a]	Study 1 (N = 302)		Study 2 (N = 279)	
	N	%	N	%
Age				
<18	11	3.6	9	3.2
18–29	139	46.0	110	39.4
30–39	70	23.2	66	23.6
40–49	47	15.62	37	13.3
50–59	15	4.9	24	8.6
60–69	11	3.6	22	7.8
Missing	9	2.9	11	3.9
Sex				
Female	160	51.3	132	47.3
Male	151	48.4	146	52.3
Other/Missing	1	0.3	1	0.4
Plays games				
No	98	32.4	95	34.0
Yes	206	68.2	184	66.0
Plays h/week				
0	98	34.1	95	34.0
1–10	103	32.4	94	33.7
10–20	48	15.9	40	14.3
20–30	27	6.3	27	9.7
30–40	19	6.2	17	6.1
40+	7	2.3	6	2.1

[a] Statistics after clearing the data.

The videos simulated gaming streams by combining and synchronizing recordings of real, dynamic actors (either male or female) with gameplay footage. The videos were presented as extracts from actual gaming streams specifically for this study. We used two well-known games: *League of Legends* and *Counter-Strike: Global Offensive*. Both of those games are competitive titles following a 5 *vs.* 5 format where the player controls a single character. The difference between them is the genre, that is the mechanics that the game is based upon, *League of Legends* being a MOBA game, while *Counter Strike: Global Offensive* being a FPS game.

In the case of both games, the footage was recorded by the authors from the perspective of the main author. The actors, White Polish individuals in their mid-twenties, were recorded under standardized conditions while playing a different action game (in this case, *Risk of Rain 2,* HopooGames, 2019). The actors' sex was not explicitly stated, but stereotypical masculine or feminine actors were chosen and perceived as expected based on responses gathered later. For standardization, the actors maintained as neutral expressions as possible, although this might have influenced the perceived authenticity of the videos. Thus, after viewing, participants were asked about the authenticity of the footage. An example still-frame from the bogus video gaming stream is presented in Fig. 1. At the actors' request, their faces were masked in the paper and substituted with AI-generated ones made with DALL-E 2.

Participants then responded to questions about the actor's performance and the actor's perceived agency or communion, using the Personal Attributes Questionnaire (PAQ; Helmreich et al., 1981; Spence & Helmreich, 1978). This was followed by the Collective Self-Esteem Scale (CSES), the Opinion of the Other Sex Scale (OOS), a brief demographic questionnaire (including age and sex), and questions about their gaming habits. Notably, while the complete PAQ, CSES, and OOS scales were presented for validity, we focused on specific subscales/items from these scales in our analysis. Participants were prevented from revisiting completed sections of the survey to ensure data integrity. The analyses were performed using R 4.3.3 (R Core Team, 2024) and IBM SPSS 29 (IBM Corp., 2023).

Note. For anonymity, in this manuscript, actual faces of the actors were replaced with AI-generated ones made with DALL·E 2.

Fig. 1. Bogus video gaming stream used in the study. *Note.* For anonymity, in this manuscript, actual faces of the actors were replaced with AI-generated ones made with DALL-E 2.

Table 2
Factor analysis of the variables used in the study.

Factor	Item	Study 1		Study 2	
		Initial model	Corrected model	Initial model	Corrected model
Actor's performance	AP1	0.867***	0.867***	0.722***	0.746***
	AP2	0.890***	0.891***	0.797***	0.806***
	AP3	0.867***	0.867***	0.557***	0.634***
	AP4	0.767***	0.768***	0.680***	0.600***
	AP5	0.258*	–	0.251***	–
	AP6	0.670***	0.670***	0.460***	0.542***
Actor's agency	AA1	0.702***	0.701***	0.502***	0.514***
	AA2	0.095	–	−0.115	–
	AA3	0.800***	0.804***	0.675***	0.678***
	AA4	0.760***	0.763***	0.536***	0.606***
	AA5	0.008	–	−0.230	–
	AA6	0.634***	0.641***	0.669***	0.582***
	AA7	0.199**	–	−0.088	–
	AA8	0.199**	–	−0.315*	–

4.2. Measures and variables

The actor's performance was measured using six self-developed items (e.g., "This streamer is a good player") rated on a 7-point Likert scale from 1 (completely disagree) to 7 (completely agree). The factor analysis of these items is detailed in Table 2.

The actor's agency/communion was assessed using the Personal Attributes Questionnaire (Helmreich et al., 1981; Spence & Helmreich, 1978). This questionnaire contains 24 bipolar items, such as "Not at all aggressive" to "Very aggressive". Originally designed with a 5-point scale, we adapted it to a 7-point scale to maintain consistency with other measures used in our study. According to Dawes (2008), such a modification should not affect the psychometric properties of the measure. Additionally, the scale's wording was altered to assess the perceptions of the actor's traits by the participants rather than self-perceptions, using the following instruction: "Please rate to what extent the streamer exhibits the following traits:". In this study, we focused only on the agency subscale, which is related to abilities, skill, or overall effectiveness, whereas the communion subscale relates to emotion-related factors, thus it did not align with the scope of our research. Factor analysis of the items used is reported in Table 2.

Collective self-esteem, referring to one's valuation of one's group, was assessed with the Collective Self-Esteem Scale (Luhtanen & Crocker, 1992). In this study, we utilized a version of the scale adjusted to sex-related social groups. This scale contains 16 items, such as "I think I am a valuable woman/man", rated on a 7-point Likert scale from 1 (completely disagree) to 7 (completely agree). We adapted four items from this scale by altering the references to sex, creating a measure called the Opinion of the Other Sex Scale (OOS), which assesses opinions about the opposite sex (item 3: *In my society, men/women are considered good by others*; item 7: *In my society, men/women are, on average, believed to be more ineffective than men*; item 11: *In my society, men/women are respected*; item 15: *In general, others think that being a man/woman does not add value to one's social standing*). Each participant was presented with two versions of these items, one pertaining to males and one to females. We utilized corresponding items from both scales to derive a variable reflecting the extent of perceived sex-related prejudice against the other sex in society. Thus, this variable does not translate into the extent to which one possesses a prejudiced view, but to the extent to which they believe that this view persists throughout society.

4.3. Results and analyses

A 2 × 2 × 2 MANCOVA was conducted with the actor's perceived performance and agency as dependent variables. The independent variables included the actor's sex, the game played, and the participant's sex. The covariates were the participant's age, perceived sex-related prejudice, and gaming frequency. Due to a violation of the assumption of multivariate normality (K-S test $< .05$), Box–Cox transformations were applied to the dependent variables. Given this violation, bootstrapping with 1000 samples was utilized for more robust significance tests.

Both Box's M test ($M = 32.27$; $p = .065$) and Levene's F test (for performance: $F = 1.138$; $p = .339$; for agency: $F = .643$; $p = .720$) confirmed that the assumption of homogeneity of variance was met. Descriptive statistics, including untransformed means, standard deviations, and their corresponding 95% CIs, were calculated using ANCOVA and are presented in Table 3. An additional Levene's test confirmed sample homogeneity between gamers and non-gamers (actor's performance: $F = .510$, $p = .476$; actor's agency: $F = .202$, $p = .654$), facilitating further analyses.

Initially, a four-item measure of perceived sex-related prejudice was planned, but due to low reliability ($\alpha = .331$), a single representative item was selected: "In my society, women are, on average, believed to be more ineffective than men", with a corresponding item for males. Subsequent factor analysis, detailed in Table 2, necessitated modifications to the utilized measures. Specifically, one item from the actor's performance scale and four items from the actor's agency

Table 3
Descriptive statistics for Study 1.

Participant's sex	Game played	Female actor					Male actor				
		N	M	SD	95% CI		N	M	SD	95% CI	
Actor's performance											
F	LoL	37	4.32	1.24	[3.92,	4.71]	38	4.48	1.21	[4.11,	4.90]
F	CSGO	32	3.86	1.23	[3.43,	4.28]	39	4.12	1.22	[3.72,	4.51]
F	Overall	69	4.11	1.25	[3.83,	4.40]	77	4.30	1.22	[4.03,	4.59]
M	LoL	38	4.23	1.29	[3.84,	4.66]	38	4.85	1.49	[4.39,	5.28]
M	CSGO	36	4.27	1.39	[3.80,	4.73]	35	4.19	1.48	[3.69,	4.70]
M	Overall	74	4.25	1.33	[3.94,	4.55]	73	4.53	1.51	[4.17,	4.88]
Overall	LoL	75	4.27	1.26	[3.99,	4.57]	76	4.67	1.36	[4.36,	4.96]
Overall	CSGO	68	4.08	1.32	[3.77,	4.41]	74	4.16	1.34	[3.84,	4.47]
Overall	Overall	143	4.18	1.29	[3.98,	4.40]	150	4.41	1.37	[4.20,	4.66]
Actor's agency											
F	LoL	37	4.53	1.28	[4.10,	4.95]	38	4.77	1.20	[4.39,	5.12]
F	CSGO	32	4.18	1.16	[3.77,	4.58]	39	4.18	1.21	[3.78,	4.58]
F	Overall	69	4.37	1.23	[4.08,	4.64]	77	4.47	1.23	[4.19,	4.75]
M	LoL	38	4.81	0.93	[4.51,	5.10]	38	5.11	1.24	[4.71,	5.49]
M	CSGO	36	4.33	1.14	[3.95,	4.67]	35	4.69	1.27	[4.26,	5.11]
M	Overall	74	4.57	1.05	[4.34,	4.82]	73	4.91	1.26	[4.60,	5.18]
Overall	LoL	75	4.67	1.12	[4.41,	4.92]	76	4.94	1.22	[4.68,	5.19]
Overall	CSGO	68	4.26	1.14	[3.99,	4.53]	74	4.42	1.26	[4.13,	4.73]
Overall	Overall	143	4.47	1.15	[4.29,	4.66]	150	4.68	1.26	[4.48,	4.88]

Table 4
MANCOVA model for Study 1.

Variable	Dependent variable	Trace	F	df	p	Partial η^2
Actor's sex × Game × Participant's sex						
Corrected model	Actor's agency		2.780	10/282	.003	.090
	Actor's performance		2.135	10/282	.022	.070
Perceived female prejudice	Actor's agency	.030	6.446	1/281	.012	.022
	Actor's performance	.030	7.869	1/281	.005	.027
Age	Actor's agency	.003	.020	1/281	.888	.000
	Actor's performance	.003	.515	1/281	.474	.002
Gaming frequency	Actor's agency	.003	.108	1/281	.743	.000
	Actor's performance	.003	.181	1/281	.670	.001
Actor's sex	Actor's agency	.011	2.798	1/281	.095	.010
	Actor's performance	.011	2.153	1/281	.143	.008
Game played	Actor's agency	.015	4.139	1/281	.043	.014
	Actor's performance	.015	.911	1/281	.341	.003
Participant's sex	Actor's agency	.022	6.290	1/281	.013	.022
	Actor's performance	.022	2.539	1/281	.112	.009
Actor's sex × Game played	Actor's agency	.003	.483	1/281	.487	.002
	Actor's performance	.003	.000	1/281	.985	.000
Actor's sex × Participant's sex	Actor's agency	.002	.011	1/281	.916	.000
	Actor's performance	.002	.420	1/281	.517	.001
Game played × Participant's sex	Actor's agency	.000	.013	1/281	.909	.000
	Actor's performance	.000	.032	1/281	.857	.000
Actor's sex × Game played × Participant's sex	Actor's agency	.016	.598	1/281	.440	.002
	Actor's performance	.016	.993	1/281	.320	.004

measure exhibited weak factor loadings. These items were removed stepwise based on the lowest factor loading until satisfactory loadings were achieved. The final items included "independent", "competitive", "self-confident", and "able to make decisions easily".

As Table 4 shows, the 2 × 2 × 2 model indicated two significant main effects: the participant's sex ($F(1, 281) = 6.290$, $p = 0.013$, $\eta^2 = 0.022$) and the game played ($F(1, 281) = 4.139$, $p = 0.043$, $\eta^2 = 0.014$) on agency. Furthermore, perceived sex-related prejudice was a significant predictor of both agency ($F(1, 281) = 6.446$, $p = 0.012$, $\eta^2 = 0.022$) and performance ($F(1, 281) = 7.869$, $p = 0.005$, $\eta^2 = 0.027$). No expected interaction effects were present.

To explore the relationships between the variables further, we developed a multi-group path model. This model, in addition to exploring relationships otherwise difficult to discern, allowed us to test for mediation effects, especially between agency and performance. In this model, agency was assumed to play a different role compared to the MANCOVA model—it was a predictor of performance. Additionally, instead of introducing the actor's sex as a predictor, we introduced it as a variable splitting the model, thus creating a multi-group model. This approach allows us to easily compare the effects between the sexes of the actors and to account for sex-specific versions of the variable representing belief in the prevailing prejudiced view of a given sex in society. As presented in Table 5, there are significant differences in the extent to which males and females believe in the presence of these views, and how strong these views are regarding males and females. Generally, as per Table 5, females seem to be harsher in their evaluations of performance, especially in regard to other females. Thus, it is especially important to consider this variable in its sex-specific versions (which was not possible in the MANCOVA due to the model's setup) to fully account for its influence on the dependent variables.

The model comprised three exogenous variables (participant's sex, age, and the game played by the actor) and four endogenous variables (perceived sex-related prejudice, gaming frequency, actor's agency, and actor's performance), while being grouped by the actor's sex. Invariance testing indicated that we have achieved metric invariance, thus the specified groups were comparable (Table 6). The analysis was conducted using the *lavaan* library in R (R Core Team, 2024; Rosseel, 2012). The model with significant paths for Study 1 is presented in Fig. 2.

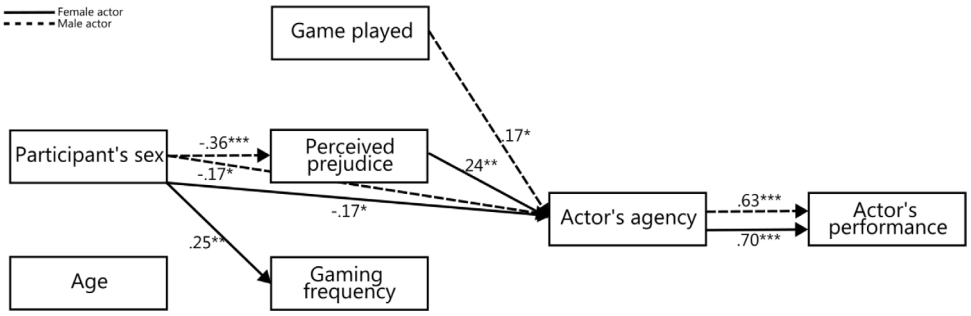

Fig. 2. Model with significant paths for Study 1.

Table 5
Sex-related perceived prejudice among the participant.

Variable	Participant's sex	N	M	SD	95% CI
Study 1					
Perceived male prejudice	Male	145	3.63	1.69	[3.37, 3.89]
	Female	157	3.38	1.69	[3.10, 3.64]
	Overall	302	3.50	1.64	[3.31, 3.67]
Perceived female prejudice[a]	Male	145	3.49	1.51	[3.23, 3.73]
	Female	157	4.27	1.53	[4.03, 4.51]
	Overall	302	3.89	1.57	[3.72, 4.07]
Study 2					
Perceived male prejudice	Male	146	3.39	1.57	[3.12, 3.61]
	Female	132	3.39	1.69	[3.08, 3.66]
	Overall	278	3.39	1.63	[3.20, 3.57]
Perceived female prejudice[a]	Male	146	3.69	1.44	[3.45, 3.93]
	Female	132	4.08	1.62	[3.76, 4.36]
	Overall	278	3.87	1.54	[3.69, 4.05]

[a] Marks significant differences between groups.

Table 6
Invariance testing for Study 1 and Study 2.

Model	df	AIC	BIC	Chi-square	ΔChi-square	Δdf	p-value
Study 1							
Configural	6	5279.3	5514.8	7.060	–	–	–
Metric	6	5279.3	5514.8	7.060	0.000	0	0.000
Scalar	10	5278.4	5499.3	14.235	7.174	4	0.074
Strict	14	5285.8	5491.9	29.606	15.371	4	0.139
Study 2							
Configural	10	5792.8	6008.3	13.623	–	–	–
Metric	10	5792.8	6008.3	13.623	0.0000	0	0.000
Scalar	16	5782.1	5976.0	14.922	1.2999	6	0.9717
Strict	22	5775.5	5947.9	20.341	5.4186	6	0.4913

The reported model was characterized by good fit indices: CFI = .995; TLI = .973; RMSEA = .035; SRMS = .023. As shown in Fig. 2, we found many significant direct effects. Especially interesting are the following: (1) the strong connection between agency and performance, showing that with rising perceived agency, people perceived stronger performance of the actor; and (2) the impact of perceived prejudice on the actor's agency in the case of female actors. Thus, as females were perceived as experiencing stronger prejudice in society, they were also perceived as less agentic. Furthermore, a set of significant indirect effects was present in the model. In the case of the male actor, there was a significant mediation between the participant's sex and performance through agency (β = −.108; p = .044). For the female actor, there was significant mediation between perceived prejudice against females and performance through agency (β = .168; p = .004) and between the participant's sex and performance through agency (β = −.123; p = .037). Therefore, it was the females who rated the actor's agency, regardless of sex, as lower and thus rated their performance as lower.

5. Study 2

5.1. Participants and procedure

Study 2 employed a 2 × 2 × 2 between-subjects experimental design, to explore the variables of actors' sex (female vs. male), their success (failure vs. success), and participants' sex (female vs. male). Participants were recruited from three platforms: *Prolific* (84 participants), *Ariadna* (214 participants), and *Reddit* (40 participants), accommodating varied funding sources. Variance analysis confirmed homogeneous variances for the dependent variables (actor's performance: F = .39, p = .67; actor's agency: F = 00, p = .95), enabling dataset merging. The participant pool comprised 338 individuals (155 females) aged from 16 to 69 years old (M = 35.31, SD = 14.04). This sample size surpassed the initial *G*Power* estimates, which suggested 240 participants for detecting a moderate effect size f = .25 (α = .05, Power = .8) across eight groups. Detailed sample descriptions are in Table 1.

We excluded 58 participants: 51 for completing the questionnaire in under 4 min, raising validity concerns; 5 for exceeding a 30-min completion time; 1 underage participant; and 1 outlier aged 98. The drop-out rates were minimal. The setup mirrored Study 1, except for the experimental manipulation which entailed narrative vignettes about an esports athlete, either a female or a male, experiencing success or failure in a gaming tournament and the journey leading to it. Sex was indicated through the use of names and pronouns. Each athlete was portrayed as a real individual with a simplified, anonymized background, as illustrated below:

> Anna [Adam] has been playing esports professionally for 5 years now, taking part in numerous tournaments. The game she [he] plays is a one-on-one (1vs1) game that requires various cognitive abilities and constant training to play as well as possible. She [He] had some minor victories along the way and she lost a few tournaments, never really paying much attention to winning or losing. This time was different, as she [He] decided to practice even harder and try her [his] best at an important international tournament that many top players attended. For a few months, Anna [Adam] played for 8 h a day, studied different techniques, watched others play, and learned new game-related skills. She [He] has qualified for the finals and managed to reach the top 3 of best players in this tournament [She/He did not qualify for the finals].

5.2. Results and analyses

A 2 × 2 × 2 MANCOVA was conducted, akin to Study 1, with the actor's perceived performance and agency as dependent variables. The independent variables included the actor's sex, their success, and the participant's sex. Covariates were the participant's age, perceived sex-related prejudice, and gaming frequency. Due to a violation of the multivariate normality assumption (K-S test < .05), Box–Cox transformations and bootstrapping (1000 samples) were applied to ensure

Table 7
Descriptive statistics for Study 2.

Participant's sex	Game played	Female actor					Male actor				
		N	M	SD	95% CI		N	M	SD	95% CI	
Actor's performance											
F	LoL	28	5.07	1.12	[4.63,	5.47]	31	4.91	0.97	[4.56,	5.24]
F	CSGO	30	5.15	0.90	[4.82,	5.47]	37	4.94	0.91	[4.64,	5.22]
F	Overall	58	5.11	1.00	[4.85,	5.36]	68	4.93	0.93	[4.70,	5.13]
M	LoL	33	5.33	0.92	[5.03,	5.68]	38	5.62	0.92	[5.34,	5.91]
M	CSGO	32	5.73	0.89	[5.41,	6.02]	38	5.57	0.75	[5.34,	5.81]
M	Overall	65	5.53	0.92	[5.31,	5.74]	76	5.59	0.84	[5.41,	5.77]
Overall	LoL	61	5.21	1.02	[4.95,	5.46]	69	5.30	1.00	[5.07,	5.54]
Overall	CSGO	62	5.45	0.93	[5.23,	5.68]	75	5.26	0.89	[5.06,	5.46]
Overall	Overall	123	5.33	0.98	[5.17,	5.50]	144	5.28	0.94	[5.12,	5.43]
Actor's agency											
F	LoL	28	4.72	1.01	[4.31,	5.06]	31	4.78	0.84	[4.49,	5.09]
F	CSGO	30	4.92	0.73	[4.64,	5.16]	37	4.75	1.10	[4.33,	5.09]
F	Overall	58	4.82	0.87	[4.57,	5.03]	68	4.76	0.98	[4.50,	4.98]
M	LoL	33	4.98	0.77	[4.71,	5.23]	38	5.05	0.99	[4.72,	5.34]
M	CSGO	32	5.29	0.85	[5.02,	5.56]	38	4.95	0.84	[4.68,	5.22]
M	Overall	65	5.13	0.82	[4.93,	5.34]	76	5.00	0.91	[4.78,	5.21]
Overall	LoL	61	4.86	0.89	[4.63,	5.07]	69	4.93	0.92	[4.70,	5.12]
Overall	CSGO	62	5.11	0.81	[4.91,	5.31]	75	4.85	0.98	[4.60,	5.07]
Overall	Overall	123	4.99	0.86	[4.82,	5.13]	144	4.89	0.95	[4.72,	5.04]

Table 8
MANVOCA model for Study 2.

Variable	Dependent variable	Trace	F	df	p	Partial η^2
Actor's sex × Success × Participant's sex						
Corrected model	Actor's performance		4.325	10/256	<.001	.145
	Actor's agency		1.718	10/256	.077	.063
Perceived sex-related prejudice	Actor's performance	.012	2.948	1/256	.087	.011
	Actor's agency	.012	1.491	1/256	.223	.006
Age	Actor's performance	.004	.403	1/256	.526	.002
	Actor's agency	.004	.993	1/256	.320	.004
Gaming frequency	Actor's performance	.040	10.602	1/256	.001	.040
	Actor's agency	.040	2.357	1/256	.126	.009
Actor's sex	Actor's performance	.004	.927	1/256	.336	.004
	Actor's agency	.004	.175	1/256	.676	.001
Actor's success	Actor's performance	.062	16.811	1/256	<.001	.062
	Actor's agency	.062	4.921	1/256	.027	.019
Participant's sex	Actor's performance	.002	.328	1/256	.567	.001
	Actor's agency	.002	.017	1/256	.896	.000
Actor's sex × Actor's success	Actor's performance	.006	1.339	1/256	.248	.005
	Actor's agency	.006	.006	1/256	.937	.000
Actor's sex × Participant's sex	Actor's performance	.015	1.903	1/256	.169	.007
	Actor's agency	.015	3.480	1/256	.063	.013
Actor's success × Participant's sex	Actor's performance	.001	.002	1/256	.967	.000
	Actor's agency	.001	.160	1/256	.690	.001
Actor's sex × Actor's success × Participant's sex	Actor's performance	.008	1.516	1/256	.219	.006
	Actor's agency	.008	1.319	1/256	.252	.005

robust significance testing. All variables were standardized. Homogeneity of variance was achieved (Box's M = 14.99; p = .842; Levene's F (performance: F = .137; p = .995; agency: F = .754; p = .626). Descriptive statistics, including untransformed means, standard deviations, and their corresponding 95% CIs, were calculated using ANCOVA and are presented in Table 7. As in Study 1, a single-item measure for perceived sex-related prejudice was employed, while the scales measuring the actor's performance and agency were shortened after a factor analysis. Factor loadings are presented in Table 2. As in Study 1, Levene's test was conducted to test for homogeneity between participants playing and not playing video games (actor's performance: $F = .434$, $p = .510$; actor's agency: $F = 3.203$, $p = .075$), allowing for further analyses.

As shown in Table 8, there was a significant effect of the actor's success on performance ($F(1, 256) = 16.811$, $p < 0.001$, $\eta^2 = 0.062$) and agency ($F(1, 256) = 4.921$, $p = 0.027$, $\eta^2 = 0.019$) ratings. Furthermore, there was a significant positive effect of gaming frequency on performance ratings ($F(1, 256) = 10.602$, $p = 0.001$, $\eta^2 = 0.040$). Perceived sex-related prejudice was not significant in this study, only exhibiting a tendency toward significance. There were no significant interaction effects.

To further explore the relationships between the variables, similar to Study 1, we developed a multi-group path model, with an identical specification—the only difference being the type of game played was altered to the level of the actor's success. We achieved metric invariance, thus the specified groups were comparable (Table 6). The model is presented in Fig. 3.

The model was characterized by good fit indices: CFI = .979; TLI = .911; RMSEA = .052; SRMS = .036. We found several significant direct effects, with the most interesting being: (1) the effect of the actor's agency, regardless of the actor's sex, on performance and (2) the effect of perceived prejudice on the actor's agency in the case of a female actor. Additionally, for the male actor, there were no significant indirect effects. For the female actor, the following significant mediations were observed: (1) age – gaming frequency – performance ($\beta = -.081$, $p = .016$); (2) participant's sex – gaming frequency – performance ($\beta = .074$, $p = .024$); (3) perceived prejudice – agency – performance ($\beta = .080$, $p = .038$); (4) gaming frequency – agency – performance ($\beta = .084$, $p = .046$).

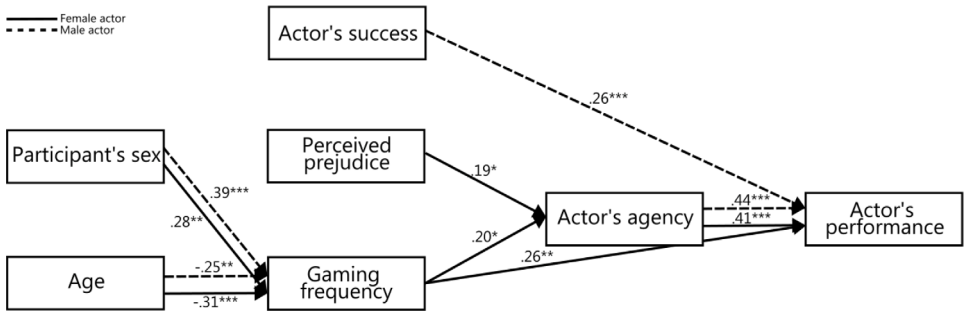

Fig. 3. Model with significant paths for Study 2.

6. Discussion

The findings from the two experiments suggest that several factors influence the attributions of performance and agency among esports players: perceived sex-related prejudices, the observer's sex, the game played, the level of success achieved by the player, and the observer's gaming frequency. These factors manifest differently based on the player's sex, albeit inconsistently across the studies. Moreover, there appears to be a mediation effect between perceived sex-related prejudice and performance through agency — an effect that was replicated in both studies when rating the performance of the female actor.

It should first be noted that the MANCOVA analyses across both studies did not indicate any significant interaction effects, and the main effects identified were rather limited. However, the path models, by further exploring the relationships between the variables used and by introducing sex-specific versions of the perceived sex-related prejudice variable (i.e., to what extent the participants believed that society is prejudiced toward females or males), allowed us to identify a few interesting effects.

Female participants generally believed that society is more prejudiced toward females compared to male participants. When we specified the path model, which considered agency as a predictor of performance, it became especially evident that in the case of the female actor, regardless of the sex of the rater, perceived sex-related prejudice affected perceptions of agency and thus the performance of this actor. This might indicate that those who are aware of the prejudiced views of females held by society, or believe that such views are common, expect females to be less agentic, which leads to lowered ratings of performance. As such, we have partially confirmed H1 and H3.2 — the belief that society is prejudiced toward a specific sex was a significant predictor of agency, not of performance, and only in the case of the female actor. However, agency did mediate the relationship between perceived sex-related prejudice and performance.

Contrary to our expectations, participants did not rate the performance and agency of males as higher compared to females. Although the descriptive statistics seemed to indicate a trend in the predicted direction, these were too inconsistent, and no significant effects were present to claim that H2.1 and H2.2 were confirmed. It should be noted that this trend indicated that females were harsher evaluators of both agency and performance, regardless of the actor's sex. We did, however, partially confirm H3.1—there was a significant mediation effect, showing that, regardless of the actor's sex, females tended to rate agency, and thus performance, as lower. As such, agency mediated the relationship between the rater's sex and performance. This effect was not present in Study 2; therefore, we have confirmed this hypothesis only partially.

Additionally, although it was not included in the original hypotheses, the second study showed that when the effectiveness of performance was an explicit success or failure, the perceived outcome (success vs. failure) became significant, particularly for the agency of the male player. This suggests that as participants gain more gaming experience, they develop greater respect for other players' efforts.

6.1. Theoretical implications

Our results relate to previous findings on sex differences, which have shown that, on average, males perceive themselves as more agentic, while females view themselves as more communal (Cuddy et al., 2008; Guimond et al., 2006). Given this, society often associates agency and high performance more with males than with females, particularly in stereotypically masculine domains such as STEM, sports, physical labor, and, more recently, video games (Blackburn, 2017; Gentile et al., 2018; Kaye & Pennington, 2016; Reuben et al., 2014). Previous studies show that females entering male-dominated domains frequently encounter skepticism about their competencies, prejudice, or even marginalization, especially from males (Kuchynka et al., 2018; Madden et al., 2021; Taylor, 2012). However, the findings from the two empirical studies presented in this work suggest that, in esports contexts, females may receive the most severe criticism of their skills and agency from other females, rather than from males. Conversely, prior work has shown that males face similar challenges when entering stereotypically feminine domains (Balachandra et al., 2019; Bosson et al., 2006). Since video gaming is not a monolithic activity but rather a collection of various games (some of which might be female-dominated, as seen in Laato et al. (2022), where a significant majority of players in the study on *Pokémon GO* were female), it is possible that in certain video gaming contexts, male players can also face negative attitudes.

The presence of sex-related prejudices in the broader social context can also create a spiraling effect, reinforcing these prejudices. When one's abilities in a given domain are questioned often enough, their motivation and confidence might become eroded, diminishing their self-concept related to that particular domain (Bonnot & Croizet, 2007). Such a self-concept is crucial for personal development and for the perception of one's performance and abilities. This perception, of course, not only stems from social factors but also from sources directly related to one's achievements (Joët et al., 2011; Lunenburg, 2011). This was evidenced to some extent in our second study, where actual success influenced the perception of a person's capabilities, reflected in their agency. In a domain such as competitive video gaming, where results are paramount, it may be possible for players to challenge sex stereotypes through consistent game outcomes. However, our findings show that an additional hurdle for female success is posed by other females, who are critical of members of their own sex in traditionally masculine domains. While we did not explicitly test how this belief affected self-concept, we found that females judged female players more critically. This observation aligns with previous studies (e.g., Calogero and Jost (2011) and Laurin et al. (2011)) and builds upon them, suggesting that perceptions of prejudice against females may be more prevalent among females than males. Although our empirical study does not offer insights into why this is the case, previous research suggests that females who are aware of the prejudiced views of females in society might internalize such views and evaluate themselves and other females through this stereotype, leading them to undermine their fellow female players' gaming performance in competitive scenarios. Interestingly, it

is likely that this relationship is mediated by agency, meaning that perceived sex-related prejudices might not affect performance attributions directly.

In contexts where success is ambiguous or hard to define, the role of the previously mentioned stereotypical perceptions might come into play more strongly. We posit that our results may be explained by the phenomenon of negative stereotype internalization—a process where individuals adopt society's negative stereotypical views into their self-concept (Bonnot & Croizet, 2007). Over time, persistent negative stereotypes can sway an individual's beliefs about their group's capabilities and, subsequently, their own. For example, when a female is frequently confronted with perceptions of lesser effectiveness among females in gaming, she might eventually believe that females are not good at gaming, and finally, that she herself is not good at it, or that she even lacks the potential to be good at it Maass et al. (2008). This is echoed in studies like those by Madden et al. (2021) or Kim (2017), where female participants indicated that females are, on average, less skilled at esports than males. For instance, one female participant in Madden et al.'s study said, "overall, men react faster than women, which makes them mechanically better at games than women". Neurological research has shown that despite the mean IQ of males and females being the same, there might be some differences in cognitive functioning between the two biological sexes (Bell et al., 2006; Weiss et al., 2003), whereby males perform better in some tasks and females in others (Downing et al., 2008). Despite these studies, beliefs about females' inferiority in skills related to esports remain largely unsubstantiated. Hence, such beliefs originate from experiences and an environment that remains biased against females and are therefore unfair.

Previous research on stereotype threat has shown that females who believe in the stereotype that females perform worse in STEM-related tasks (especially in mathematics and spatial tasks) tend to be affected by this belief and perform worse when presented with such tasks (Bonnot & Croizet, 2007; Cadaret et al., 2017; Chang et al., 2019). Maass et al. (2008) show that, in the context of chess, when the sex of the player is undisclosed, there are no significant performance differences between sexes. However, when females become aware that they are playing against males, their performance drops. This effect also occurs in the domain of video games (Kaye & Pennington, 2016). Nevertheless, if the stereotype is somehow negated, shown to be untrue, or if, as demonstrated in the classical study by Steele and Aronson (1995), the situation is framed so as not to activate the stereotype, its destructive effect can be, at least to some extent, alleviated. Given the context of video gaming, where females are well aware of the negative perceptions toward their gender, it is imperative to address the root of the problem.

6.2. Practical implications

Efforts to foster positive intergroup relations between males and females in esports and video games, such as increasing representation and enhancing the visibility of females (as initiatives like AnyKey do), are commendable for promoting and upholding equality (Allport et al., 1954). However, these efforts might not be sufficient to tackle negative perceptions arising primarily from intragroup dynamics. The broader challenge, it seems, lies in addressing the deeper sociological roots of these perceptions, which transcend the confines of esports and video games. One promising strategy, as proposed by some studies, involves encouraging female gamers to identify more with a non-stigmatized gaming identity during play (Kaye & Pennington, 2016). While this may sound difficult, it essentially means thinking of oneself as a member of the wider gaming community or a specific team, rather than focusing on one's sex. However, it should be noted that if one is reminded of being a member of a stigmatized group, stereotype threat could potentially arise.

Another option is to challenge prejudiced beliefs about females by demonstrating through objective performance that sex-related stereotypes are incorrect. For example, in the context of chess, the Hungarian Grandmaster Judit Polgar is cited as critical evidence of the capabilities of female players and has served as an inspiration and role model for many (Maass et al., 2008). Throughout the esports literature, authors have suggested that creating role models, such as Judit Polgar in chess, might be crucial for developing future players among those who are stigmatized (Kim, 2017; Madden et al., 2021). However, this is a challenging task, as assuming the role of a role model can be particularly burdensome. Being under constant scrutiny, dealing with performance pressure, and bearing the responsibility of representing a large group can easily lead to negative outcomes (Cullen, 2018). Moreover, given that, in the context of esports, performance is likely tied to one's identity, simply providing information contrary to the prevailing consensus might not be enough to motivate change, as many critiques of the information deficit model suggest (Simis et al., 2016).

Some researchers suggest that the continued internalization of negative stereotypes by both females and males might stem from a desire, not necessarily conscious, to maintain the current status quo (Calogero & Jost, 2011; Laurin et al., 2011). If individuals' self-perceptions align with societal views—driven by a need to justify the existing system—such perceptions could reinforce behaviors that legitimize this system (Jost & Hamilton, 2005; Laurin et al., 2011). Those more inclined to validate the system might perpetuate these stereotypes through self-stereotyping, thereby allowing for the exclusion of females from stereotypically male spaces (Jost & Hamilton, 2005; Laurin et al., 2011). Hence, society may amplify, perhaps initially small, biological sex differences, leading to a more dramatic disparity in competitive esports than what might be expected based solely on biological differences.

6.3. Limitations and future work

This study is not without limitations. First, it is likely that some of the variables utilized may mediate the relationship between performance attributions and the actor's sex, and our two studies did not test for this. Second, while the current actors represent broader social groups of white and European individuals, they might not allow us to capture the universal complexity of the issue. Thus, if the cultural context of the actors or participants were different, it is likely that the measured perceptions would vary. Future studies should consider employing actors from diverse ethnic and cultural backgrounds and include a broader range of participants.

Third, due to the design, we included only individuals who identify as male or female; thus, we did not engage with the scholarly corpus on more diverse representation. We encourage future research to explore the lived experiences of those identifying as non-binary and how they are perceived by others. Additionally, future studies might modify the experimental manipulation by including different stream elements, such as the comments section, the streamer's profile, or other personal characteristics, such as voice. In the current study, we opted not to include voice as a stream element, as it could introduce additional confounding factors affecting the image of the player, such as attractiveness or dominance (Hodges-Simeon et al., 2010).

Fourth, we did not assess the objective level of performance in the videos. Although the videos were recorded by the same person, his skill level might have varied between games, or specific in-game conditions might have influenced the level of objective performance, which could affect evaluations. Further on the game types being recorded, while FPS and MOBA genres are among the most popular PC gaming genres, they are also notably male-dominated. For example, according to a report from 2023, 66% of FPS game players in the U.S. are male,[1] and in MOBA games, the proportion of female players is even lower, with about 5%–20% reportedly being female (Kordyaka et al., 2023). Therefore, we encourage future researchers to explore other competitive esports games, particularly those that are more female-dominated.

[1] https://www.statista.com/statistics/1129301/shooter-gamers-gender/ visited on April 30, 2024

Fifth, factor analysis revealed that not all items were included in the final scales, indicating that modifications to the measures, namely the CSES and PAQ, might have impacted their reliability and validity. This issue is particularly relevant for the agency measure. Although we use the term "agency" throughout this manuscript, the construct we have measured may not precisely align with traditional definitions of agency, given the converging results of factor analyses in both studies. Indeed, the PAQ assessed agentic/communal traits within the video gaming context of this study from a particular vantage point, that reflects the competitiveness or a similar aspect, given the inclusion of the following traits: "independent", "competitive", "self-confident", and "can make decisions easily". However, these traits do not solely define agency. We, therefore, propose that within the gaming domain, constructs of masculinity and agency might diverge from their traditional "real-world" definitions (Taylor, 2012). We encourage future researchers to use alternative measures for agency and replicate our findings with these measures in different contexts.

Finally, both of our studies were based on data collected at a single point in time. We encourage future researchers to adopt longitudinal data collection processes to examine how prejudices evolve over time and to consider not only societal prejudices but also those held by individuals. Additionally, we support experimental interventions where sex-related stereotypes in competitive online gaming are intentionally dismantled to study their effects on players' perceptions.

7. Conclusion

There is a disparity in competitive online multiplayer games and esports, where females are underrepresented at both casual and competitive levels. Past work suggests that sex-related prejudices against female players result in expectations for females to fill supportive roles and exhibit lower levels of skill and agency (Kim, 2017), paralleling other male-dominated fields (Eagly & Karau, 2002; Ellemers, 2018). In this study, we explored sex differences through two experiments. The results indicated that females were harsher in their ratings toward other females and, generally, toward gamers. These results can be explained through concepts of negative stereotype internalization and stereotype threat. Females who are regularly exposed to prejudiced perceptions may adopt these beliefs into their self-concept, regardless of whether the stereotypes originate from video games or a broader social context. This distorted self-view contributes to more negative attributions regarding agency and performance, potentially decreasing female players' performance in competitive settings. We suggest that this issue transcends the realm of esports and video games and is rooted in broader societal understandings of sex roles. While addressing such an issue on a large scale may be challenging, increasing representation or altering roles within competitive gaming could be a good starting point.

CRediT authorship contribution statement

Radosław Trepanowski: Writing – review & editing, Writing – original draft, Validation, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Samuli Laato:** Writing – review & editing, Writing – original draft, Conceptualization. **Dariusz Drążkowski:** Writing – original draft, Funding acquisition. **Juho Hamari:** Writing – original draft, Supervision. **Zuzanna Kopeć:** Writing – original draft, Resources, Investigation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

We have provided an Open Science Framework link in the manuscript to which data will be uploaded.

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