Understanding Gaming Perceptions and Experiences in a Women's College Community

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ABSTRACT
Recent trends in gaming diversification have shown that women are both an increasingly significant pool of consumers and game producers, and regular victims of misogynistic harassment. Such observations stress the importance of investigating the complex relationships of women and gaming. In this paper, we draw upon perspectives from Feminist HCI to extend the current knowledge of issues in gaming that are specific to women. We present results from a mixed-methods study with 327 participants who are students and alumnae of a women's college. Our findings shed light on the complex relationships of women with games, with other gamers, and with gaming culture and industry. The results also indicate that in some cases gender-related negative experiences of gaming have lasting impact on the participation and self-confidence of young women. We conclude by discussing the implications of our findings for the design of games, game development education, and for the study of gaming.

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Feminism, Gender, Video Games

INTRODUCTION
While the gaming community has, for many years, been assumed to consist of primarily young men, recent developments suggest a significant shift underway. In fact, the most up-to-date survey by the industry's largest trade group, the Entertainment Software Association, shows that 41% of the game-playing population are female, and that women age 18 or older now represent a significantly greater portion of the game-playing population (31%) than boys age 18 or younger (17%) [43]. Examining the actual composition of the game-playing population suggests that we need to further our understanding of who is a gamer as well as to broaden the composition of subject pools in our studies of gamers.

Recent efforts of some women, men, and transgender individuals to have greater representation and diversity in gaming show that gaming is no longer a boys' "club house" [64]. Such a shift, however, is not taking place without resistance. Consider "GamerGate", an organized action targeting the media critic Anita Sarkeesian and the game developer Zoe Quinn, among others, for their critiques of misogynistic representations and behavior in the broader gaming community [14, 28, 72, 83]. While those participating in GamerGate argued that their aim was to protect "ethics" in videogame journalism, their actions evinced an anti-feminist stance.

The most recent developer surveys show a gaming industry dominated by men, with only 22% of game developers identifying as female and only 2% as transgender or non-binary. Diversity in sexual orientation, race, and ethnicity in the mainstream industry is similarly low [43]. However, new alternative platforms, such as Twine, are gaining popularity with female and transgender gaming communities, enabling new types of narratives to be explored with minimal capital and technical investment [1, 52, 66, 67].

Consequently, gaming is emerging as a significant site for expanding our understanding of the intersections of gender and technology. After all, it is often through games that girls and young women today have some of their first encounters with technology [48]. Early experiences with games inform not only how young women participate in games and gaming culture, but also how they view their own potential role within this field. However, while literature on the subject of women and games often focuses on issues of representation, gaming research is primarily done on mixed subject or male dominated subject pools [19, 49, 76, 78]. Thus, we know very little about the gaming behavior, perceptions, and experiences of women. Moreover, we have limited understanding of how young women envision themselves as part of this male-dominated field and perceive a potential career in games.

The GamerGate controversy has certainly highlighted the rampant sexism, misogyny, and physical threats that women and transgender individuals face when playing games or discussing representation in games [7, 54, 68]. While the importance of these observations cannot be understated, we believe that the gaming experiences of women cannot be reduced to the perva-

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sive misogyny that some gamers face. We are thus interested in exploring the complicated relationships women have with gaming in general, gaming with others, and the gaming industry as a whole.

In this paper, we present results from a study with a sample of 327 students and alumnae of a women's college that contributes to extending the knowledge about young women's perceptions and experiences of gaming, gaming culture and the gaming industry. We examine participants' experiences with same- and mixed-gender players, their motivation for gaming, their experiences (or not) of harassment, and their perception of careers in game development. We triangulate these experiences through the lenses of their self-professed engagement with gaming, their major, as well as their (self-reported) race and ethnicity. Our results show that the experiences of the participants in our sample are incredibly complex, unable to be simply categorized in gendered fashion. We also find evidence that in some cases online harassment and toxicity have long-term impact on the participation and confidence of young women in online gaming, and on their view of their own potential role within this growing industry. At the same time, we found that positive experiences could help women to persist, participate, and develop a sense of belonging to gaming culture and communities.

We begin by exploring why the context of a women's college should be of interest to the broader CHI community. We then explore related work and describe our study methodology and our quantitative and qualitative results. We conclude by outlining how these results inform game design, game development education, as well as further studies of games.

Studying a Women's College Community

Our work draws upon and contributes to recent activities of Gender and Feminist HCI [2, 3, 4, 6, 39, 57, 71] as well as to broader currents of feminist science and technology studies [36, 37, 38, 82]. In particular, we draw on Sandra Harding's elaboration of "standpoint epistemology" for science and technological fields, which emphasizes the importance of moving away from an "essentialized" standpoint of marginalized groups [38]. Instead of assuming that there is a singular women's experience of gaming, as implied by the GamerGate reports, we seek to understand the diversity of perspectives within the varied standpoints of women. This allows us to counter essentialized views of women's experiences in gaming and of a particularly "feminine" way of playing.

Our choice to study gaming behaviors, attitudes, and experiences at a women's college was influenced by our observation that, on the heels of GamerGate reporting, more attention is being given to women-only spaces in computer science and in technology more broadly. These include women-only hackathons, hackerspaces, and groups such as FemTechNet [29, 32, 60], which were created to foster the participation of women in gaming and computing. A women's college is another example of such a space, where gender issues and participation of women in computing and media are paramount.

A women's college is therefore a prime site for applying HCI feminist methodology [3], which emphasizes an empathic relationship with research participants, co-construction of the research activities and goals, and self disclosure of researchers' perspectives. Two of the authors teach in a women's college where discussions inside and outside of class often examine gender representation and participation in depth. Another author teaches a course on game design from a feminist art history perspective. The goals of this study and the research questions explored were co-constructed with students of a women's college who participated in a course and research group about games. We approached these research questions from a feminist perspective, arguing for considering not only the experiences of women playing games but also their perceptions and aspirations of developing games. The fourth author is an alumna who participated in the research group.

A women's college is, of course, not representative of society or women as a whole. However, studying this population provides several advantages to HCI researchers seeking to understand the relationship of women and gaming in detail. First, a women's college environment reduces stereotypes about women in computing and STEM [51], increasing the likelihood of student engagement in activities that are traditionally considered masculine. In addition, women's colleges currently enroll a more racially and ethnically diverse population of students than other liberal arts colleges [73]. As such, only 45.4% of our study participants identify themselves as White. Thus, while our sample is not representative of the general population, it does provide a more diverse data set than in many previous studies, which enables us to investigate not only gender and gaming but also racialized aspects of gaming. Finally, while existing studies are often confined to a particular game, set of games, or self-contained gaming community, ours is not limited by these boundaries, but instead represents a condensed cross-section of a women's college community in gaming culture. As such, we can investigate diversity of experiences in gaming.

RELATED WORK

Partly as a result of GamerGate, and partly as a result of shifts in gaming more broadly, there has been a growing body of work on the intersection of gaming and gender, perhaps most easily indexed in the popular media by a syllabus on "Gaming and Feminism" produced by *The New Inquiry*, an online publication devoted to critical analyses of contemporary culture [62]. As a result, it is impossible to cite all of the relevant and important work in this area. Rather, we focus mostly on work that directly intersects with HCI and the immediate concerns of this paper.

The intersection of gender and gaming has been of wide interest to computing scholars since the landmark *From Barbie to Mortal Kombat: Gender and Computer Games*, a text that has been recently updated in *Beyond Barbie and Mortal Kombat: New Perspectives on Gender and Gaming* [13, 49]. A sampling of recent works examines modding communities in The Sims 2 [85], intimacy in World of Warcraft [63], marriage in the online game Audition [33] and gaming motivation in the "pink game" GoSupermodel [81]. The latter study is illustrative of what has become a common critique against these "pink games", namely that they reify assumptions regarding

gender, suggesting that women gamers are "naturally" drawn to certain types of games [78]. Other researchers have suggested that any future research on women and games needs to take this realization into account, arguing that the task is to "find out how to identify differences in game play without naturalizing them into an underlying truth of gender" [45, pg. 176], while drawing upon salient allied research in theories of gender, queerness, and postcoloniality [44]. Also important is the need to recognize that who is and who is not considered a "gamer" is open to question, as playing games intersects with many other identities and varies in different social contexts [75].

Research also shows that gaming is at time most inhospitable for women [31, 40, 46]. Conformance with masculine norms and higher scores on social dominance scales predicted higher scores on a video game sexism scale [30]. Harassment is not limited to female gamers, as female-passing chatbots experienced more sexual language and more sexist stereotypes directed at them than male-passing chatbots [10]. Online harassment, and in particular of young women, is also prevalent beyond games [26].

Finally, the intersection of computer science and gaming—game development—is also often inhospitable to women [17, 77]. While the composition of game players in terms of gender and race has changed dramatically over the past decade, approaching parity with the wider population, the composition of game developers has not [43, 74]. More broadly, women remain underrepresented within the world of computer science and programming due to a number of issues, including pre-existing biases, implicit sexism, and lack of support, even if the situation is much improved compared to the days of women as literal computers [21, 57, 67]. Women have been shown to still parrot these negative stereotypes [15], and continue to leave computing in greater numbers than men [59, 65, 70]. Yet, encouragement by family members and friends combatting some of these stereotypes was found to be an important factor in girls' decisions to take computer programming classes in high school [5]. This potentially carries over to gaming. While there is equivocal evidence as to whether or not an interest in gaming is correlated with an interest in computer science [25], it has been found that storytelling activities, in the context of game development, can encourage middle school girls to become interested in programming [50].

STUDY

Goals and Research Questions

The goal of our study is to examine the gaming experiences and attitudes of members of a women's college community. We seek to unpack the experiences of women with games and to examine assumptions of who is a gamer, what is the impact of gender and race on game playing, and how women perceive the qualities required for a career in game development. More specifically we seek to answer the following questions:

Q1: What are the gaming attitudes and habits of participants: how often do they play, what do they play, and why do they play?

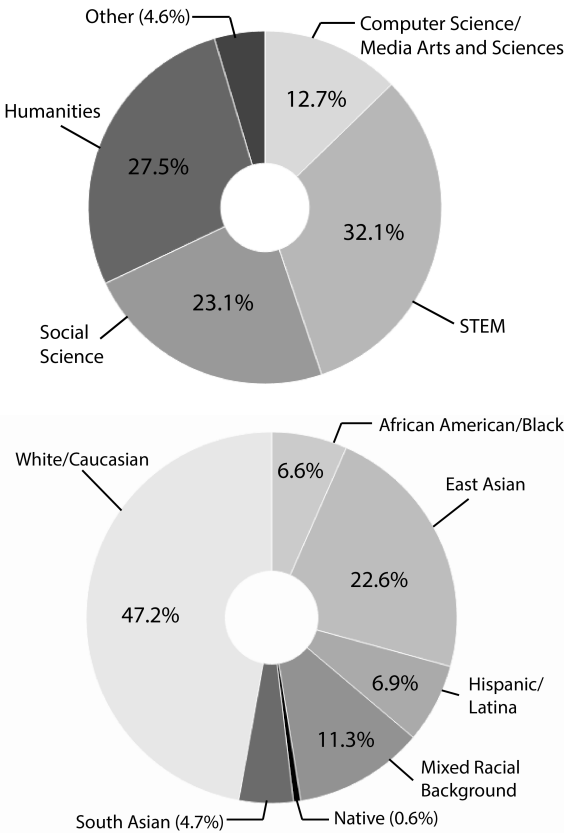

Figure 1: Participants by primary major (upper) and race/ethnicity (lower)

Q2: What are memorable experiences participants have had from playing with others (with same-gender players and with different-gender players)?

Q3: What (if any) negative experiences did participants have while playing that are related to their gender and what was the impact of such experiences?

Q4: What (if any) negative experiences did participants have from playing that are related to their race and ethnicity and what was the impact of such experiences?

Finally, Q5: How do participants perceive the qualities required for a game development career and do they envision themselves seeking opportunities in this field?

Methods

Participants

We recruited participants using online public mailing lists limited to students and alums of Wellesley College, a liberal arts college for women. The invitation read: "Take our survey on gaming behaviors and perceptions. Even if you only play a few games on your phone, your responses are important. . . ." Participation was voluntary and no compensation was given in exchange for participation, but all participants were offered a chance to win an Amazon Kindle device. 327 students and alumnae from the college completed this study. Of these,

313 participants self-identified as women, and 14 participants self-identified a gender other than male or female (e.g. genderqueer, genderfluid, non-binary). Of these 327 participants, the average age was 20.9 years old (SD=4.0), and 23.8% were alumnae. Our sample, while not representative of the general population, is representative of Wellesley College's population in terms of ethnic/racial and major diversity (Figure 1) [84].

Procedure

Participants completed an online questionnaire available only to the college community.

Questionnaire

The questionnaire was designed to collect both quantitative and qualitative data. It was comprised of the following measures and indicators:

Gaming habits were surveyed through multiple-choice questions about platforms used to play games, favorite genres, and time per week playing games. We also asked participants about what age did they start playing video games.

Attitude was assessed using the question *how important is gaming for you* (5-point Likert scale where 5 is very important).

Gaming motivation was assessed using the Gaming Motivation Scale (GAMS) [56]. We chose this scale because it is validated, multidimensional, and goes beyond online gaming. GAMS was designed to assess *intrinsic motivation*, four types of *extrinsic motivation*, as well as *amotivation*. Intrinsic motivation is the desire to perform an activity for itself [22, 23]: players who play because they enjoy exploring the game, improving their skills for the thrill of the game. Extrinsic motivation refers to engaging in an activity as a means to an end. GAMS identifies four types of extrinsic motivation including: *external regulation*, which refers to behavior regulated through external means such as rewards and competition; *introjected regulation*, which refers to regulation through internal pressures such as anxiety and guilt; *identified motivation*, where people engage in a behavior based on its perceived meaning or relation to personal goals; and *integrated regulation*, which entails engaging in an activity out of choice that is part of the person's sense of self [80]. Finally, amotivation refers to the relative absence of motivation either intrinsic or extrinsic.

Gender-related experiences were surveyed through open questions. We inquired whether and why a participant felt uncomfortable in online gaming because of their gender, whether a participant self reported a different gender in online games and why, and whether a participant ever received a gender related comment in online games and how were they impacted by such comments.

Similarly, race/ethnicity related experiences were surveyed through open questions. We inquired whether a participant felt uncomfortable in online gaming because of their race or ethnicity, whether a participant self-reported different race or ethnicity in online games, as well as whether a participant ever received race or ethnicity related comments and how they were impacted by such comments.

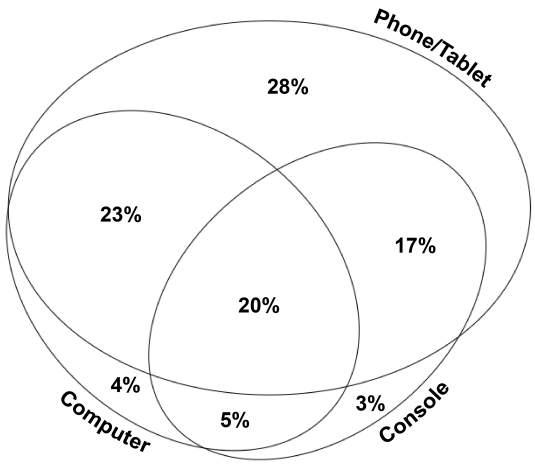

Figure 2: Venn diagram of percentage of participants per platform used.

Interaction with other players was studied by asking users to describe a memorable experience with a player of other gender, and another memorable experience with a player of the same gender.

Perceptions of career in gaming were investigated by quantifying how many participants have considered a career in gaming, and how many know a female game developer. We also asked participants to describe the skills they believe are required for a career in game development.

Data Analysis

We analyzed quantitative data using IBM SPSS Statistics, Version 22. All multiple choice responses were coded numerically and all mean comparison was done using independent samples t-tests. Responses to open questions averaged 26.2 (SD=23.3) words per answer per user. We analyzed the qualitative data using content analysis methods. First-level codes were developed from preliminary review of the data by two independent coders and were then collapsed into advanced categories based on frequency. Categories were analyzed for the identification of themes. Inter-coder reliability based on 100% of the data was good with 87% agreement.

RESULTS

Gaming Habits

On average, participants spend 5 to 10 hours a week playing games. The average age reported for starting to play digital games was 8.6 (SD=3.3). While 22% of the participants only play on their phone, 45% of the participants play on a console, and 51% play using a computer. The distribution of players per gaming platform is described in Figure 2. These results stand in contrast to an image long held that women are not interested in or are not actually playing computer games [78]. Many of our participants play puzzle games (34.3%), however, a significant portion are involved with role playing (13.8%),

Genre	Frequency
Puzzles	112 (34.3%)
Role Playing	45 (13.8%)
Strategy	25 (7.6%)
Adventure	24 (7.3%)
Simulation	18 (5.5%)
Trivia	16 (4.9%)
Word	15 (4.6%)
Action	14 (4.3%)
Independent	10 (3.1%)
Arcade	10 (3.1%)

Table 1: Favorite genre by number and percentage of participants

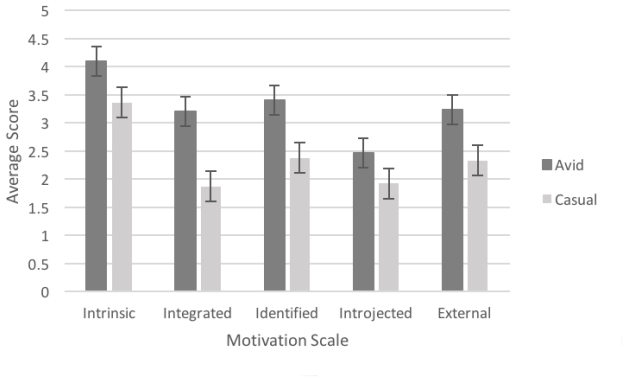

Figure 3: Average motivation scores for avid and casual gamers

strategy (7.6%), and adventure (7.3%) games. The top ten favorite genres reported are detailed in Table 1. These results differ from the notion that women are naturally drawn to casual and/or "pink" games [53, 69].

Gaming Attitude

19.3% (63/327) of participants responded "Important" or "Very Important" when asked "How important is gaming to you?" These participants reported significantly more time spent gaming than other participants, with 76% playing regularly more than 5 hours a week. They were less likely to play on their phone and more likely to play on a computer or a console. We thereby labeled them as avid gamers. The remaining 264 participants were classified as casual gamers [18, 47].

Motivation

Both avid and casual gamers reported higher levels of intrinsic motivation than extrinsic motivation—playing because they enjoy exploring and mastering the game. Avid gamers scored significantly higher on all five motivation scales than casual gamers using Bonferroni adjusted alpha levels of .01 per test ($p < .001$, see Figure 3). Notably, avid gamers reported moderate to high external and integrated motivation, which indicate competitive game orientation. Such competitive orientation is often overlooked as a motivating factor for women [78].

Time, Attitude, and Motivation

Time spent gaming, importance of gaming, and all five measures of motivation significantly correlated with each other for all participants ($p < .001$). The alpha coefficients for each motivation scales were as follows: intrinsic (.626), integrated (.890), identified (.829), introjected (.690), external (.771).

Gender and Gaming

Overall, 22.6% (74/327) of the participants reported that they received gender-related comments about or while gaming. Of the 178 participants who had visited an online game room 48% (85/178) reported feeling uncomfortable because of their gender. Participants who had received gender related comments were less likely to play on their phone for gaming and more likely to play on the computer or a console. Avid gamers reported more gender- and race-based comments than did their casual gamer counterparts, χ^2 (2, N = 327) = 11.82, p =.001.

Gender-related comments

To better understand the nature of gender-related comments, we analyzed participant open responses. We identified several core themes including: sexualized comments and slurs; comments about women's lack in skills; and division of value between boy and girl games, avatars, and characters. About 22% (16/74) reported sexualized comments. In the voice of one participant: "While I was in a public voicechat server, a random gamer who wasn't even playing with us joined the server and started saying sexual things to me after he heard my voice." Another participant reported "I've been called a whore, told to go make people sandwiches, I've been targeted during attacks (Call of Duty)." Many of these comments included unwelcomed invitations such as: "Someone asked to date me. They were persistent." Or, "My sister, then 13, and I offered to help a new player if he needed advice. He asked us if we were girls, and when we confirmed it, he asked for our phone numbers and generally was extremely abrasive."

23% of these participants (17/74) reported comments indicating that women lack in skills. For example, one participant described, "Boys make fun of me for being bad because I'm a girl, friends included." Another participant wrote, "People would act surprised if I played well because I was a girl. They'd act more humiliated as if it was a degrading thing to get beaten by a female." Participants also reported that when attempting to respond to comments they were often dismissed: "It was clearly based on the presumption that I was a less talented gamer due to my gender. It further was based on me being 'too sensitive' due to my response that his behavior was not OK."

18% (13/74) reported comments that expressed surprise that a gamer is a woman. In the words of one participant: "Whenever I use it [a microphone] people always ask if I'm a little boy or a girl. Often are shocked to hear I am a girl." Similarly, a console player shared: "When I connect my console to the Internet I can play with a wider community. Sometimes they notice that I have a more feminine voice. As a result, they either want to place me in a more defensible/safer position b/c they doubt my ability. Or they respond with surprise and then leave me alone after the initial realization that there is a girl on their team."

10.8% (8/74) described comments that highlight division of value between boy and girl games, avatars, or characters. For example, "I make a point of avoiding situations and groups that aren't pointedly female-friendly to avoid gender-related comments, but when I do get these comments, it's often just to tell me that my interests even within open-ended games (like Skyrim or MMOs, or even girlier sims like Animal Crossing or Harvest Moon) are 'frilly' or 'girly' in the sense that they are not the intended experience of games, and that I am somehow playing them all wrong." Finally, 10.8% (8/74) reported targeted attack that excluded them from a game: "I used pink spray paint to play counter strike and got called out for likely being female, when I responded that I was booted out."

Impact of gender-related comments

Of the 74 participants who received some sort of gender-related negative comments, 53% (39/74) reported that these comments affected their attitude toward gaming negatively. Avid gamers received significantly more gender related comments and were more likely to report losing interest in online gaming based on a gender related comment. From analyzing participant open responses, we identified several themes of negative impact including: negative perception of gaming culture, losing interest or avoiding online gaming, losing interest in a game-related career, loss of confidence, and hesitancy to show gender. Many participant comments integrated more than one theme.

Sharing their perception of gaming, participants expressed their frustration and sense of being excluded from the community (13/74). One participant wrote: "I'm frustrated sometimes because ideally I would feel like participating more in the greater community if it wasn't full of racist, sexist dudebro who make me feel unwanted and/or unsafe. I also sometimes feel like I need to hide the fact that I play videogames because it is something gross."

Participants also described losing interest or avoiding online gaming (25/74): "I have found certain games that allow me to play as a woman without prejudice, ie I never got serious about multiplayer online games but instead started playing simulation games in single player mode."

Participants also described losing interest in pursuing a career in gaming (4/74): "When I was younger, I thought it would be interesting to go into game design. I now refuse to enter that field due to the misogyny and unsafe environment for women that exists." Another participants described: "I grew up playing video games. By the time I was truly considering career options, this thought was long gone, mostly due to the sexism that exists in game development."

In several cases participants described sensitivity to gender related judgment, internalization of stereotypes, and lose of confidence (5/74). In the words of one participant: "I stopped playing regularly because I should do more feminine things. I have constant guilt for getting a game console, and also regret for not playing." Another participant shared: "I'm afraid to play because of my lack of skill in games I enjoy."

Finally, participants described changing their behavior and hiding their identity in online gaming (6/74). One participant described: "I'm always so paranoid and uncomfortable when I meet a male gamer for the first time, even if my friends are there. I usually never join voicechat-required games without a good friend with me."

Taken together, these findings indicate that gender-related comments in online gaming do have a significant negative impact that in some cases results in alienating women from gaming, gaming culture, and industry.

Self-reporting gender

Previous studies found that players take advantage of the freedom for making avatar choices in virtual worlds to recreate their gendered identities and to explore human relationships mediated by these sociotechnical systems [11, 33, 42]. We sought to investigate socio-cultural contexts that cause players to self-report a different gender in online games. Gender reporting is not always consistent with avatar choice.

12% (38/327) of all participants shared that they self-reported a different gender in online games. From participant responses, we identified several reasons for self reporting a different gender, including: to be treated with respect; to not being scrutinized for own abilities; to blend in; dissatisfaction with female characters; for fun, new experiences, or as a social experiment; because of gender fluidity; and for privacy. Many participants refer to more than one of these reasons in their response.

Some participants emphasized hostility towards women. For example, "Super toxic communities. It was easier to be mistaken as a teenage boy undergoing puberty than a female." Similarly, "On games such as Call of Duty, male players seem to target and seek out female players on occasion more than other players." Other participants sought to avoid unfair scrutiny and judgment: "You don't get judged as harshly for the same level of skill."

Participants also expressed dissatisfaction with female characters, the economy surrounding female characters, and with how female characters are treated by other players. In the words of one participant: "The male characters have more clothes and people treat them with more respect. I always worry that when I start a new game like when I joined WoW that people would be more judgmental if I identified as a girl." Another player describes, "I tried an MMORPG once and the culture was very misogynistic. Even the virtual economy was very biased to favor male players." Other participants mentioned exploration and experimentation as a reason for self-reporting a different gender: "I wanted to know if it was any different being a guy. It wasn't." Similarly, "I thought it would be fun to play that way and have the other players assume I was a male." Finally, participants mentioned lack of flexibility in avatar and gender reporting choices: "I wanted to have a male avatar and was restricted to only female if reporting female." Another participant wrote: "People are less likely to make rude/sexist comments if I say I'm male. Also, I'm genderfluid, so generally there's no possible way to self-report my actual gender."

Race, Ethnicity, and Gaming

As previous research highlights, gender is not an identity category that exists separately from other considerations such as age, race, class, and ethnicity [12, 16, 27]. Our ethnically and racially diverse sample (see Figure 1), enables us to investigate racialized aspects of gaming in addition to gender related issues.

A much smaller proportion of the participants felt uncomfortable in online gaming rooms because of race or ethnicity (15/327 of all participants) compared to those who felt uncomfortable because of their gender. 13 of these participants reported that they experienced race/ethnicity-related comments.

Participant responses revealed comments targeting Asian, black, or Jewish gamers. For example, "not bad for an Asian girl", "people like to use the n-word that rhymes with 'figure"', and "one of my online friends would call me a Chink (I'm Chinese)". In the words of a participant, "racist and anti-Semitic comments abound."

Of the respondents who have played online games, four participants shared that they self reported a different race/ethnicity. Among the reasons for self reporting different race or ethnicity, participants listed avoiding harassment and fear of racist reactions: "When you're a black person on an anonymous forum, the best option is usually to not disclose [your race]. Going around saying 'hey guys, guess who's black!' is a great way to get unwanted attention."

Also, similarly to gender reporting, participants mentioned lack of flexibility in avatar choices: "Well, I'm a complicated race/ethnicity. 'Other' on the census form. . . ", and "For games that ask you to choose a character, the characters usually do not have different ethnicities apart from caucasian or black."

Impact of race/ethnicity related comments

Of the 13 individuals that reported race related comments, 46% (6/13) reported that such comments affected their attitude toward gaming in a negative way. In the words of one participant: "Sometimes the negativity gets to me, but I'm actively working on improving my overall attitude." A different participant wrote: "Another reason I don't play with strangers." And "It just disgusts me on a certain level that human beings can be so casual with racial slurs."

Interaction with Other Players

Interactions with players of a different gender

Only 23% (75/327) responded to the questions about sharing memorable interactions with players from a different gender. Of the participants who responded, 75% (56/75) shared positive experiences, and 30% (21/75) shared negative experiences.

Positive experiences included bonding with and making new friends (including romantic connections), finding support, teaching and helping, and connecting with family members.

Many participants described making and strengthening relationships with other players. One participant shared: "In middle school, I used online gaming as a way to make friends with the boys in my class. The first time I got asked out on a date was while online gaming." Participants also described relationships they developed through online gaming: "I had this really good friend, we actually met in real life a few times. It was interesting because he didn't friend me for my gender but for my gaming skills."

Some participants described experiences of teaching, helping to develop a skill, or experimenting together. For example, "I remember my male friend helping me play a shooting game and being encouraging despite my ineptitude", or in the words of a different participant, "My male friend always chose a female character and I always chose a male character." Other participants described support they received from male friends against gender-based harassment: "One of my teammates heard another gamer making comments about my gender and spoke up saying that gender has nothing to do with skill."

The negative experiences center around gender-based comments with similar themes to those discussed earlier in the paper. In the words of one participant: "I used to play Runescape when I was 10/11 years old, but stopped after a male player propositioned me for cyber sex in exchange for making me new armor in the game. This came after another male player two years older than me asked me to be his in-game girlfriend and a boy I knew from school tried to trick me into 'marrying' him."

Interactions with players of the same gender

Only 20% (66/327) of participants answered the question about sharing memorable interactions with players of the same gender. Interestingly, one participant that did not share a memorable interaction wrote: "Only elaborating here because I just realized I never interacted with a girl on the online games I've played." Of the participants that did share a memorable experience, 89% (59/66) shared positive experiences including sharing passion, finding support, making new friends, and bonding with family members and friends. For example, one participant described, "My mom has been a gamer for a long time too." Another participant shared: "My wife and I both like gaming and play together—it's a lot of fun." Also, "My sister and I used to compete on video games. I also taught several older family members about some of the games I liked to play."

Other participants shared a memorable experience playing with a close friend. "My female best friend and I played several online fantasy games together in middle school. Having a friend play with me made me feel like less of an outsider, especially because all the other people I knew who played the games were male." Participants also described bonding with other female gamers, sometime extending their friendship beyond the game: "A female gamer picked me up in a car in GTA Online and went on a mission with me." Another participant described: "One of my teammates is a girl and we've listened to each other rant and supported each other when anything, even not-gaming related, goes too negative." A different participant shared:

> I guess I've had a lot of "memorable interactions" with gamers of the same gender as I specifically seek

> out mixed-gender or solely non-male groups in online games/groups. It's not even talking about the experience in such a sexist atmosphere, it's knowing that friendliness/help is not coming from ulterior motives. That you are more likely to be viewed as a person, not a girl conforming to/subverting stereotypes about girls playing videogames. Just talking in conversational styles that are comfortable/natural for me with someone who will not judge me weirdly for doing so, is sometimes a breath of fresh air.

Only 11% (7/66) of the responders shared negative experiences, mostly due to gender-based comments from female friends. One participant described: "Quite a few girls in my year in high school (I went to high school in Hong Kong if that matters) are pretty heavy gamers. A lot of them throw the same gendered insults about gaming towards their friends/other gamers, e.g. 'xx game is so girly', etc."

Views on Game Development Careers

Career in gaming

Despite the evidence that our study participants play and enjoy a large range of games, only 21% (69/327) of participants have considered a career in gaming. These participants were significantly more likely to be avid gamers (χ^2 (2, N = 327) = 22.18, p <.001). They were also more likely to be a Computer Science (19.0%), Media Arts and Science (6.3%), or English majors (11.1%) and less likely to be a Science or Social Science majors. There were no significant differences in race/ethnicity for the two groups. Interestingly, participants considering a career in gaming were more likely to know a female game developer than those who had not, χ^2 (2, N=327) = 7.69, p = .006. Overall, 11% (36/327) of the participants reported to know a female game developer. Most of these participants knew a female game developer through their social or professional network. Others heard about famous game developers through the media or through classes.

Perceptions of game development

To gain insight into how our participants perceive the loosely defined position of a game developer, we asked participants about the skills they think a game developer should have. About 21.1% (69/327) of participants view game developers as "Renaissance" people holding both strong artistic skills and technical skills: "Creative. Coding. Artistic. Technical abilities." Another 19.6% (64/327) of participants view game development as requiring "analytical skills, problem solving, and intellect". These views are in line with a common stereotypical image of game developers, thought to be responsible for all aspects of the game including development, design, art, and sound [41, 58, 61, 79]. Noticeably, 14.7% (48/327) of participants described qualities such as determination, "thick skin", strong will, and the ability to work long hours, which perhaps reflect the harsh reality of female game developers as portrayed by the media. This view is also in line with the traditional portrayal of game development, which emphasizes long hours and deadlines [41]. Finally, 17.4% (57/315) of participants mentioned cultural, racial, and gender sensitivity as required skills: "Someone who has the technical skills/creativity to develop a game, but who also has the awareness/empathy to reach wider audiences, and be cognizant of the social impact their game (or certain tropes within the game) might have, especially for minority audiences." This reflects a desire to make games more inclusive and the view that game developers can potentially lead to a positive change in the industry.

DISCUSSION

In this study, we expanded on existing work that aims to understand the experiences of women in gaming, by presenting findings from a study that goes beyond a particular game, set of games, or self-contained gaming community, to examine a condensed cross-section of women in gaming culture. Our results show that the experiences of the participants in our sample are complex, and cannot simply be categorized as either feminine or masculine, and thus requiring a nuanced analysis that takes into account the complicated ways in which identity and gaming intersect. This study thereby contributes to calls by others to understand how gaming amongst women is not homogeneous and relates to other identities [44, 75, 76]. In particular, this study contributes to Sandra Harding's call to move away from an "essentialized" standpoint of marginalized groups [44, 75, 76].

Our findings show that there is no singular "women's" experience of gaming, but rather a diversity of perspectives within the varied standpoints of members of a community. Women who participated in our study enjoy a large variety of game genres on different platforms. Within our participant population, we identified both casual and avid gamers, and found that participants are motivated mostly by intrinsic factors, though avid gamers are also motivated by extrinsic factors including competition. Taken together, our findings undermine the stereotypical view of who is a gamer, are in contrast to the notion that women are naturally drawn to casual and/or 'pink' games, and show that competitive orientation can be a major motivating factor for women. These findings are supported by previous research [78].

In many ways, we found that our participants play games in spite of barriers to entry. To play online, our participants needed to navigate unfriendly and sometime unsafe spaces, while being offered limited options of female characters with often dull economy of accessories and objects. About 23% of the participants reported that they received gender-related comments about gaming. Of the participants who had visited an online game room, about half reported feeling uncomfortable because of their gender. Participants reported incidents of blunt sexualized comments, harassment, being targeted while playing, demeaning comments about their skills, harsh judging, and exclusion from participation. While most comments came from male players, a small number of participants reported negative gender-related comments from female players or friends. In some cases participants reported long lasting negative impact on the perception of gaming and on participation in online gaming. Some women who had hostile experiences reported that they were less likely to pursue a career in the game industry. This finding is consistent with findings from a recent study by Fox and Tang [31].

However, the experiences of the participants are complex and cannot be reduced to simply facing pervasive misogyny. Many participants shared positive memorable experiences of playing with other players, male and female. Such experiences highlight the increasing relevance of videogames and game spaces as spaces of profound sociability for women, where connections are strengthened and formed, and gender relations are negotiated and contested. Also, positive experiences with gaming, such as bonding among female players, could help women to persist and participate in gaming as well as foster a sense of belonging to gaming communities or culture.

Only one out of five of our participants have considered a career in gaming, reflecting the current reality in the field [43]. We argue that women who face barriers to entry for playing games find it difficult to envision themselves in this field. These results are consistent with findings from a number of studies on female presence, or lack of it, in the gaming industry [43], which show that the male dominated environment, the gendered perception of gaming, and the lack of information about careers in gaming pose barriers for women to enter the industry. Notably, participants who know other game developers are more likely to consider career in gaming. This highlights a need to expose more women to role models as well as to provide information about opportunities in the field. Our participants mostly view game development as an interdisciplinary endeavor, including both technical skills of programming, but also skills more related to the humanities, such as training in the arts, media and cultural acumen, and the ability to tell coherent and engaging narratives. A large number of our participants suggested the importance of gender and racial sensitivity for game developers, indicating a desire to increase inclusion and improve representation in games.

Implications for Design

Our findings have implications for the design of games, game development education, and studies about gaming. In the design of games, our participants commented on thinly drawn female characters present in many mainstream games and on the limited economy around female characters. This raises a need to increase and diversify the representation of female characters while making the economy around them as equally rich and intriguing as around male characters. Also, our findings indicate a need for supporting more gender fluidity—the ability to smoothly move between genders beyond the binary of male/female—as a key aspect of the game experience. This could be achieved by providing more freedom in choosing characters and in reporting a player's gender. Applying a more complicated understanding of gender and identity to the representation of characters in games could result in environments that are not only inviting to diverse populations but are also more intriguing and enjoyable. Beyond representation, fostering civility in a gaming community can increase the participation of women. Game designers can apply various techniques and systems for monitoring communication between players, encouraging positive behavior, and punishing negative behavior. Online forums have had varying levels of success with flagging and human moderation [20, 34, 35]. Advances in machine learning offer opportunities for automatic identification and response to exclusion, harassment and verbal toxicity [8, 9, 24, 55, 58].

In the design of courses about gaming and game production, our findings identify opportunities for humanities, arts, and engineering collaborations that are based on the observation that those participants who want to become game developers are interested in storytelling as much as in the technology. In addition, to extend the skills of game developers to include awareness about gender and racial representation there is a need to educate students on how representations of any kind (including games and game developers) reflect the social context in which they are embedded. This requires joint effort between science and humanities fields, so that courses in art history, visual culture, cinema and media studies, women's and gender studies, in addition to math and computing, can be a requirement in training new game developers. In addition, the wide diversity of gaming experiences and interests highlighted in our findings suggests offering students more diverse options in terms of assignments and content to encompass a variety of game genres and cultures that enable students to learn about and experiment with different forms of representation. By diversifying our classroom materials and activities we increase the likelihood of inviting female students to engage with gaming culture and development. Furthermore, considering the impact of role models and of friendships with other female players and developers, it is important to consider the development of women-only spaces for game studies. Examples include classes, workshops, hackathons, etc. Such spaces have already proven effective in computing education, and could empower girls and women to engage in gaming, and to pursue an active role shaping the direction of the field.

Finally, while existing studies of gaming are often confined to a small number of women playing a particular game, a set of games, or a part of a self-contained gaming community, our study demonstrates that it is also important to conduct studies that are not limited by these boundaries, but instead represent a condensed cross-section of a gamer population. This study, focusing on a detailed investigation of a population of women that are students and alumnae of a women's college, shows tremendous variation rather than homogeneity. Our results demonstrate that the experiences of the women in our sample cannot simply be categorized in a gendered fashion. In the spirit of standpoint epistemology [38], we believe that findings from this study could be useful when studying other populations in gaming, and together demonstrate the need to broaden studies on gaming to further diversify our knowledge of experiences and behaviors in gaming.

Limitations and Future Work

There are a number of limitations to this study that should be considered in future research. First, our study utilized an online survey, which collects a one-time data point from self-selected participants. Our future work will expand on this work using interviews for a more in depth examination of life experiences related to gaming and to particular game platforms and communities. Second, although our sample included 14 gender non-conforming individuals, we focused mostly on issues specific to female players. Future work will expand on

issues specific to gender non-conforming individuals' in gaming. Third, our research focused on women that are students and alumnae of a women's college. While we described the advantages that this user population provides for HCI research, our study population is not representative of women as a whole. Other studies should focus on different populations of women and girls, including intergenerational populations. Fourth, our research indicates that race and ethnicity play an important factor in the gaming experience; future studies should expand upon this area. Finally, the responses to our open-ended questions about experiences with same and other genders were fascinating, highlighting a range of behaviors, from support to harassment, both within and across genders. Further studies should delve into this area in more detail, not only to learn about these dynamics, but also to potentially develop strategies across genders to combat misogynistic behavior wherever it is found.

CONCLUSION

As gaming rapidly diversifies in terms of market and culture, women are both discussed as an increasingly significant pool of consumers, critics, and producers of video games, as well as victims of misogynistic aggression. In the interest of broadening perceptions, our study draws upon perspectives from Gender and Feminist HCI, to expand on existing work aiming to understand the experiences of women in gaming. Our goal of this paper is not to make definitive statements but rather to make a descriptive contribution–rigorously documenting and assessing the prevalence of different types of women's experiences with games, yielding richer data about diversity in games that others can build on.

Our findings highlight games as a space of social and professional possibility for women where participation is affected by certain barriers. The hostility many women face while playing does have, in some cases, a long-lasting impact on the participation of women in gaming. Some women who experienced hostility also reported on decreased interest in pursuing career in gaming. Our findings also suggest that positive experiences with gaming such as bonding among female players, could result in positive impact, helping women to persist and participate as well as fostering a sense of belonging to a game community, or more broadly to gaming culture. Thus, to reduce hostility and to pursue potential benefits of positive experiences we suggest advantages to pursuing parallel changes both in game design, and in game development education. Finally, our study indicates the urgency of elaborated and nuanced exploration of women and gaming.

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