Exploring toxic behavior in multiplayer online games: perceptions of different genders

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***Abstract*—Multiplayer online games are currently very popular among teenagers and adults for entertainment. However, a gaming environment can also be a place where people suffer from toxic behaviors, such as harassment, insults, and bad comments. It is known that the digital gaming environment is predominantly male, and it can cause discrimination against other genders as a reflection of society. To create coping strategies to reduce or eliminate it is necessary to know the root of the problem. Thus, in this paper, we present results of a survey applied to all genders, Male, Female, Transgender, and others, to identifying the toxic behavior in digital game environments, the various types of toxicity, how they deal with this situation, and what they do to mitigate this situation as well. The results indicate that, although the female presence in the online gaming environment has been gaining strength in the last five years, regardless of gender, toxicity was unanimously identified as such present behavior in games, which leads to demotivating of some players that need to use different strategies to avoid toxicity.**

***Index Terms*—Toxic behavior, gender, multiplayer online games**

I. Introduction

Multiplayer online games continue to gain popularity due to providing a complete gameplay experience between players in which is possible to cooperate for a unique goal and compete with other people. Usually, these games take place in a shared map or world where each player embodies a character. For many players the choice of a character is an important step towards achieving a high level of entertainment. Hence, the game industry has explored the diversification of characters through different genres and appearances.

Currently, the gaming industry makes billions of dollars due to the recent reach of audiences other than men and teenagers as female and transgender players. Although the gaming environment is a resource for people's entertainment, bad social behaviors also reflect in digital online games. This type of bad behavior refers to insulting the player or family members, xenophobia expressions, racial or religious offenses, sexist imposition, and other forms of discrimination [1].

As in real life, victims of toxic behaviors are likely to acquire psychological disorders such as depression, anxiety, and persecutory delusions [2]. Furthermore, victim players feel less motivated to go back to the game, to not receive toxicity towards them. When these victim players do not leave the game, they usually deal using strategies such as gender-masking, avoiding talking/chatting during the match, and mainly responding aggressively to the offending player.

In general, the toxic comments directed at a player can come from two communication channels in-game, *i*) chat and *ii*) voice channel. Toxicity is more common via chat, however, studies as [3] shown that when female players use the voice channel, they receive three times more toxic comments than masculine players, but this is true for all non-male gamers, as well. Although toxic behavior is very frequent in online games, only a few mechanisms to deal with this problem have been employed by game development companies. The most common strategies are the mechanisms of banning players via denunciation, blocking of words considered inappropriate, and services to silence the chat of players.

The literature on behavioral analysis in online multiplayer games shows a variety of studies that addressing researches to qualify and quantify the forms of offenses [1] to analyze which gender is more susceptible to be victims of toxicity [4], and, to classify or detect toxicity [5]. The literature has been noted that the bad behavior of players can also contaminate each other due to current mechanisms being ineffective. Unfortunately, the problem of toxicity in online games is by no means new and this problem continues to occur mainly because people play anonymously and identified only through a nickname.

To discover the relationship between the forms of toxicity and different genders, we conducted a comprehensive survey of casual players in online multiplayer games. Furthermore, our survey aimed to determine the extent to which, players act when witnessing toxic behavior against another player and which coping strategies have been taken to mitigate toxicity.

In this paper, we describe the survey results conducted in 2021 June by a google form. Overall, our findings are mainly that the survey contemplated 554 players of the 433 are male, 111 female, two transgender, and eight non-binary, which have averaged between 20 and 30 years. 491 players reported that toxic behavior is an issue in today's online games and 158 of them felt less motivated to win. About toxicity players' perceptions, for male players, the principal toxicity is concerning to gender, while for female players is performance. In this context, 521 players have already witnessed some toxic behavior type against women, and 529 players had some attitude when witnessing a toxic behavior.

Finally, the toxicity more commonly suffered by 429 male players is verbal aggression, while underestimated skill was mentioned by 109 female players. This scenario reflects the need for 97 female players to hide their gender, while 387 male players never needed to hide. In this sense, 511 players mentioned the Block/Mute use as a strategy to reduce these toxicities.

The remainder of this paper is organized as follows: Section II reports the proposed approach and some related work. Section III reports research design of survey conducted. Section IV analyzes and discusses the results obtained through survey. Section V discusses the related work. Finally, Section VI makes the concluding remarks and future directions are discussed.

II. Background

This section presents the main concepts about online games, toxic behavior in those games, and their effects on the gaming community. Furthermore, we highlight the female presence in online games since they are one of the biggest toxicity victims.

A. Online gaming

Online games can be described as games that are played over the internet. Online games have taken their place as important part in global entertainment and media markets in the past decades. It is commonly possible to play online against a computer controlled component or against a human player. In both cases, games occurs individually or in teams.

The online environment becomes conducive to the existence of social interactions, and in team games genres, such as Multiplayer Online Battle Arena (MOBA) and First-Person Shooter (FPS), this interaction is even more frequent and relevant since they are games where communication between players is one of the main keys to achieve victory. Unfortunately, these interactions are not always healthy, and end up generating episodes of toxicity.

B. Toxicity

Toxic behavior, also known as griefing [6], happens when players break co-existence rules, acting in antisocial and disrespectful ways. It brings forth anger or frustration on other players, leading to a bad game experience. Inside the game, toxic behavior can create a spiral of insults and blame that can destroy the communication within a team [7].

There are several factors that lead to acts of toxicity, such as harassment, imposition of power, greed or unsportsmanlike conduct, scamming, sexism, among others [6].

Women and other minorities are often specifically targeted for the harassment aforementioned, particularly if they do not conform to expected behaviors. As result, these minorities may miss out on the sense of belonging experienced by male gamers and instead experience ostracism and harassment because of their gender.

C. Woman in games

Despite the number of female gamers, video games have traditionally been perceived as a male space, an activity created by men and for men [8]. Indeed, the gaming industry itself is extremely skewed, with female designers, programmers, and producers comprising only a fragment of its workers [9].

However, according to New Zoo [10], around half of all gamers are women. Also according to the report, they mainly play mobile games, where they even exceed the number of male players. However, women remain among the biggest victims of toxicity in online gaming, regardless of the platform.

III. Experimental study

We conducted an exploratory survey to analyze the players' perceptions of toxicity in online games and how toxicity differs between gender viewpoints. The survey was planned following the process proposed by Kasunic [11] and Kitchenham e Pfleeger [12] for effective design of surveys for the software engineering area . In this sense, the process of survey conducting included seven five details following.

A. Research Objectives

We used the Goal-Question-Metric (GQM) model [13] to set out the objectives of the experiment that can be summarized as follows:

"Identify ***toxicity*** *for the purpose of* ***analyzing*** *with respect to* ***perceptions players*** *from the point of view of* ***different genders*** *in the context of* ***online games****."*

For achieving the goal, we seek to investigate the two Research Questions (RQs), presented in Table I.

B. Target audience and sample identification

The target audience of this survey is made up of men and women gamers who perceived toxicity within online games and some of their preferences when playing these games. These players are distributed in several states of Brazil. From the target audience defined, the next step consists in the selecting sample. In this survey, we use a random sampling in which individuals of the sampling frame are selected at random [14].

TABLE I
RESEARCH QUESTIONS ACCORDING TO SURVEY GOAL

Research Questions	Description
RQ_1: What is the players' profile?	To answer this RQ, we identify some information about players such as the age, gender, city, gaming experience, number of times the player plays per week, and most played game types.
RQ_2: What are the men's and women's players' perceptions about toxicity behavior in online games?	To answer this RQ, we analyze avatar characteristics, feelings about toxicity, toxic behavior, toxicity types witnessed, players' attitudes when witnessing a toxic behavior and the frequency of toxic behavior against women.
RQ_3: What are the men's and women's players' perceptions about the toxicities suffered in online games?	To answer this RQ, we identify toxicity types suffered, need to hide gender and strategies to mitigate toxicity.

C. Survey instrument design and evaluation

The survey was conducted using the Google Forms[1] tool for questionnaire design. The survey, including almost twenty six Portuguese questions, was designed based on the literature as well as earlier empirical studies of toxicity on online games.

The questionnaire had several different types of questions such as 9 multiple choice questions, 9 Likert scale questions, and 8 open questions. A 5-point Likert scale was adopted to understand the players' experience frequency in each question, where "1 = Never" and "5 = Always"; and to indicate if the players agree or disagree with each question, where "1 = Strongly disagree" and "5 = Strongly agree". The questionnaire items were reviewed by experts to ensure content validity.

The questionnaire is grouped into the following two sections: *(i)* information and experience of players; and *(ii)* information of players' perceptions about toxicity on online games. The first section aims to gather background information about the players and the online games they play. The second section is designed to get information from the players' perception about if they identify the toxicity as a problem within online games, what type of toxicity they experienced as well, and if their gender makes them feel restricted while playing. The full survey and all its questions can be found in: *https://forms.gle/Vd3u7oUAq1cuwFYW8*.

D. Survey instrument evaluation

After the first version of the survey has been released, a pilot study was conducted aim to analyze instrument validity. According to Kasunic [11], conducting a pilot survey is fundamental, as it allows detecting possible existing problems.

In this sense, we applied four open questions proposed by Hauck et al. [15] to evaluate survey content, such as (1) Does the questionnaire contain everything that is expected to meet your goal?; (2) Does the questionnaire contain unnecessary information for the context and purpose of the survey?; (3) Did you adequately understand the questions?; and (4) Are there any errors or inconsistencies in the questionnaire?

[1]https://www.google.com/forms/about/¿

A group of gamers from many genders were invited by email to participate in the pilot study. These players were chosen by the criteria of availability and proximity as the group where this research was carried out. Six players (three women and three men) participated in the pilot study, answering the questions defined by Hauck et al. [15] and sending their feedbacks. The players evaluation was positive, with suggestions to: *(i)* reduce the number of questions; *(ii)* leave some questions as non-mandatory; and *(iii)* include at least an open-ended question.

E. Data Collection and Analysis

After piloting the questionnaire to checking its consistency and legibility, the survey request was available to the players. The questionnaire was made available on two gaming forums and three social networking communities, due to being predominantly used by players who played a variety of different games. The questionnaire was open for three weeks, from 3rd May to 3rd June 2021, and during this time 559 players responded to the survey.

The obtained survey data is analyzed. To assist the analysis process, two activities were carried out previously [12]: *(i)* we performed the data validation, checking the consistency and completeness of responses; and *(ii)* we partition the players' responses into two subgroups according to gender (male and female) before data analysis.

After these activities, the quantitative and qualitative analyses were conducted according to the type of questions used in the survey. We use descriptive statistics for the quantitative data interpretation; and discourse analysis and data visualization for the qualitative analysis.

IV. RESULTS

This section presents the survey results. We focus on the analysis of results concerning the perception of different genders regarding toxic behavior in online gaming. Through the analysis of the results, we answer the three RQs defined in Section III and trace the players' profile and their perceptions about the toxicities in the online games. Of the 559 players who responded, we considered only 554 responses because other participants did not answer the questions correctly.

A. Players' profile (RQ_1)

Initially, we sought to draw the basic profile of the players, and for that, they answered about where they live, age, gaming experience, and which games they like to play the most, or play most often. Of the 554 players, 78% (433/554) are male, 20% (111/554) are female, 0% (2/554) claimed to be transgender and 2% (8/554) declared to be non-binary, as can be seen in Figure 1.

Figure 2 shows the distribution of players grouped according to their age. The results indicate that 73% (315/433) male participants are in the age group of 20 to 30 years, being 44% (189/433) between 20 and 25 years old, and 29%(126/433) between 26 and 30 years old. Only 1% (4/433) are in the age group of 40 years or more. For the female gender,

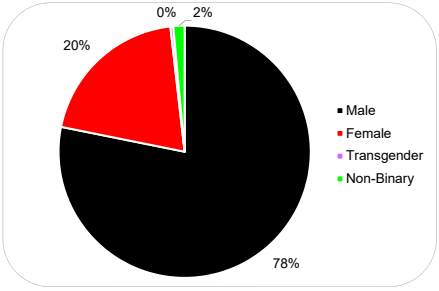

Fig. 1. Players distribution by gender.

61%(68/111) have between 20 and 25 years and 3% (3/111) over 30 years old. Both transgender players have between 14 and 25 years. Finally, of the eight non-binary players, seven of them are in the age group of 20 to 25 years and only one over 30 years. As can be seen in Figure 2, the highest percentage of players is in the age group of 20 to 25 years old.

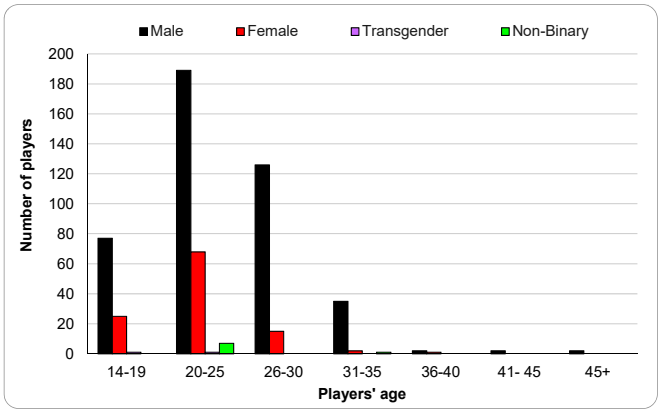

Fig. 2. Players distribution by age.

We categorized the players by the region and state they are living in. Figure 3 represents the Brazilian states according to their regions.

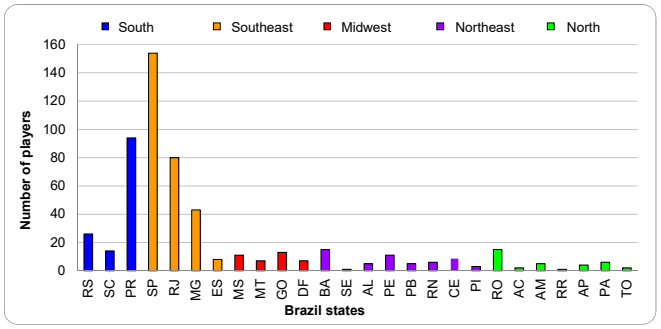

Fig. 3. Players distribution by region and state.

As the results show, it was observed that 51% (285/554) of players are concentrated in the Southeast region of Brazil. Of these, 54% (154/285) players currently live in the state of São Paulo and 28%(80/285) in Rio de Janeiro. The South is the second Brazilian region with 24% (134/554) players, where 70%(94/134) of them reside in Paraná. Finally, the survey reached international territory, being answered by one person in Spain, Italy, Canada, and two people in Portugal.

To understand the players' feelings and experiences, we investigate which games they enjoy playing the most and how long they had been part of the gaming world. Figure 4 presents the most played games by participants.

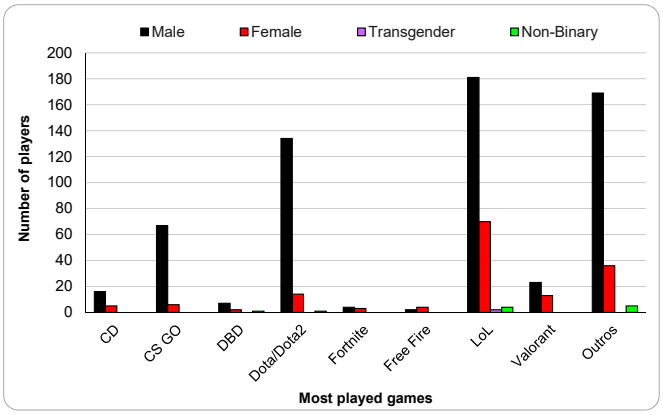

Fig. 4. Distribution of players according to the most played games.

The game of moment between the genres is League of Legends (LoL) pointed out by 45% (250/554) of players. Other games that are very popular among male players are Dota/Dota 2 and Counter-Strike: Global Offensive (CS GO), Valorant, Call of Duty (CD), Dead By Dayligth (DBD), Fortnite, and Free Fire. The "Others" category includes games that appeared a few times in the players' responses, such as Overwatch, Tibia, RuneScape, PUBG, FIFA, Phasmophobia, Assassin's Creed, Rocket League, Chess, among others.

In Figure 5 it is possible to observe that 51% (219/433) of male players already have more than ten years of experience in online games, while only 1,4% (6/433) players started playing for less than a year. For females, the scenario has changed a little, in which most players have entered the online environment in the last five years.

With the analysis of these results, we notice that, on average, players are mostly concentrated in the states of São Paulo, Paraná, and Rio de Janeiro, and the age group of players is between 16 to 30 years of age. It is still possible to notice that women joined this environment about five years ago, and before that, the universe of online games was predominantly popularized by male players, a fact that may have contributed to the delay in the entry of female players of females in online games. Given the insecurity of female players in issues related to sexism, prejudice, devaluation of females in the face of skills and gameplay of male players, among other toxic behaviors aimed at females by the influence of society that imposes that boys can do some things and have some behaviors that should not be followed by the female gender.

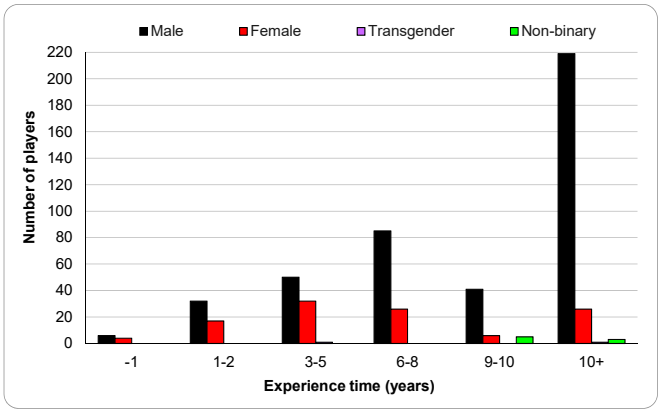

Fig. 5. Number of players by time of experience in online games.

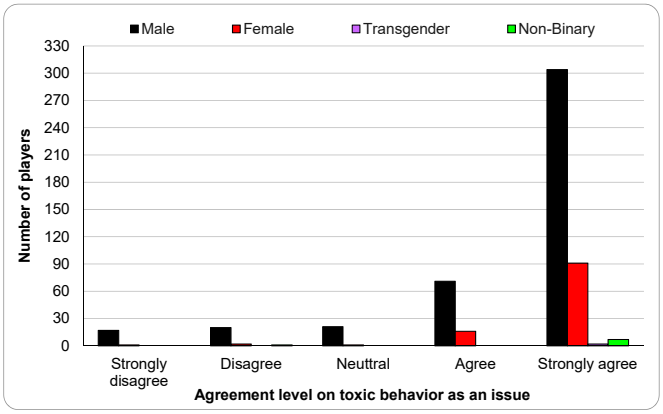

Fig. 7. Number of players that feel like toxic behavior is a problem in online games.

B. *Players' perceptions about toxicity behavior (RQ_2)*

In this RQ, we analyzed the players' perceptions of toxic behavior in games. In this sense, we asked players about the characteristics of their nicknames and avatars within the games.

In Figure 6 of the 111 female players, 51% (57/111) use nicknames/avatars with male and female characteristics to identify themselves in the games, and only 7% (8/111) use male characteristics. This behavior may be related to the insecurity they feel concerning male players' since they may suffer from some toxic behavior type and consequently feel the need to hide their gender. On the other hand, 51% (223/433) of male players use more often only male characteristics, and 44% (191/433) use male and female characteristics. It is still important to note that four male players did not inform the types of characteristics for their nicknames/avatars.

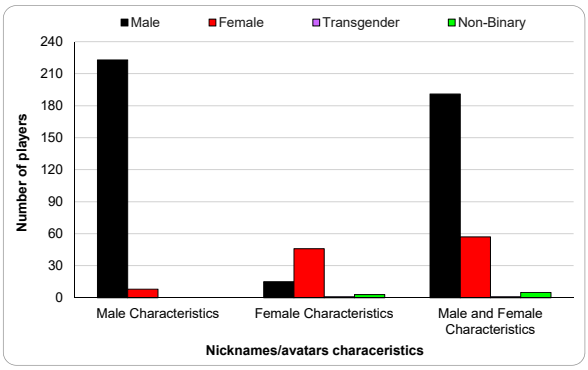

Fig. 6. The characteristics used by players related to nicknames/avatars in the games.

The majority of players do confirm that toxic behavior is an issue in today's online games. Figure 7 presents that 73% (404/554) of players, regardless of the genre, "strongly agree" that toxicity is an issue. Only 4% (17/433) of male participants "strongly disagree" toxic behavior as an issue.

According to results, most players are affected by toxicity within a game in some way, as only 17% (97/554) said that toxicity did not affect them at all, as can be seen in Figure 8. Most male players (around 28% (121/433)) felt less motivated to win, but also 24% (104/433) felt annoyed and reported that another player was having toxic behavior. Comparing the female answers with the male answers, however, show that men feel less affected by toxicity than women do, as 15% (85/554) of the male participants do not feel affected by toxicity, where only 2% of the female (11/554) and the transgender players (1/554) felt that they are not affected at all.

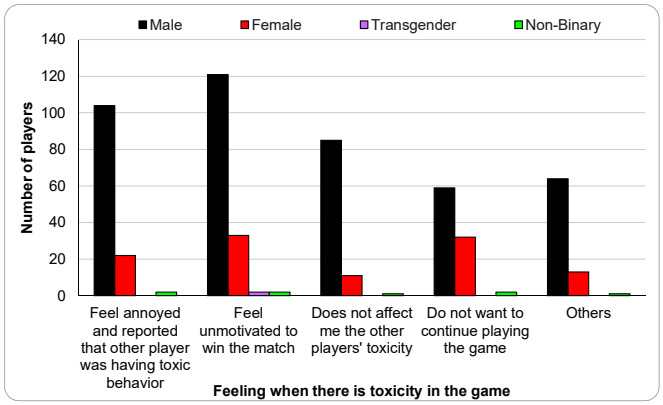

Fig. 8. Feeling of players when there is toxicity in the game.

Furthermore, we created an open question to discover other possible feelings about toxicity. The vast majority of participants said they take actions such as "ignoring, silencing, blocking the toxic person and continuing to play". Other participants said "I took it in stride, and in some situations played with the other player". One male player said, "Depending on the game, just beating the toxic player makes me very happy."

Also, in this sense, other players expressed their feelings about it: "It bothers me, but I did not say stop because I will probably never see or play with the person again, so I usually try to ignore it and tell the victims to ignore it too"; "I think it's funny when it's with me, but with someone

else, it's unpleasant"; "It bothers me when the toxicity is heavy, like talking about the mother, being racist or inciting suicide is unacceptable". A female player said, "I usually play with acquaintances and, I usually use the option to block the individual, so I don't interfere". In addition, seven other male players and two female players claimed to be toxic in games.

An issue in the game is toxic behavior episodes. Figure 9 shows the toxicity types witnessed by male players.

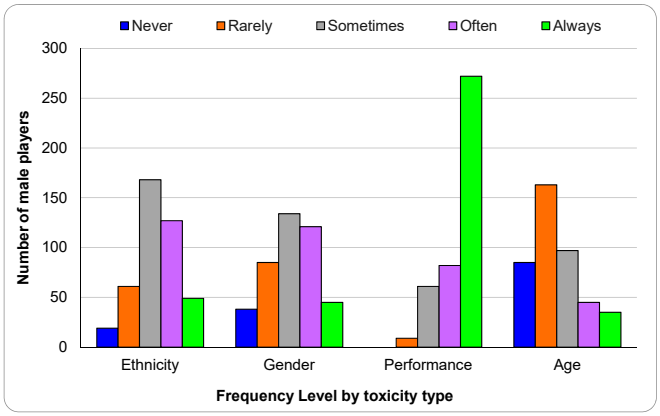

Fig. 9. Distribution of the toxicity types witnessed by male players.

65% (283/433) of male players stated that the most common toxic behavior type they witnessed is related to players' performance. 31% (134/433) of them reported that "Sometimes" and 28% (121/433) "Often" witnessed gender-related toxic behaviors. 39% (168/433) indicated that "Sometimes" the ethnicity can be a toxicity type witnessed by players. Age is one of the factors less prone to toxicity from the point of view of male players.

Furthermore, the toxicity types witnessed by female players are presented in Figure 10.

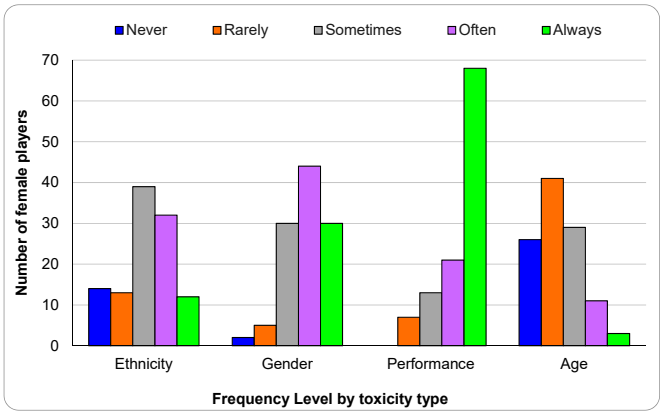

Fig. 10. Distribution of the toxicity types witnessed by female players.

As well as the male gender, performance was identified by 61% (68/111) of female players as one of the most significant toxicity types. 40% (44/111) and 35% (39/111) of female players stated that "Sometimes" and "Often" witnessed toxic behavior regarding ethnicity and gender, respectively. In contrast, 37% (41/11) described that "Rarely" the age is a reason for toxic behavior. It is relevant to highlight 67% (74/111) of the women answered that "Often" or "Always" have experienced the toxicity regarding gender, while 38% (166/433) of the men answered the same.

Based on the behavior toxic witnessed, we identified whether the players witnessed these behaviors against female players. Furthermore, we also analyzed the attitudes frequency taken by players when witnessing a toxic behavior.

Figure 11 shows the players' frequency who have witnessed women being the toxicity target in games.

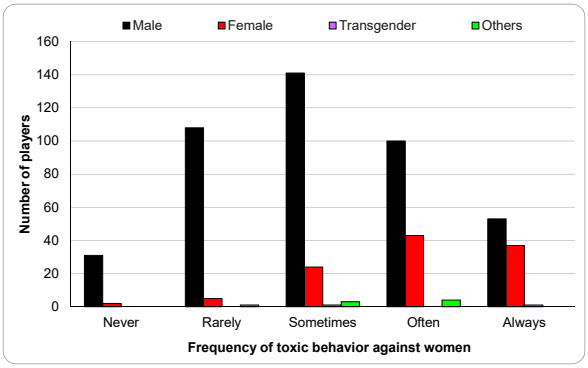

Fig. 11. Frequency of toxic behavior against women by players.

33% (141/433) of male players reported that "Sometimes" witnessed toxic behavior against female players, while 23% (100/433) of players observe this behavior "Often" and 25% (108/433) "Rarely". In contrast, 39% (43/111) of the female players stated that "Often" other women are toxic player's targets.

We also analyzed the attitudes frequency taken by players when witnessing a toxic behavior and what they usually do in these situations. Figure 12 presents that all players "Always" take action when witnessing toxic behaviors. In general, players try to stay calm, block users, console and support victims, banish toxic players from the rooms and denounce the toxic players' profiles.

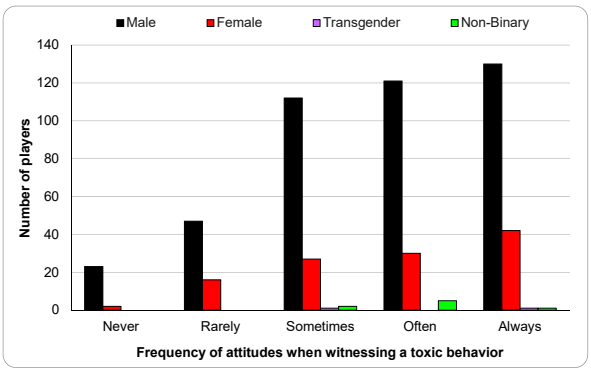

Fig. 12. Frequency of players attitudes when witnessing a toxic behavior.

Some participants reported the attitudes they take. A male player described "basically I just report the player's profile on Steam if serious such as racism". Other players also reported that "I always try to file all insults and forward them to the company game owns"; or "I've already interfered in some cases of sexism and racism".

Female players also commented on their attitudes towards toxic players. One player stated: "I've already questioned the person for offending the other, asking why he wasn't going to play another game or play with other people since the other participant's performance was being an issue for him". Another commented that "in addition to always reporting, we must take part because we never know what the other person is going through and no one deserves to receive gratuitous hatred".

From the analysis of the results, we conclude that there is a very high degree of toxicity in the online gaming environment because these environments are no longer a moment of distraction since players have their skills underestimated. In addition, some players suffering from comments related to ethnicity and inequality between genders once the female gender is characterized as inferior to the male gender concerning gameplay.

Some players reported that they were called names in online matches. Other players made sexist comments about the female presence in the game, such as "There is a woman in the game, we are going to lose" or "It had to be a woman". In addition, it is important to highlight those male players who do not accept losing a game for a female player. Therefore, from player comments, we noticed that in few cases the players' toxicity can negatively impact the lives of players outside the games. This circumstance is very usual once some players reported that entering matches when they are feeling upset or sad, and in the face of the other players' malice feeling even worse.

C. Players' perceptions about toxicity types suffered (RQ_3)

The purpose of this research question is to identify the toxicity types suffered by players, whether they need to hide their gender, and strategies to mitigate these toxicities. Figures 13 and 14 present the toxicity types frequency undergone by male and female players, respectively.

Figure 13 shows that the highest rates of toxicity are related to offenses and verbal aggression. 38% (163/433) and 35% (151/433) of male players reported they had already been the target of these behaviors, respectively. In addition, 31% (136/433) of male players asserted that "Always" occurs the pressure to perform well in the game. 29% (126/433) also stated that "Always" the skills are underestimated. Sexual harassment is a toxicity type that for 69% (298/433) of male players "Never" happened. However, only 2% (7/433) of players said it "Always" happens to them.

Figure 14 shows female players' opinions about being targets of toxicities. 36% (40/111) of female players reported that "Sometimes" experienced sexual harassment in the game. On average, 31% (35/111) of them informed that they "Often" experience verbal aggression, offense, skills underestimated, and pressure to perform well.

Based on these toxicities suffered, some players affirmed that need to hide their gender in the online gaming environment to evade these behaviors. However, 89% (387/433) of male players reported that "Never" needed to hide this fact.

In contrast, only 13% (14/111) women informed they never hid their gender. In addition, 30% (33/111) and 29% (32/111) of female players stated that "Often" and "Always" hide the fact that they are women, respectively. These data are related to the results obtained in the previous question, in which female players reported having been victims of sexual harassment in the middle of games, sexist comments of male players about not seeing the advantages of having women in their teams.

In this context, the players applied different strategies to minimize the toxic behavior experienced. The strategies adopted by male and female ´players are presented in Figures 15 and 16, respectively. These strategies consist stop voice messages to even playing only in groups of friends or players of the same gender.

According to Figure 15 and 16, the strategy that is "Always" used is the Block/Mute, which was mentioned by 51% (222/433) male and 56% (62/111) female players. Regarding communication, 46% (51/111) female players prefer to communicate only by text message, while 57% (247/433) of male players communicate by text and voice.

Therefore, according to the results, we notice that the toxicity regarding verbal aggression is more common in online games allows through voice communication. However, these games do not have any mechanisms to filter bad words or offenses. Another point observed is about the lack of trust from male players to female player's skills. Unfortunately, this behavior is a sexist society reflection, which can also be seen in the labor market.

Finally, although the gaming industry is on the rise, few automatic mechanisms have developed to minimize toxicity among players. The current solutions are the same as the previous decade, i. e., chat filters, blocks/mute, and reports. Besides that, society needs to know the issues to create coping strategies and reduce the incidence of harmful behaviors as sexism, racism, xenophobia, discrimination in the game's environment.

D. Threats to validity

This paper is concerned with the relationship between the forms of toxicity and different genders. We discuss the possible validity concerns, based on a standard checklist [16], in terms of internal, construct, conclusion, and external validity, and also the steps that we have taken to minimize or mitigate them.

Internal validity: in this study lies in the selection bias, i.e., the randomness of the participants. As reported in Section III, we utilized a variety of wherewithal to reach out to as many participants and also various demographics of these players as possible. To mitigate the associated validity issue, we took the following steps: *(i)* we attempted to enlarge our email list to

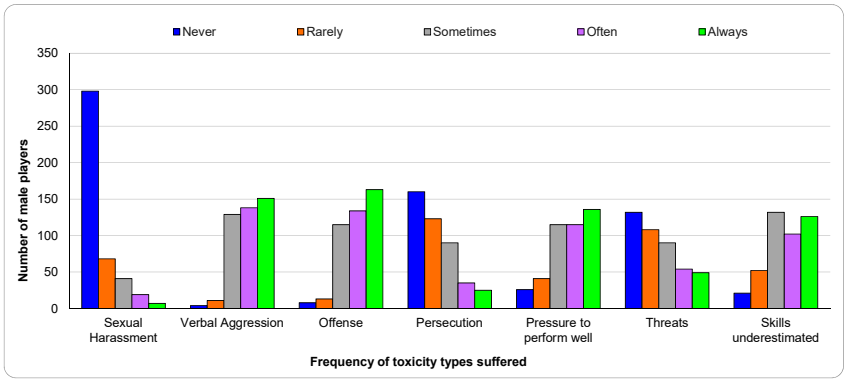

Fig. 13. Distribution of the toxicity types experienced by male players.

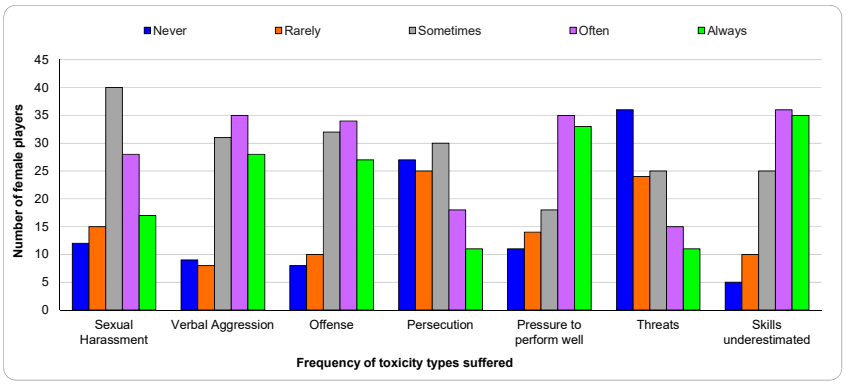

Fig. 14. Distribution of the toxicity types experienced by female players.

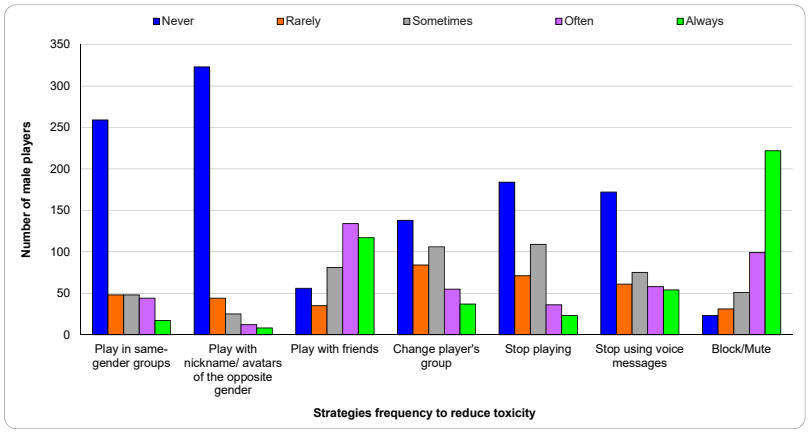

Fig. 15. Strategies adopted by male players to reduce toxicities.

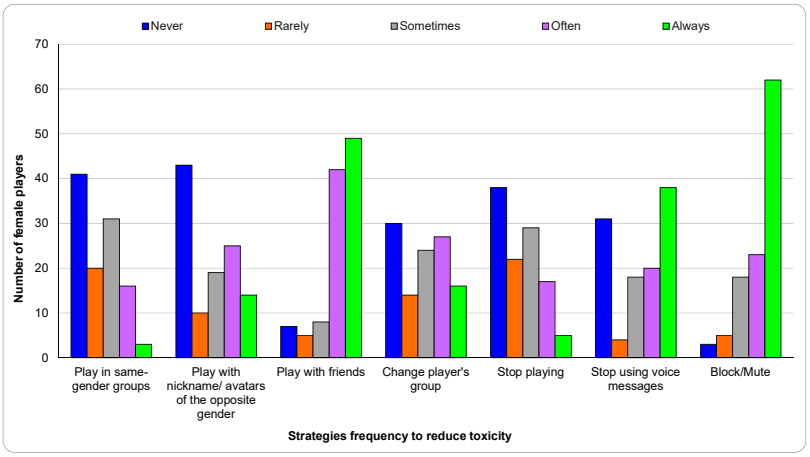

Fig. 16. Strategies adopted by female players to reduce toxicities.

include different players profiles; *(ii)* we posted messages in online Social and forums e.g., Facebook, and Twitter; and *(iii)* we allocated one month for all invitees to fill out the online questionnaire.

Construct validity: the issue relates to whether we covered the real toxic behavior in the games and the differences between genders in this survey. For this, we counted the answers for each question and then analyzed open questions. It is believed that results based on such voting data can, to a certain extent, reflect the opinions of the majority of the game players. It is also common for people to deflect their answers when they feel being evaluated and based on what they think is the intended result of a study. To mitigate these, we informed players before the survey that our motive in this study was to take a snapshot of the online game scenario and that we will not collect any identifying information so that participants will remain anonymous.

Conclusion validity: for each RQ, we attempted to reduce the bias by seeking support from the statistical descriptive. Thus, all the conclusions that we drew in this study are strictly traceable to data. Moreover, to increase transparency, the raw survey data is made available online for other researchers to validate and replicate. Our survey questions were reviewed by the authors of this study and a few experienced players contacts for preventing survey reliability-related issues such as poor question wording and survey layout. Furthermore, we improved the reliability of our survey using a small-scale pilot study before the main survey execution.

External validity: as discussed in internal validity, all the efforts were made to minimize the selection bias, which is an important factor for both internal and external validity. The size and geographic distribution of our samples are quite reasonable to make a rough conclusion and clearly, we do not have any intention to generalize our findings to other countries and regions. Nevertheless, we reported demographic information of the participants covered in our study, and therefore the readers will be able to evaluate the applicability in different contexts.

V. Related Work

The 2017 Game Brazil Survey [17] showed that the female presence in games reached the mark of 53%, a growth of more than 10% since the year 2013. Santos [18] presents the opinion of 144 female players. The participants were between 19 and 29 years old, and 96% of them consider the online gaming environment sexist, and 72% said they had already suffered aggression in MOBA and FPS games. The author concludes that women's objectification is configured by two main reactions when women participate in online games: harassment, which brings the idea that women are just an object; and aggression, which can happen in various ways, where the main one happens through the idea that the woman should not be there.

Bergström and Ericsson [4] seek to know if toxicity differs between men and women in Overwatch, as the authors believe that female players may be much more affected by sexist statements, and believe that male players become toxic from the moment players are using voice chat. The authors conclude that both genders agree that toxicity exists, have already been victims of toxic behaviors, and that it is a problem in the electronic environment since toxicity affects players regardless of gender. Finally, the authors confirm the hypothesis that women are more susceptible to toxicity, causing many to feel the need to hide their gender because of this.

Ribeiro [19], and Pupo and Avila [20] seek to understand whether there are barriers to female participation in League of Legends, and what violence against women is in digital games. As seen in other experiments and research, issues related to sexism are present in all games, imposing barriers on women who participate in online games. In LOL, Ribeiro [19] identified issues of machismo where women were overlooked for their skills or excluded from matches when other players discovered that it was a woman. In the same vein, Pupo and Avila [20] observe the need to apply the principle of equality between players, to ensure dignity to players of both genders,

once it is found that women are more vulnerable in the online gaming environment. The violence suffered by female players is related to swearing, gender discrimination, and slighting skills, which can cause various embarrassments to victims.

Through the studies is possible to identify that toxicity is something recurrent in the gaming environment. Although these are different researches, all of them observe the behavior change of male players in the presence of the female gender in the games, which often becomes the target of toxicities, such as sexism, offenses, discrimination, exposing some people thoughts about the superiority of genders. Thus, this research stands out due to the number of participants, the scope of games considered, and the overlap of opinions of different genres on toxicity.

VI. Conclusion

This paper brings the planning, execution, and results of a survey, where the main objective is to identify and present the toxicity in the environment of the digital game in relation to females. For this purpose, the data collection was carried out between different genders and ethnicities that have a certain affinity in this branch of digital games. Seeking to understand the player's perceptions in relation to this inequality scenario, this survey was applied throughout Brazil, not only covering all regions, but also some European countries, such as Portugal, Spain, and Italy.

To build the survey, the Kasumic [11] process and Hauck et. all [15] directions were used. To assist in the definition of objectives, the GQM proposal by Basili and Weiss [13] was addressed. In order to validate and mitigate possible threats to the validity of the research, a pilot survey was conducted by five participants and, based on feedback from the pilot survey participants, revisions and improvements were made out in relation to the format and formulation of questions.

After carrying out this pilot survey validation, we actually ran the survey for a period of two weeks, where we got a total of 553 responses. All types of gender were included in this survey, with 433 males, 111 females and 2 transgenders, and 8 non-binary.

According to the validation of the results, it is possible to notice that we still have a lot of male performance in relation to females and the curious thing is, when there is a female presence in digital game groups, more than half use male and female characteristics to identify themselves within the game, rather than just female characteristics, this behavior may be a connection to security to identify. What really stood out among all this, was the number of positive responses when we asked about toxicity in this environment, where 100% of women agreed and 98.6% of men also agreed, thus obtaining almost unanimity on this issue.

Therefore, it was possible to notice a high rate of toxicity in digital gaming environments, making a high range of women still afraid to enter this environment and identify themselves as such a gender, even though some mitigating attitudes are taken by the players and also by game developers, there is still a lot of topics that can be adopted to improve this situation. Thus, we identified great potential for future studies to be developed, such as identification of ways to mitigate toxicities in the digital games environment and stricter penalties when identified and denounced players who exhibit such behaviors.

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