Women's preferences concerning digital games: identification of relevant characteristics through descriptive and formal concept analysis

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Abstract. ***Introduction****: While girls love to play games, many games still fail to engage them properly. Game development is still dominated by a male perspective, perpetuating stereotypes and making it difficult for women to enter the industry.* ***Objective:*** *Therefore, this study explores the characteristics of digital games considered relevant for women, aiming to encourage their engagement with these games.* ***Methodology or Steps****: Female participants completed an online questionnaire to provide data on their perceptions about game characteristics to achieve this objective. The collected data were analyzed using Descriptive Analysis and Formal Concept Analysis (FCA).* ***Results:*** *Based on the results from FCA, we identified and discussed significant relationships among the characteristics considered relevant in games for women.*
Keywords *Games for women, Formal Concept Analysis, Association rules, Digital games, Quantitative analysis.*

1. Introduction

Many games fail to engage girls effectively [Stewart-Gardiner et al. 2013]. Although girls enjoy playing games, Hughes (2017) emphasizes the need for more options tailored to their preferences. In line with this, Kohler et al. (2021) observed positive reactions from girls when engaging with games specifically designed for them. Alserri (2017) also highlighted that gender significantly influences game preferences and motivations, noting a lack of game content developed with girls in mind.

Despite gradual progress, the game industry remains largely shaped by a male perspective, both in development and professional representation. Stereotypical gender portrayals are still widespread [Hughes 2017], and many women face prejudice and judgment when entering gaming spaces. These stereotypes can contribute to feelings of inadequacy and exclusion [Olsson 2018].

This research emphasizes adapting digital games to better attract and engage female players. Given the low number of women in computing and the potential of games to increase tech engagement, it is crucial to identify features that appeal to women. Thus,

this study aims to explore which digital game characteristics resonate with women to support their engagement.

The identified rules — **Rule 1** (allows me to learn more → is not stereotyped), **Rule 2** (allows me to learn more → is not violent), **Rule 3** (is open-world → is not stereotyped), **Rule 4** (is open-world → has female protagonists), **Rule 5** (has female protagonists → is not stereotyped), **Rule 6** (allows for customization → is not stereotyped), **Rule 7** (allows me to relive memories → is not stereotyped), and **Rule 8** (requires reasoning → is not stereotyped) — indicate that players value non-stereotyped, customizable, and educational game features.

The findings show that preferences vary significantly by age group. These variations reinforce the importance of designing games that reflect these differences, promoting greater inclusivity and engagement through personalization.

The inclusion of women in the digital gaming market is important not only as a leisure option. Women remain underrepresented in Science, Technology, Engineering, and Mathematics (STEM), particularly in computing, where cultural and structural barriers persist [Nweje et al. 2025]. Digital games are a potential pathway to increase engagement in tech-related fields, fostering interest and skills in computing [Hosein 2019a].

This article is organized as follows. Section 2 reviews related work on female player engagement and highlights the novelty of our FCA-based approach. Section 3 details the methodology, including data collection and the use of descriptive and formal concept analysis. Section 4 presents the results, focusing on association rules and age group preferences. Section 5 discusses design implications, and Section 6 concludes with contributions and future directions.

2. Related work

Several studies have investigated the relationship between user experience and female player engagement. LiTing and Ying (2021) demonstrated that prioritizing user experience enhances both retention and user loyalty. Building upon these findings, our study examines game features such as the presence of female protagonists and non-stereotyped environments as key elements for increasing inclusivity.

Vermeulen et al. (2016) found that exposure to negative stereotypes can significantly undermine women's confidence in gaming contexts. In response, our work seeks to reduce such barriers by identifying inclusive design elements that foster a more welcoming and supportive environment.

Shaer et al. (2017) highlighted the social and professional potential of games, especially in women's academic and career development. Extending this perspective, we explore how freedom of choice and non-violent gameplay can further encourage female participation.

Van Reijmersdal et al. (2013) emphasized the importance of social interaction and character identification for female players. In alignment with their findings, our research focuses on the appeal of relatable female characters and inclusive narratives that reflect the players' values and identities.

Distinct from previous studies, our work adopts Formal Concept Analysis (FCA) to uncover meaningful associations between game characteristics and player preferences. This methodological approach enables the identification of structural patterns that can inform the design of more inclusive digital games tailored to female audiences.

3. Methods

This section presents the activities and techniques used for data collection and analysis.

3.1. Data collection

We designed a questionnaire grounded on a systematic literature review, following the methodology of Kitchenham and Charters (2007), which ensures rigor in computing and software engineering research. The review covered studies from 2010 to 2023, focusing on female gaming preferences, gender differences, and engagement factors in tech-related activities.

We analyzed a total of 52 peer-reviewed articles. Key studies, such as Duarte et al. (2021), highlighted how features like non-stereotyped narratives and customization significantly influence women's motivation and retention, which directly informed the questionnaire's content.

The questionnaire was built around recurring themes from the literature, using validated constructs related to gender and gaming. Three experts in Human-Computer Interaction and Game Studies reviewed the content to ensure validity. A pilot test with 32 participants was conducted to refine clarity and reliability and remove potential biases. Adjustments were made based on feedback before final deployment.

The final version included 24 statements beginning with "I like a game that..." (e.g., "...is not stereotyped" or "...is simple to play"). These statements appear as "Characteristics" in Table 5.

The questionnaire was published online for 46 days to collect demographic data and assess women's perceptions of digital games. All participants agreed to a Free and Informed Consent Term (FICT), which a Research Ethics Committee approved.

Responses were recorded on a 5-point Likert scale, from 1 (Completely disagree) to 5 (Completely agree).

3.2. Data analysis

In FCA, a formal context corresponds to a tuple $K := (G, M, I)$, where G is a set of objects (extension), M is a set of attributes (intension), and I is an incidence relation ($I \subseteq G \times M$), indicating the incidence of specific attributes in objects (Table 1). When an object $g \in G$ and an attribute $m \in M$ are related through I (a mark **X** on the formal context), it is represented as $(g, m) \in I$ or gIm, which can be interpreted as "the object g has the attribute m".

Given a set of objects $A \subseteq G$ from a formal context K, it is interesting to determine which attributes $B \subseteq M$ are shared by all objects in A. Similarly, for a set $B \subseteq M$, we want to find the objects $A \subseteq G$ that have all the attributes defined in B in common. The search for these answers leads to derivation operators, which are formally

defined as:

$$A' := \{m \in M \mid gIm \ \forall \ g \in A\}$$

$$B' := \{g \in G \mid gIm \ \forall \ m \in B\}$$

It is also possible to extract rules of the form $P \rightarrow Q$, where P and Q are sets of attributes and $P' \subseteq Q'$ - it means that if an object has attributes in P, it also has attributes in Q. A rule $P \rightarrow Q$ is valid if and only if every object that possesses the attributes in P also possesses the attributes in Q. These implications represent dependencies between elements of a set obtained from a formal context.

Evaluation metrics such as support and confidence can be associated with each rule. Formally, **Support** (Equation 1) corresponds to the proportion of objects in the subset $g \in G$ that satisfy the implication $P \rightarrow Q$, relative to the total number of objects $|G|$ in the formal context K, where ($'$) represents the derivation operator.

$$Support(P \rightarrow Q) = \frac{|(P \cup \{Q\})'|}{|G|} \tag{1}$$

Confidence (Equation 2), on the other hand, measures the proportion of objects in the subset $g \in G$ that satisfy both P and Q simultaneously, relative to the number of objects satisfying P.

$$Confidence(P \rightarrow Q) = \frac{|(P \cup \{Q\})'|}{|P'|} = \frac{Support(P \rightarrow Q)}{Support(P)} \tag{2}$$

These evaluation metrics provide quantitative measures of the strength and reliability of the rules in a formal context.

For our data analysis, we employed descriptive statistical techniques to systematically organize and elucidate the key characteristics of the data obtained from the online questionnaire. Additionally, we applied Formal Concept Analysis (FCA) to explore and identify relationships among specific attributes within the female audience.

We used FCA because it can systematically identify hierarchical relationships among attributes, providing a structured representation of female gaming preferences [Ganter and Wille 1999]. Previous studies have successfully applied FCA in user experience research and behavioral pattern analysis [Tilley et al. 2005], demonstrating its suitability for this study. This method enables the extraction of association rules that reveal underlying connections between game characteristics and player preferences.

Responses were recorded using a five-point Likert scale (1 = Completely Disagree, 5 = Completely Agree). For the FCA-based rule extraction, responses rated 4 or 5 were categorized as 'agreement,' while responses rated 1 or 2 were categorized as 'disagreement.' Neutral responses (score = 3) were excluded from the association rule analysis to maintain clarity in identifying distinct preference patterns.

4. Results

In this section, we present the results of the Descriptive and Formal Conceptual Analysis.

Table 1. A Formal Context

G/M	Attribute 1	Attribute 2	Attribute 3
Object 1	X	X	
Object 2	X		X
Object 3		X	X

Table 2. Participants' age

Group	Age	Number	%
1	18-26	341	27.75%
2	27-35	353	28.72%
3	36-44	292	23.76%
4	more than 44	243	19.77%

A total of 1229 women from 28 different countries completed the questionnaire. As seen in Table 2, the participants were from different age groups, with 56% of the participants being between 18 and 35 years old. Interestingly, 55% of participants did not have the habit of playing (Table 3). This profile was even present among younger women (Table 4), since in the 18-26 age group, 10% reported they did not play, and 33% indicated they rarely played (less than once a week).

In the analysis, we did not exclude responses from individuals who do not regularly engage in gaming for various reasons. Their lack of engagement could be temporary — such as due to time constraints — but they may still be familiar with certain games and have specific preferences. One of the objectives of this article is to encourage more women to begin playing games. Therefore, it is crucial to understand their preferences and what they would like to see in games.

Table 5 presents the descriptive statistics of the 24 game characteristics evaluated by participants. The highest-rated attributes include development of skills (M = 4.32), offers challenges (M = 4.30), and "is not stereotyped" (M = 4.29). Attributes related to female representation, such as having female protagonists and characters (M = 3.96), received lower ratings than core gameplay mechanics, suggesting that mechanics and narrative depth are more potent drivers of engagement than representation. These findings align with previous research indicating that while inclusivity is important, mechanics and narrative depth drive player retention [Vermeulen et al. 2011].

It also presents the descriptive analysis results, with mean values sorted in descending order to highlight the most and least-rated characteristics. Participants agreed on most characteristics, except for "allows interaction with other people' and "is of the RPG genre." Disagreement about interacting with others may suggest that female players

Table 3. Participants' playing game habits

Frequency	Number	%
Don´t play	213	17.33%
Rarely	468	38.08%
1-2 times a week	178	14.48%
3-6 times a week	160	13.02%
Daily	210	17.09%

Table 4. Participants' age X playing game habits

Age	Do not play	Rarely	1-2 times a week	3-6 times a week	Daily	Total
18 - 26	34	113	56	65	73	341
27 - 35	62	154	56	38	43	353
36 - 44	63	113	39	30	47	292
> 44	54	88	27	27	47	243
Total	213	468	178	160	210	1229

prefer solo play, while preferences for RPGs are genre-specific.

Table 5 presents the mean scores for each characteristic by age group. The five highest-rated characteristics were: "develops my skills," "offers challenges," "allows freedom of action," "is not stereotyped," and "requires reasoning".

Since this study focuses on characteristics that stimulate engagement and motivation, more general characteristics, already discussed in game design literature [Schell 2008], will not be elaborated. One example is the characteristic "offers challenges".

As can be observed, most of the characteristics obtained similar averages across all age groups. The two characteristics with the most discrepancy in the results by age group were, in descending order: "is not violent" and "has female protagonists and characters".

The results showed that features such as "being non-stereotyped" and "having female protagonists" have a more significant impact among younger women, while games promoting reasoning and being "non-violent" appeal to older women. These findings underscore the need to segment game design features, addressing the specific expectations of each age group to enhance satisfaction and engagement.

Also, the younger ones feel less uncomfortable with the presence of violence in a game. They are more interested in female characters, perhaps due to the game genre they prefer to play.

Participants aged 18 to 26 (Group 1) exhibit a greater preference for games that offer customization options compared to older women. Additionally, engaging characters are a significant preference among women aged 18 to 35 (Groups 1 and 2). Besides, the higher the age group, the more women like games that require reasoning. Furthermore, participants aged over 35 years (Groups 3 and 4) demonstrate a preference for games that provide learning opportunities.

Three characteristics were selected for analysis. The first two were the ones with the greater discrepancy in the results by age group: "is not violent" and "has female protagonists and characters". The third one was "is not stereotyped", because among the characteristics with the mean over 4, it draws attention for providing a discussion on a non-discriminatory view of women.

Figure 1 shows part of the rules, premises, conclusions, supports, and confidences used to extract the association rules and implications. This choice allows observing the most relevant rules. For this study, we used the Lattice Miner tool to extract the rules with a minimum support and confidence of 50%. This approach highlights the most relevant

Table 5. Descriptive analysis with mean per age group

Characteristics	Mean	Standard Deviation	Median	Mean per group			
				1	2	3	4
develops my skills	4.32	1.02	5	4.18	4.29	4.42	4.46
offers challenges	4.30	1.00	5	4.29	4.17	4.43	4.36
allows freedom of action when playing	4.30	1.01	5	4.45	4.25	4.18	4.28
is not stereotyped	4.29	1.13	5	4.28	4.32	4.25	4.31
requires reasoning	4.21	1.06	5	3.99	4.18	4.32	4.48
is simple to play	4.18	1.11	5	4.12	4.11	4.24	4.29
is interactive	4.17	1.11	5	4.33	4.16	4.03	4.11
has an interesting storyline	4.17	1.17	5	4.36	4.11	4.00	4.14
allows me to get out of the routine	4.10	1.17	5	4.18	3.97	4.05	4.22
is a casual game	4.07	1.15	5	4.15	4.00	4.08	4.07
has engaging characters	4.06	1.20	5	4.45	4.05	3.70	3.87
is an adventure game	4.05	1.15	4	4.05	4.01	4.04	4.11
has female protagonists and characters	3.96	1.31	5	4.35	4.01	3.70	3.48
allows me to learn more	3.89	1.20	4	3.79	3.76	3.98	4.12
allows for customization	3.85	1.26	4	4.12	3.83	3.54	3.79
is open-world	3.77	1.29	4	3.83	3.71	3.68	3.86
has humor	3.69	1.27	4	3.62	3.67	3.61	3.93
is not violent	3.69	1.47	4	2.86	3.57	4.12	4.51
allows me to relive memories	3.60	1.37	4	3.70	3.38	3.66	3.69
is of the simulation genre	3.56	1.33	4	3.67	3.48	3.54	3.48
is competitive	3.55	1.38	4	3.54	3.44	3.64	3.63
has fantasy	3.53	1.31	4	3.75	3.46	3.28	3.56
allows interaction with other people	3.02	1.43	3	3.28	2.81	2.78	3.26
is of the RPG genre	2.81	1.44	3	2.99	2.89	2.44	2.85

rules, thereby providing a more precise characterization of a game as perceived by the participants [LarimUQO 2023].

Figure 1. Lattice Miner

To analyze the questionnaire, we considered the four groups according to age presented in Table 2. This division allows the analysis of specific preferences of the female audience at different times in life. The total number of rules found and selected by age group is shown in Table 6 and described as follows:

- **Group 1** (18–26 years) identified 614 rules, with six notable ones showing support above 56% and confidence over 75% (Table 8). Preferences include games that "allow learning," are "open-world," have "female protagonists," and offer "customization," all linked to "non-stereotyped" content. Learning is also

Table 6. Rules X Participants´ age

Age	Number	Total rules	Selected rules
18-26	341	614	6
27-35	353	119	5
36-44	292	242	3
more than 44	243	174	2

associated with non-violence, highlighting a preference for inclusive, educational, and customizable experiences.
- **Group 2** (27–35 years) found 119 rules, with five standing out—four with support over 50% and confidence above 81% (Table 8). Expectations mirror Group 1, favoring learning, open-world settings, female representation, customization, and non-stereotyped, non-violent environments.
- **Group 3** (36–44 years) identified 242 rules, with three key ones showing support over 53% and confidence above 74% (Table 8). As with younger groups, preferences include learning, open-world environments, non-stereotyped content, customization, and non-violence.
- **Group 4** (45+ years) identified 174 rules, with two prominent ones showing support above 50% and confidence over 69% (Table 8). This group values learning, non-stereotyped narratives, and non-violent gameplay. Fewer standout rules suggest more individualized or varied preferences.

The analysis reveals that, in general, women across different age groups share similar expectations regarding digital games, focusing on learning opportunities, open-world environments, female protagonists, and customization. Additionally, there is a common trend among participants in valuing non-stereotyped and non-violent games. This result can be valuable for developing more inclusive digital games that align with women's preferences and expectations.

Table 7. Context representation

	allows me to learn more	is not stereotyped	...	is not violent
Player 1	X	X	...	
Player 2	X		...	X
Player 3		X	...	X

The rules presented in Table 8 represent knowledge extracted from a FCA context (Table 7). As shown, women who value learning in games often prefer non-stereotyped content. Rule 1 (*allows me to learn more → is not stereotyped*) illustrates this: in the 18–26 group (341 participants), 65.1% enjoy learning games, and 87.74% of them prefer non-stereotyped narratives—a trend consistent in older groups.

Rule 2 (*allows me to learn more → is not violent*) shows that 56% of this same group favor learning features, with 75.5% also rejecting violent content, pointing to a preference for positive experiences. Rule 7 (*allows me to relive memories → is not stereotyped*) and Rule 8 (*requires reasoning → is not stereotyped*) further suggest that both emotionally resonant and cognitively demanding games are linked to a rejection of stereotypes. Rule 3 (*is open-world → is not stereotyped*) indicates that 70.38% of younger women enjoy open-world games, and 89.55% of them also dislike stereotypes. This link

Table 8. Rule X Support X Confidence

Rule	Premise	Conclusion	Group	Support	Confidence
1	allows me to learn more —>	is not stereotyped	1	65.10%	87.74%
			2	59.20%	81.64%
			3	62.32%	80.17%
			4	60.49%	84.00%
2	allows me to learn more —>	is not violent	1	56.01%	75.49%
			2	50.14%	69.14%
			3	58.21%	74.88%
			4	50.20%	69.71%
3	is open-world —>	is not stereotyped	1	70.38%	89.55%
			2	57.79%	85.35%
			3	53.42%	83.87%
4	is open-world —>	has female protagonists and characters	1	64.51%	82.08%
5	has female protagonists and characters —>	is not stereotyped	1	66.27%	86.92%
			2	52.40%	85.64%
6	allows for customization —>	is not stereotyped	1	61.29%	85.65%
			2	50.42%	85.16%
7	allows me to relive memories —>	is not stereotyped	1	62.17%	84.12%
			2	51.55%	80.17%
			3	52.05%	77.15%
			4	52.26%	77.43%
8	requires reasoning —>	is not stereotyped	1	56.01%	85.65%
			2	56.65%	77.51%
			3	58.21%	75.89%
			4	56.79%	77.96%

weakens slightly with age, suggesting younger players care more about representation. Rule 4 (*is open-world → has female protagonists*) is exclusive to the 18–26 group: 64.5% enjoy open-world games, and 82% of them like female protagonists. Rules 5 and 6 (*has female protagonists → is not stereotyped* and *allows for customization → is not stereotyped*) reinforce that those who prefer female leads or customization also reject stereotypes, especially women aged 18–35. In short, learning, reasoning, emotional engagement, non-violence, customization, open-world design, and female representation are key preferences among younger women, guiding inclusive game design.

5. Discussion

The descriptive analysis and FCA results highlight the importance of female characters and protagonists in fostering inclusive representation, supporting previous research. Studies like the one from Leonhardt and Overå (2021) point out that male-oriented game design can alienate female players and contribute to a hostile gaming culture. In our results, the feature "has female protagonists and characters" appears in two key rules—linked to non-stereotyped content and open-world games—reinforcing the need for better representation.

Preferences vary by age: younger women value customization and female protagonists, while older women prefer non-violent and reasoning-based games. For instance, 56% of women aged 18–26 enjoy learning through games, and 75.49% of them prefer non-violent options. Across all age groups, at least 50% show interest in educational games, with 69% favoring non-violent content, reflecting findings from

[López-Fernández et al. 2021].

Narrative and casual gameplay are also relevant: the feature "has an interesting storyline" averaged 4.17, while "is a casual game" scored between 4.00 and 4.15 across all ages. In contrast, RPGs were least preferred (2.81), consistent with Shaer et al. (2017) and Ratan et al. (2022) .

The findings of this study deepen and contextualize previous insights from the literature by offering a segmented analysis by age group and gender – an area still underexplored. Social interaction was valued more by younger female players, decreasing from 3.28 (ages 18–26) to 2.78 (ages 36–44). Younger women also placed higher importance on female protagonists, engaging characters, and customization options, with ratings for engaging characters dropping from 4.45 to 3.70 across age groups. Interestingly, women aged 44 and older showed a strong preference for non-stereotyped games and titles involving reasoning and competition, suggesting a desire for cognitively stimulating experiences aligned with their life stage. Therefore, this study brings empirical evidence to support inclusive game design, emphasizing three key priorities: (i) **Representation** – by including diverse female protagonists; (ii) **Gameplay experience** – through customization and problem-solving elements appealing to younger players; and (iii) **Cognitive engagement** – by offering non-violent, reasoning-based challenges that resonate with older female audiences.

6. Conclusions

This study identifies key digital game characteristics that attract female players, based on responses from an online questionnaire. The analysis, using descriptive statistics and FCA, focused on three main characteristics: "is not violent," "has female protagonists and characters," and "is not stereotyped." The findings reveal that women who want to learn prefer non-violent, non-stereotyped games. Younger women favor open-world games with female protagonists and characters, and games with customization options, but these preferences differ across age groups.

The results highlight the importance of considering age-related preference variations when designing games. These differences can foster more inclusive experiences, enhancing engagement and retention in game usage. Indirectly, these characteristics could also increase women's interest in Computing [Hosein 2019b].

A limitation of the study is the demographic bias, with 90% of responses from one country. Future work should diversify the sample and develop a game incorporating the identified characteristics to test its appeal and satisfaction. A longitudinal study could explore how such a game influences women's career choices in Computing and analyze the evolution of preferences over time using TCA.

In conclusion, non-violent games with female protagonists and non-stereotyped narratives are key to boosting female engagement, especially among younger women. Developing a game based on these features could validate their effectiveness in attracting female players and promote female participation in computing and technology, helping to overcome historical gender barriers.

References

Alserri, S. A., Zin, N. A. M., e Wook, T. S. M. T. (2017). Gender-based engagement model for designing serious games. In *2017 6th International Conference on Electrical Engineering and Informatics (ICEEI)*, pages 1–5.

Duarte, S., Pinheiro, R., Bacchin, C., Machado, M., e Ishitani, L. (2021). Sucesso4me: projeto de um jogo para atrair mulheres para a área de computação. In *Anais Estendidos do XX Simpósio Brasileiro de Jogos e Entretenimento Digital*, pages 218–227, Porto Alegre, RS, Brasil. SBC.

Ganter, B. e Wille, R. (1999). *Formal Concept Analysis: Mathematical Foundations*. Springer, Berlin.

Hosein, A. (2019a). Girls' video gaming behaviour and undergraduate degree selection: A secondary data analysis approach. *Computers in Human Behavior*, 91:226–235.

Hosein, A. (2019b). Girls' video gaming behaviour and undergraduate degree selection: A secondary data analysis approach. *Computers in Human Behavior*, 91:226–235.

Hughes, L. A. (2017). *Video games help to prepare girls for a competitive future in STEM: An analysis of how video games help to build visual-spatial skills and the positive influence early childhood gaming can have on girls.* PhD thesis, Kent State University.

Kitchenham, B. e Charters, S. (2007). Guidelines for performing systematic literature reviews in software engineering. Technical report, EBSE Technical Report.

Kohler, L., Fronza, L., Sartori, A., Burger, K., e Araújo, J. (2021). A representatividade feminina nos jogos digitais. In *Anais do XV Women in Information Technology (WIT 2021)*, pages 265–269, Porto Alegre, RS, Brasil. Sociedade Brasileira de Computação.

LarimUQO (2023). Lattice miner. `https://github.com/LarimUQO/lattice-miner`.

Leonhardt, M. e Overå, S. (2021). Are there differences in video gaming and use of social media among boys and girls?-a mixed methods approach. *Int. J. Environ. Res. Public Health*, 18(11):6085.

LiTing, H. e Ying, Z. (2021). Research on the influencing factors of female mobile games loyalty based on acsi model. In *Proceedings of the 6th International Conference on Intelligent Information Processing*, ICIIP '21, page 16–26, New York, NY, USA. Association for Computing Machinery.

López-Fernández, F. J., Mezquita, L., Griffiths, M. D., Ortet, G., e Ibáñez, M. I. (2021). El papel de la personalidad en el juego problemático y en las preferencias de géneros de videojuegos en adolescentes. *Adicciones*, 33(3):263–272.

Nweje, U., Ndubuisi, S., e Makai, C. A. (2025). Women in stem: Breaking barriers and building the future. *International Journal of Science and Research Archive*, 14.

Olsson, M. (2018). "True gamer" culture on Twitch and its effect on female streamers. Master's thesis, Malmö universitet, Malmö.

Ratan, R., Chen, V. H. H., De Grove, F., Breuer, J., Quandt, T., e Williams, J. P. (2022). Gender, gaming motives, and genre: Comparing singaporean, german, and american players. *IEEE Transactions on Games*, 14(3):456–465.

Schell, J. (2008). *The Art of Game Design: A book of lenses*. CRC press.

Shaer, O., Westendorf, L., Knouf, N. A., e Pederson, C. (2017). Understanding gaming perceptions and experiences in a women's college community. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, CHI '17, page 1544–1557, New York, NY, USA. Association for Computing Machinery.

Stewart-Gardiner, C., Carmichael, G., Latham, J., Lozano, N., e Greene, J. L. (2013). Influencing middle school girls to study computer science through educational computer games. *J. Comput. Sci. Coll.*, 28(6):90–97.

Tilley, T., Cole, R., Becker, P., e Eklund, P. (2005). A survey of formal concept analysis support for software engineering activities. In Ganter, B., Stumme, G., e Wille, R., editors, *Formal Concept Analysis: Foundations and Applications*, pages 250–271. Springer Berlin Heidelberg, Berlin, Heidelberg.

Van Reijmersdal, E. A., Jansz, J., Peters, O., e van Noort, G. (2013). Why girls go pink: Game character identification and game-players' motivations. *Computers in Human Behavior*, 29(6):2640–2649.

Vermeulen, L., Castellar, E. N., Janssen, D., Calvi, L., e Van Looy, J. (2016). Playing under threat. examining stereotype threat in female game players. *Computers in Human Behavior*, 57:377–387.

Vermeulen, L., Van, L. J., De, G. F., e Courtois, C. (2011). You are what you play? a quantitative study into game design preferences across gender and their interaction with gaming habits. In *Proceedings of DiGRA 2011 Conference: Think Design Play*, Tampere. DiGRA.