Education and Information Technologies (2023) 28:10639–10664
https://doi.org/10.1007/s10639-022-11574-8

Systematic literature review of digital resources to educate on gender equality

Alma Gloria Barrera Yañez[1] · **Cristina Alonso-Fernández**[2] · **Baltasar Fernández-Manjón**[1]

Received: 18 September 2022 / Accepted: 29 December 2022 / Published online: 2 February 2023

Abstract

Violence and discrimination against women are serious problems that affect today's society regardless of culture or social environment. Educational and government programs addressing these gender issues are difficult to scale up, insufficient or, in some cases, nonexistent. Digital resources can contribute to address discrimination against women and different technological initiatives are being carried out around the world. Videogames and digital resources have proven their effectiveness as tools to educate, prevent and raise awareness about social problems. This article presents a systematic literature review of digital resources such as videogames, apps and simulations that address gender issues including violence and stereotypes. Throughout the review, we analyze multiple characteristics of the resources found (development tools, platforms, location, target audience) to classify the studies found. The main goal of this review is to present the status of gender-focused digital resources, their evaluation studies, including the metrics used and samples, as well as the acceptance and impact of their application. Most of the studies reviewed aimed to raise awareness about gender-based violence using serious games targeted at teenagers. For the resources evaluated, pre-post questionnaires were commonly used. However, many of the projects reviewed did not have evaluation studies or the resources were not openly available, thus limiting their massive application and their potential impact on society. We consider that our results provide a starting point to better understand the role of digital resources in raising awareness about gender issues, highlighting their current limitations, and providing recommendations for future research in gender-based digital resources.

Highlights

- There are multiple digital tools (serious games, apps, etc.) to educate in equality.
- The found digital tools come from all over the world.
- Most gender education initiatives belong to private organizations and NGOs.
- Not all digital tools for educating in equality have related studies or follow-up.
- The reviewed digital resources can be used in different contexts (socioeconomic, geographic, etc.).

Extended author information available on the last page of the article

Keywords Digital resources · Gender equality · Gender stereotypes · Gender violence · Serious games

1 Introduction

Gender stereotypes, gender violence and discrimination against women are serious societal problems frequently ignored or not adequately addressed nowadays. Among the different types of discrimination that exist (United Nations, 2022), this work focuses on discrimination against women, due to its social relevance and prevalence among different countries and cultures. This is a type of discrimination of large reach, as women roughly represent half of the world's population, and time span, as it is not of recent appearance. These sexist behaviors are present in all cultures and social environments. These issues are especially serious in educational institutions, which commonly lack effective protocols to address them (Bailey & Graves, 2016).

Gender stereotypes are social and cultural constructs that assign specific characteristics to individuals, based on their sex and the attitudes historically associated with it. For females, stereotypes generally reduce social value and attack the individual's self-esteem. The so-called gender roles refer to the roles assigned by society and establish the norm of how an individual should act, depending on his or her sex. These roles depend on stereotypes and aim to regulate the associated or expected behaviors of an individual, as well as the interactions with other members of society (Heilman, 2012).

Among the many gender issues that women face, violence is one of the most alarming. In its multiple forms (sexual, economic, physical, labor, institutional, etc.), it attacks different aspects of the victims, including their physical and mental health, economy, dignity, ability to make decisions for themselves, and self-esteem. According to WHO figures in its 2002 World Report on Violence and Health, with surveys conducted in 48 countries, up to 69% of the women interviewed had been physically assaulted by an intimate partner at some point in their lives (Krug et al., 2002). UN Women, the United Nations organization dedicated to promoting gender equality and women's empowerment, estimates that 736 million women globally (nearly one in three) have been subjected to intimate partner violence, non-partner sexual violence, or both at least once in their lifetime and less than 40 percent of women who experience violence seek help (UN Women, 2021). Gender-based violence can also escalate due to external circumstances; for example, because of the quarantine measures taken during the COVID-19 pandemic, cases of gender-based violence rose considerably (Pastor-Moreno & Ruíz Pérez, 2021).

Gender-related discrimination and violence additionally have a serious impact on children's development, mainly on those of primary school age, whose formative years define and ingrain the individual's future values, beliefs, and behaviours in society. Gender stereotypes and violence faced daily especially by girls in environments such as school can have detrimental effects including school dropout, depression, low performance, or substance abuse, and even permanent effects on their psychosocial and learning development (OHCHR, 2021). Constant exposure to the media (music, television, social networks) and its hypersexualization only aggravate

this problem (Trekels et al., 2018). Regardless of women's age and circumstances, gender-based issues are prevalent and widespread, and need to be made visible and effectively addressed.

Digital resources such as serious games, virtual reality simulations or mobile apps can contribute to address these gender issues, mainly for prevention and awareness. For instance, the mobile application "Girl Rising[1]" addresses the difficulties girls face when attending school in India, while the app "Sheboard[2]" uses the predictive text of mobile keyboards to educate on the use of inclusive and gender-neutral language. Both initiatives have proven to have a positive impact among their users (Vyas et al., 2020).

Serious games are designed with a formative and educational purpose beyond the playful purposes typically associated with videogames (Djaouti et al., 2011; Zhonggen, 2019). A wide range of serious games have been effectively used in education, scientific (biotechnology, STEM), medical (health professionals, CPR training), political, or historical domains. Videogames provide an interactive environment that allows serious messages to be conveyed through platforms commonly used by children and teenagers, enriching opportunities for interaction, engagement, and active learning (Horban & Maletska, 2019). NGO examples such as Project Tomorrow[3] reported that in the USA, during 2021, 67% of primary and secondary school principals considered the use of serious videogames and digital tools as an indispensable part of their curricula.[4] Considering their multiple benefits, once validated, serious games can be effectively used in educational settings (e.g., schools) and can be easily scaled up to obtain a bigger impact than traditional non-digital resources (Boyle et al., 2016).

This article presents a systematic literature review of studies presenting serious games and other digital resources addressing gender issues (including stereotypes, violence, etc.). The review studies the educational resources to analyze their characteristics and assess their impact on players. The main goals of this review are:

- To present a compilation of existing works on games and interactive digital resources that address gender issues, describing their main characteristics and, if applicable, the evidence on their effectiveness.
- To present the current state of research to set an academic and informative precedent for those who are developing or researching games and digital resources to address gender issues.

The rest of the article is structured as follows: Section 2 reviews some related works and the background of the review; Section 3 describes the methodology used for the systematic literature review; Section 4 presents the results obtained which are

[1] https://girlrising.org/
[2] https://www.sheboard.com/en/
[3] https://tomorrow.org/
[4] https://tomorrow.org/speakup/pdfs/2020%20Speak%20Up%20National%20Report.pdf

discussed in Section 5; Section 6 states the limitations; and finally, Section 7 summarizes the main conclusions of the literature review.

2 Related work

Multiple types of serious games have been used to address different educational or social problems. There are many examples of serious games created to train or educate in various domains (e.g., STEM, business, health) (Eid et al., 2014). Other kinds of serious games are used to address complex scientific problems by transforming the problem into a game, so users contribute to solve the problem simply by playing (e.g., Foldit to find new medicines) (Kleffner et al., 2017). Serious games have also been used to increase students' awareness of various social problems (e.g., cyberbullying) (Calvo-Morata et al., 2019) or even to change complex behaviors such as prejudice or bias (Gertner et al., 2016). However, despite the great variety of existent serious games, we have identified an important gap concerning gender education and we have not found any specific review on the topic.

Regarding gender issues, technology has been used mainly for informative purposes, while there are few interactive or playful approaches that could foster connection or increase participants' interest in these topics. There are mainly awareness campaigns and other actions to combat sexism, counteract gender stereotypes or make women's rights more visible (Sabri et al., 2022). Those campaigns are usually funded or supported by NGO or non-profits organizations. For example, "Alerta Machitroll" by the Karisma Foundation (Naranjo Ruiz & Ospina Álvarez, 2021) in Spain to visibilize the digital gender-based violence suffered by women, or the "Centro Especializado de Atención a la Violencia" of the DIARQ Foundation in Mexico (Weinstein, 2020) aims at the prevention, detection and care of family and gender-based violence. Another example of a non-profit company is John Snow Inc. (JSI) that provides governments around the world with technical and management assistance for different initiatives, including the prevention and awareness of gender violence.[5]

Recently some serious games and other digital resources have started to be used to address gender-based violence and gender-related issues. A relevant initiative is the one of "Jennifer Ann's Group" a non-profit specialized in educating and preventing dating violence (Crecente, 2014). They have created and promoted many digital resources (mainly serious games) to raise awareness about dating violence, including titles like Honey Moon,[6] Another Chance[7] and Grace's Diary.[8] Other initiatives addressing gender issues are "Ni más ni menos[9] (Spain)" or "Spotlight[10]

[5] https://www.jsi.com/preventing-and-responding-to-gender-based-violence/
[6] https://playhoneymoon.com/
[7] https://jagga.me/anotherchance.html
[8] https://jag.itch.io/graces-diary
[9] http://carei.es/igualdad-de-genero/
[10] https://www.spotlightinitiative.org/es/lo-que-hacemos

(worldwide)" that use different approaches, such as trivia to test the user's knowledge on gender issues, usually combined with more traditional approaches, such as community work, fostering independent associations and civil society, or providing support services to victims of gender violence. Another relevant initiative is "Afroes games", a project developed in Africa that uses digital tools to address violence and inequality (Fisher, 2016). For instance, they created the videogame "Moraba",[11] a digital tool that aims to raise awareness about gender violence on the continent (Fisher, 2017).

Games to address gender issues may incorporate all features, techniques, and mechanics of serious games in general, to increase empathy, or raise awareness about gender differences like other social issues covered in serious games. While a priori, gender issues can be addressed through serious games like any other, some factors may need to be considered. A potential difference when addressing gender issues may appear from the perspective followed in the game: first-person games may rely on the identification of the player with the game's character (Dillon, 2013) and, if the gender of the game character is different to that of the player, it may cause a lack of identification that affects the game's purpose. The same may occur if all members of one gender are oversimplified in the game (e.g., women depicted as victims, men as villains), potentially drifting those players away from the game by causing an initial rejection, instead of engaging both male and female players (Sadati & Mitchell, 2021). While there also may be potential differences in the preferences between male and female regarding videogame genres, the stereotype that females do not play videogames is not valid (Rugelj & Lapina, 2019), therefore, a well-designed game-based approach could be equally effective for both male and female players.

An important issue regarding gender-related serious games and digital resources is that in most cases these resources have not been scientifically validated, and there are no related scientific articles presenting these resources or providing evidence on their effectiveness. To cope with this problem and find such resources, in a previous study a search of general gaming websites was conducted to locate serious games that aimed to educate on a variety of gender topics (Barrera et al., 2020). Some of the example games and applications mentioned in this paper come from that general search. Even though multiple resources were found in that study, we still confirmed that most of them did not have related publications validating the resources and/or providing evidence of their effectiveness. Therefore, we decided to carry out this systematic literature review, to find such validated and tested games and digital resources addressing gender issues.

3 Methodology

This article presents a systematic review of the literature on serious games and digital resources that address gender issues, with goals such as awareness, visibility, or support for a more egalitarian gender education, describing their effectiveness and validity. This methodology is based on the PRISMA 2020 protocol (Page et al.,

[11] https://afroes.com/moraba

2021). The review was performed independently by the authors of this review to try to minimize any possible bias (every result was reviewed by at least 2 researchers).

In this review, we aim to determine the described benefits and identified challenges of using digital resources (e.g., serious games, mobile apps) to raise awareness of gender-related issues (e.g., gender stereotypes, gender inequality, gender-based violence). For that, we analyze the type of resources and mechanics used to address these gender issues, as well as their target audience (e.g., age, socio-cultural context). Regarding the studies concerning their validation or effectiveness, we further analyze the characteristics of such studies including the number of users with whom these games are evaluated, and the accessibility of these tools and their social impact.

3.1 Research questions

To obtain that information, we propose the following research questions:

- RQ1. What gender issues are addressed in existing digital resources?
- RQ2. What are the target audience and platform of the digital resources?
- RQ3. What are the types of digital resources and their characteristics (e.g., mechanics) used to identify and counteract the issues addressed?
- RQ4. What instruments are used to conduct the impact analysis of the digital resources[12]?
- RQ5. What are the characteristics of the samples used in the studies (sample size, ages, geographic location, social context, etc.)?
- RQ6. What results have been obtained in the studies?
- RQ7. What are the limitations of the studies?

3.2 Data collection

We followed a standard systematic literature review methodology, using a fixed set of queries in a previously identified list of bibliographic databases and clear inclusion/exclusion criteria.

3.2.1 Databases used

We identified and consulted 16 different databases, including some of the main research-oriented databases and specific databases chosen based on their relevance, academic validation, and number of results. The databases consulted are Association for Computing Machinery (ACM), Cambridge Journals Online, CIEG UNAM, Dialnet, Education Resources Information Center (ERIC), Frontiers, IEEE Computer

[12] It is of utmost importance to consider that we cannot give a single definition for "instruments", as these will change based on each of the documents reviewed, therefore, one study may have pre/post application questionnaires of the digital resource as an instrument, while another may opt for quantitative analysis based on its own indicators.

Society Digital Library (CDSL), IEEE Xplore, JSTOR, Oxford University Press (journals), Science Direct, Scopus, Springer, Taylor & Francis, Web of Science and Wiley Online Library. The databases CIEG UNAM and Dialnet were included to consider possible relevant results in Spanish, which is pertinent due to the high rate of gender issues present in Spanish-speaking countries, especially in Latin America (Pérez-de-Guzmán et al., 2019). In the specific case of CIEG we considered it relevant since it is a database focused on gender issues.[13]

3.2.2 Search terms

Our search scope is articles written in English or Spanish, so we initially proposed two alternative searches with terms in both languages. The queries include terms related to the digital resource (serious game, and alternative terms for digital resources) combined with terms related to gender-related issues. All searches, when allowed by the database search, are limited to the title, abstract and keywords. In databases that did not allow this filtering automatically, it was performed manually by the authors. All searches were conducted in May 2021.

- English search terms:

(“videogame” OR “serious game” OR “educational game” OR “video game” OR “mobile app” OR “educational app” OR “simulation” OR “virtual environment” OR “m-learning” OR “mobile learning” OR “e-learning” OR “game-based learning” OR “digital resource”)

AND

(“gender equality” OR “gender education” OR “gender stereotypes” OR “gender violence” OR “gender roles” OR “gender inequality” OR “gender gap” OR “gender discrimination” OR “gender issues”)

- Spanish search terms:

(“videojuego” O “juego serio” O “juego educativo” O “video juego” O “aplicación móvil” O “app educativa” O “simulación” O “realidad virtual” O “aprendizaje móvil” O”aprendizaje electrónico” O “aprendizaje basado en juegos”)

Y

("igualdad de género" O "educación de género" O "estereotipos de género" O "violencia de género" O "roles de género" O "desigualdad de género" O "brecha de género" O “discriminación de género”)

3.2.3 Selection of studies

While several games and digital resources may exist that address gender issues, this review focuses only on those resources described in scientific publications or with

[13] CIEG: Centro de Investigaciones y Estudios de Género / Center for Research and Gender Studies.

some type of academic or formative validation, to ensure that they provide sufficient evidence for analysis. To this end, we established the following inclusion and exclusion criteria.

Inclusion criteria:

- Articles published in scientific journals or at research conferences.
- Articles that include empirical evidence from studies that evaluate serious games or digital resources on gender-related issues (even if the resource is not available).

Exclusion criteria:

- Publications whose full text is not available.
- Publications whose language is not English or Spanish.
- Publications that focus on gender differences in videogame use (e.g., gender differences playing non-serious videogames).

All searches and study selection were conducted by at least two of the authors independently, and the results were compared to ensure both an adequate search of the different databases and an adequate selection of relevant studies.

3.2.4 Data analysis and extraction

For each of the articles included in the review, we collected the specific data to address each of the proposed research questions, and then conducted a mapping study to categorize the results obtained. Any additional information provided in the studies and considered relevant to the literature review was also collected. We classified the data from the selected studies according to the following measures:

- Focus and approach to the gender issue (addressing RQ1)
- Target audience and platform (addressing RQ2)
- Type of digital resources and features/mechanics (addressing RQ3)
- Instruments used to study the impact of the resources, such as pre-post questionnaires (addressing RQ4)
- Sampling used in the studies, including sample size, ages, geographic location, social context (addressing RQ5)
- Results obtained from the studies (addressing RQ6)
- Limitations of the studies (addressing RQ7)

4 Results

4.1 Studies identified by search terms

The studies were retrieved in May 2021 using the search queries. Some of the selected databases (e.g., Dialnet, JSTOR) did not support the full query, so it was

necessary to split it into separate searches and then combine the results. Other databases did not work correctly with the AND and OR operators, so we had to double-check the presence of the terms in the studies.

The total number of studies obtained in the searches performed in the different databases was 6669 articles. Some databases did not provide any results (IEEE Xplore and CIEG UNAM).

4.2 Studies identified by inclusion criteria

The selection of studies was carried out by reviewing the obtained 6669 articles. Although the search yielded many articles, most of them did not meet the inclusion criteria. One of the reasons was the confusion between "gender" and "genre" (referring to videogame genres like shooters, sports, role-playing games / RPGs, etc.) in the results. This was solved (in the absence of adequate filters in the databases) by reviewing each result individually and discarding those with topics unrelated to this research. Another issue was the high number of articles that studied gender differences when using videogames. These articles appeared in the search results as they included terms such as "videogame" and "gender roles" but were discarded because the games did not address any aspect of gender; instead, the gender perspective was only included to measure differences between female and male users when playing the games.

After reading the titles and abstracts of the articles obtained, 188 were selected as possible candidates. Removing the articles that were duplicated in different databases, we obtained 119 unique articles that were subjected to scrutiny to determine their full relevance (or lack thereof). After reading the full text of these articles, the final set of articles included in our literature review contains 36 studies (Fig. 1).

The 36 studies included in the final set were reread and analyzed according to the criteria established in Section 3.2.4 Data analysis. The following section presents the results obtained from that analysis, answering the research questions.

4.3 Analysis results

All selected studies were recent (publication years ranged from 2014 to 2021). The selected articles had been published in journals (22 studies), conferences (12) and workshops (2) and were written in English, except for one that was written in Spanish.

RQ1. What gender issues are addressed in existing digital resources?

Serious games and digital resources addressing gender issues are primarily aimed at raising awareness (13 studies, including (Fonseca et al., 2018)), changing player behavior (13, including (Jouriles et al., 2016a)), and teaching or training skills (10, including (Potter et al., 2021)).

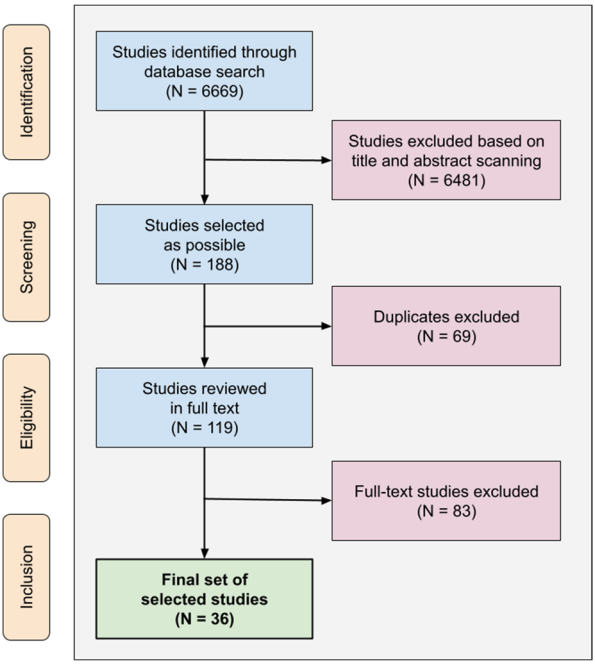


Fig. 1 Systematic literature review search process

Gender-specific issues addressed by digital resources can be broadly categorized within the theme of gender-based violence (28 studies) and gender stereotypes (8). Gender-based violence aspects considered in the studies included domestic violence (Smith et al., 2017), gender violence (Aguilar et al., 2019) or sexual violence (Gilliam et al., 2016). Gender stereotypes are considered in studies like (Muller et al., 2017) or (Hagerer et al., 2020). In particular, the specific gender-related issues addressed by the resources are shown in Fig. 2, along with the number of tools that mention each issue. Some resources cover more than one gender-related topic.

RQ2. What are the target audience and platform of the digital resources?

The target audience of the games and resources reviewed are mainly adolescents (18 studies, such as (Gilliam et al., 2016)), followed by youth and university students (8 studies, such as (Do et al., 2021)). Only 3 studies targeted younger participants in elementary school (Andrade et al., 2019; Boduszek et al., 2019; Scholes et al., 2014). 5 studies targeted participants of any age, and 2 did not specify any age, but a specific profession (health care providers and professionals), thus targeting adults in those fields (Almeida et al., 2018; Mason & Turner, 2018). Notice that the resources in some studies targeted multiple age ranges (e.g., high school and college students).

Regarding the platform of use of the games (Fig. 3), most can be played online on websites (13), while others mention specific platforms or operating systems: Android (7), iOS (4), Windows (4), MAC (1), and headsets/virtual reality goggles (4). The remaining 3 studies do not mention platform of use.

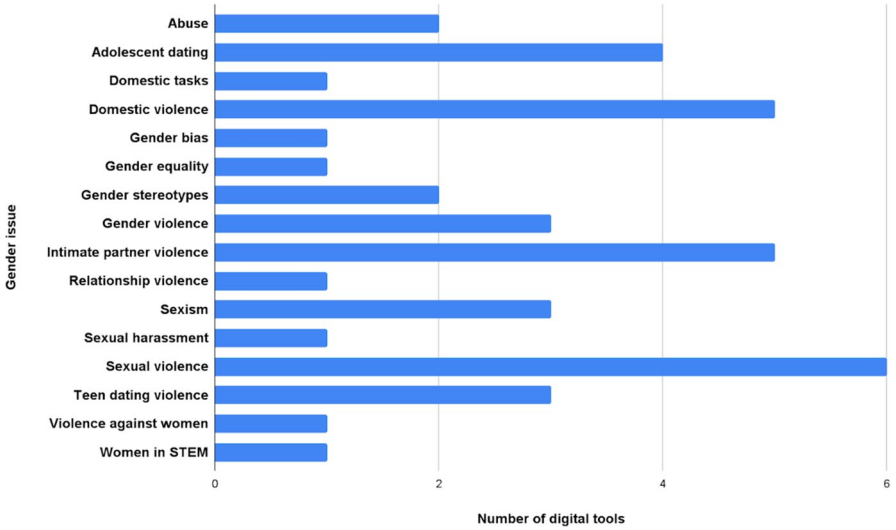
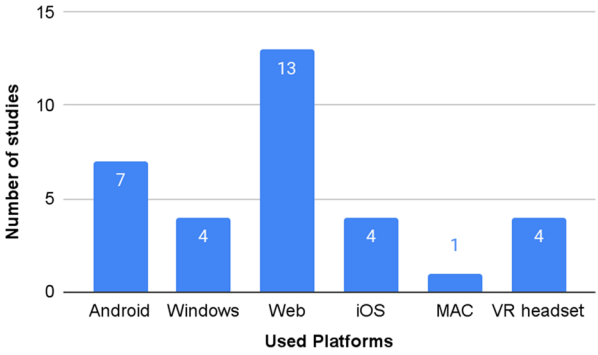


Fig. 2 Specific gender-related issues addressed in the games

Fig. 3 Platforms and operating systems used in the games



RQ3. What are the types of digital resources and their characteristics (e.g., mechanics) used to identify and counteract the problems addressed?

The tools included in the studies are mainly videogames and serious games (25 studies), followed by virtual reality environments (6) and apps (5).

The mechanisms used to identify and counteract the gender-related issues addressed are varied. Most games and tools (17 studies) expose players to different situations to promote reflection and learning. Through this "situation exposure", players can learn by observing the actions and experiences of other people (indirect learning): both the player's avatar and other NPCs. To further promote these reflections, games include different mechanics, such as allowing interactions with some characters in the game (Pabón-Guerrero et al., 2019), conversations, challenges and multiple-choice options to act in response to the story (Navarro-Pérez et al., 2019), observing actions and their consequences (Sygel et al., 2014). With these mechanics,

games aim to make players question socially accepted beliefs, identify negative messages or problematic scenarios, or explore gender stereotypes.

Some of these studies (3) specify that players are exposed to a story that follows the life of a woman: one story involves a mother and her child, who live with the mother's partner who has violent tendencies (Boduszek et al., 2019); another story features a woman recalling a past experience of sexual assault (Gilliam et al., 2016); and the third story follows a female character and her experiences of intimate partner violence in her relationships (Pearson et al., 2020).

Another large group of games and tools (11 studies) uses perspective-taking to address gender issues. In most cases, players take the perspective of the victim of one of the gender issues (dating violence, domestic violence, sexual harassment, discrimination in the workplace) (Ugolotti et al., 2020). In some of those situations, players can respond to change the story or observe the consequences. Some tools allowed players to take different points of view in the story (a friend of the main female character (Cabrera-González & Florido, 2020), female or male avatar to compare stereotypes (Beltran et al., 2021), or both first and third person perspectives (Muller et al., 2017)). This perspective-taking approach appears in studies using virtual reality environments, 4 of which included an actor to play the role of the male avatar in the simulation. Some studies mention that instructors can use supplemental teaching materials to then discuss in small groups in class the gender issues covered in the resources (Lee et al., 2019).

RQ4. What instruments are used to conduct the impact analysis of the digital resources?

27 of the 36 selected studies (75%) present assessment of the games, but not all studies used similar instruments to analyze the impact of their respective games. Most studies used pre-post questionnaires (13 studies, like (Jozkowski & Ekbia, 2015)), while some authors choose to apply only post-game questionnaires (e.g., (Sygel et al., 2014)). Some studies included control groups (e.g., (Rowe et al., 2015)), focus groups (e.g., (Debnam & Kumodzi, 2021)) or follow-ups (e.g., (Ugolotti et al., 2020)). All methods contained in the evaluation studies are shown in Fig. 4.

RQ5. What are the characteristics of the samples used in the studies (sample size, ages, geographic location, social context, etc.)?

Of the total of 36 studies, only 26 provided information on the population used in the evaluation studies. One additional study described the use of pre- and post-questionnaires, but did not detail validation samples (Lee et al., 2019). Of the 26 studies that did present information on the population used, the mean sample size used was 443 participants (SD = 1735). This result is altered by an outlier of one study with almost 9000 participants (Mason & Turner, 2018). Without this outlier, for the remaining 25 studies the mean sample size falls to 103 participants (SD = 103, median = 71 and mode = 32), with a minimum value of 7 participants (Pearson et al., 2020) and a maximum of 369 participants (Navarro-Pérez et al., 2019). Figure 5 provides the boxplot of the sample size of the studies.

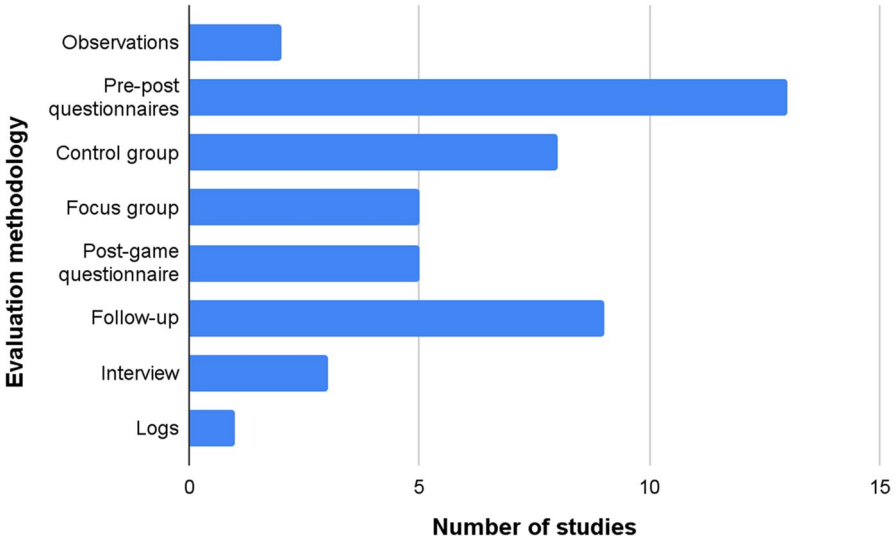
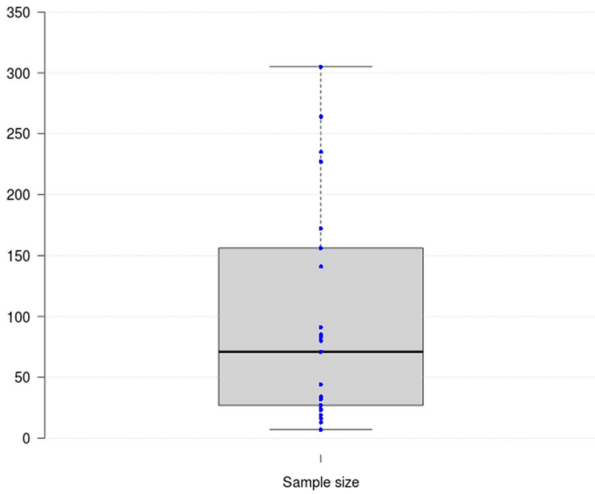


Fig. 4 Tools and methods used in evaluation studies

Fig. 5 Sample size of the studies



Regarding the age of participants, most of the 26 studies presenting population information (19), were applied with adolescents and college-aged participants (aligning with the target ages of the resources), while only 4 were tested with adults. 3 studies did not provide information on the age of the participants.

Of the 22 studies that reported the location of participants, most studies were conducted in the American continent, followed by Europe (Fig. 6).

Figure 7 presents the studies by country that provide information on the samples. It is important to note that although the American continent yielded the most studies, it is the United States that contributed most of these articles and

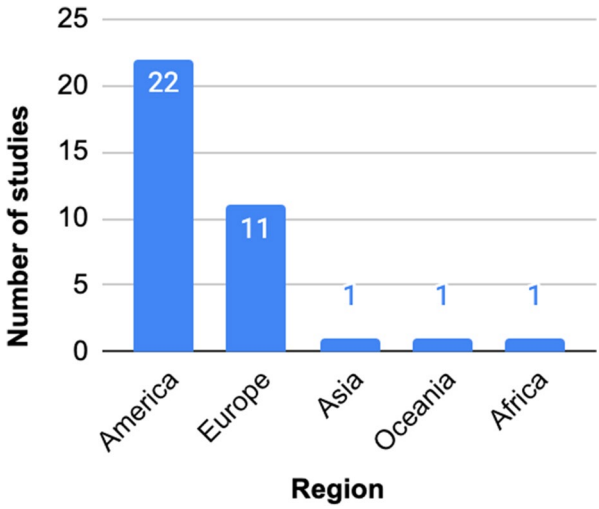


Fig. 6 Studies found by continent

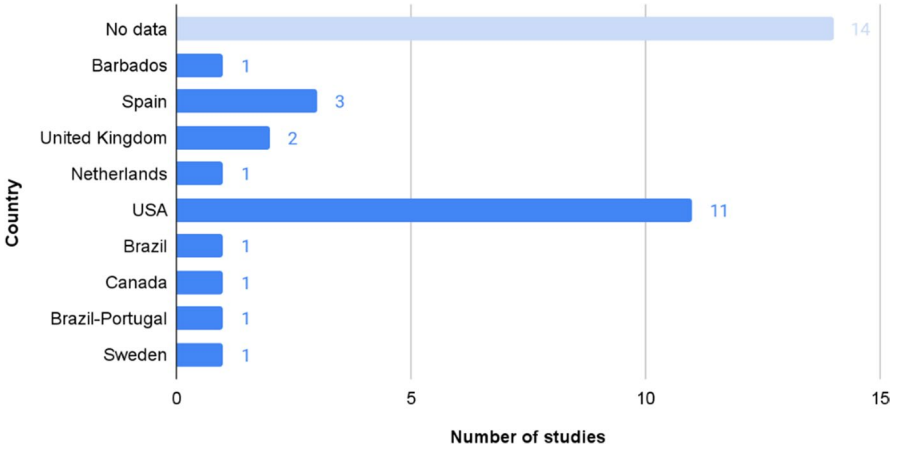


Fig. 7 Studies by country that include sample information

digital tools (11), with studies like (Potter et al., 2019) or (Sargent et al., 2020). The remaining studies were conducted in Spain (Aguilar et al., 2019; Navarro-Pérez et al., 2019, 2020), United Kingdom (Bowen et al., 2014; Pearson et al., 2020), Barbados (Boduszek et al., 2019), Canada (Mason & Turner, 2018), Netherlands (Muller et al., 2017), Sweden (Sygel et al., 2014), two of Brazil (Fonseca et al., 2018), one of them in collaboration with Portugal (Andrade et al., 2019).

Some studies mentioned additional characteristics about the participants. In most studies, participants were university or college students (8) or primary and secondary school students (4). Health professionals were the subject of 2 studies (Almeida et al., 2018; Mason and Turner, 2018). Other studies included additional eligibility criteria. For example, one study included public school students with

a substance abuse or intimate partner violence risk criterion (criteria included being pregnant, being a parent, or having failed two or more core classes) (Elias-Lambert et al., 2015). Other studies indicated that participants were recruited through local community service organizations (Debnam & Kumodzi, 2021) or reception centers (Navarro-Pérez et al., 2020). One study was tested with a group of male offenders and a control group of non-offender males (Sygel et al., 2014).

RQ6. What results have been obtained in the studies?

Of the 27 studies analyzed that contained an evaluation of the games, 18 reported positive results, while 5 obtained mixed results and 4 stated that were still in the analysis process at the publication time.

The positive results obtained included measures of effectiveness and impact of the tools applied. The game "Behind Every Great One" effectively conveyed benevolent sexism and increased empathy toward victims (Ugolotti et al., 2020). The game "Pandora's Caixa" positively impacted players, with 80% of participants increasing their awareness about domestic violence against women after the game (Almeida et al., 2018). The initial application of the game "Ines & Us" indicates that it can influence adolescents and adults to combat critical social scenarios in their region regarding, among others, violence against women (Andrade et al., 2019). With the "Choices & Consequences" game, participants increased their learning about gender violence and believed that the game can help prevent violence in relationships (Elias-Lambert et al., 2015). The use of the "Campus Craft" game increased students' learning about different prevention concepts related to sexual consent and rape culture, while participants also enjoyed various aspects of the game (Jozkowski & Ekbia, 2015).

Several studies also reported positive outcomes of the resources compared to control groups. The mobile app "Liad@s" had two studies that showed that the application of the app reduced adolescent sexism significantly by 6% to 12% (Navarro-Pérez et al., 2019) and that the reduction in all dimensions (sexism, prejudice towards men, romantic love myths) was linked to the prevention of teen dating violence. In that second study, the experimental group had a greater effect than the control group, and no differences were found by sex of the participants (Navarro-Pérez et al., 2019). The results of the application of the videogame "Jesse" showed that participants in the experimental condition, but not in the control condition, increased affective responsiveness toward victims of intimate partner violence (IPV) at the end of the intervention (Boduszek et al., 2019). Users of a conversational interface also reported feeling more engaged with the situation and more comfortable discussing the topic of sexual harassment than those in the control group who read the same vignette online (Do et al., 2021).

Virtual reality (VR) environments also elicited positive effects on players. The virtual reality "Through Pink and Blue Glasses" had a positive effect, with more than half of the participants feeling moved, involved in the character's feelings, and with new insights after seeing things from another perspective (Muller et al., 2017). Another VR obtained scores on four simulations that correlated, as expected, with self-report measures of dating violence perpetration, among other issues (Sargent et al., 2020). The

VR environment presented by Jouriles had two studies, the results of which showed that bystander behavior in simulations correlated with all measures of responsibility to intervene, effectiveness to intervene, intention to intervene, and self-reported bystander behavior (Jouriles et al., 2016a), and that effectiveness to intervene correlated with observed bystander behavior in dating violence situations at 1-week and 6-month assessments (Jouriles et al., 2016b). In a virtual work environment, comparing positive and negative work scenarios, and female and male avatars, the largest effect was found for participants with a female avatar in the negative environment, who significantly reduced their implicit gender bias (Beltran et al., 2021).

In health applications, the "Responding to Domestic Violence in Clinical Settings" program to increase knowledge and competence in assisting victims of intimate partner violence was positively received by both health professionals and students, and was perceived as engaging and clear (Mason & Turner, 2018). Also, the "Reactions to Display/Intimate Partner Violence (RoD/IPV)" computer simulation was well received and understood by both offender and non-offender male groups. Results showed that offenders who had not undergone the Integrated Domestic Abuse Program showed a tendency to make more violent decisions in the simulation (Sygel et al., 2014).

Some of the analyzed articles also obtained positive results in follow-up studies. The games "Mindflock" and "Ship Happens" had two studies. In the first, both the question-and-answer game (Mindflock) and the interactive scenario game (Ship Happens) had a positive impact, while the interactive scenario game was especially effective in increasing male attitudes towards bystander intervention. This increased effect was obtained in the posttest and in the follow-up study (Potter et al., 2019). The second study with these games found an increase in bystander efficacy (confidence in knowledge about the intervention) and bystander attitude (perceived intention to intervene) in both the trivia and adventure game conditions, but not in the control group (Potter et al., 2021). The game “Lucidity” was first tested with a focus group in which participants gained new knowledge and approved the game. In follow-up interviews, nearly all participants had initiated a conversation with a parent, peer, or teacher about sexual violence, and reported that the game increased their knowledge and awareness of a variety of health and sexual violence issues (Gilliam et al., 2016).

Some studies presented mixed results in their findings. Basically, these results included some possible improvements discovered during the evaluation studies and some limitations found in the resources. Two studies reported limitations and frustrations with functionality (Bowen et al., 2014), and the need to simplify the instructions and clarify the language to make it more familiar to the young target audience (Aguilar et al., 2019). Two studies had poor results in follow-up interventions: one reported an effect in only 12 participants (Rowe et al., 2015), while the other reported changes that only held for females in one of the game conditions (Potter et al., 2021). Participants in one study had positive attitudes but still reiterated gender stereotypes (Fonseca et al., 2018).

Other studies reported work in progress: a study with preliminary evaluation results yet to be analyzed of a game to increase awareness of gender-based violence (Pabón-Guerrero et al., 2019); a discussion between game designers and participants

about the characteristics (characters, environments, story, etc.) of a game to increase awareness of intimate partner violence (Pearson et al., 2020); a preliminary evaluation with a focus group to provide feedback (e.g., should clarify signs of abusive relationships, provide resources for immediate help) on an app for safety planning and teen dating violence (Debnam & Kumodzi, 2021); and a theoretical framework that uses empathy and creativity to design serious games, illustrated with an example of a serious game to raise awareness of domestic violence (Marda et al., 2018).

Additionally, the 9 studies that did not contain game evaluation described different phases of the life cycle of the games: the background that led to the creation of the game (e.g., interviews with victims of teen dating violence), the design, development, and implementation of the games, and/or general description of the games (Alonso-Garcia et al., 2020; Cabrera-González & Florido, 2020; Crecente, 2014; Fisher, 2017; Hagerer et al., 2020; Hosse et al., 2015; Lee et al., 2019; Scholes et al., 2014; Smith et al., 2017).

Some additional findings were presented in the studies. Positive features of the games were highlighted, including the possibility of being able to change gender, which helped in identification (Muller et al., 2017) and the use of first person, which made the narrative realistic and relatable (Do et al., 2021). Interactivity was also a major strength of the tools (Mason & Turner, 2018). The virtual reality simulations yielded high-impact results and provided an additional method relevant to self-reports for assessing responses in different situations (Sargent et al., 2020). Finally, young participants stated that they preferred games to traditional learning methods, as they are more engaging, interactive, and combine learning in formal and informal settings (Elias-Lambert et al., 2015).

RQ7. What are the limitations of the studies?

The limitations found in the studies included small sample size (9 studies), other limitations in the sample (6 studies), technical problems (8) and other limitations in the game (8), the lack of follow-up studies (6), and the lack of results (5).

Regarding the sample size, it was a limitation of several studies for replicability and generalizability of the results (Aguilar et al., 2019). Some other limitations in the samples used are that are not representative of the users, either not belonging to the target population, being from a single school or not being sufficiently diverse (e.g., the game "Papo Reto" was tested in just one school, during a short period of time (Fonseca et al., 2018)). In the experiments conducted in presence of members of the design team, a possible positive bias may arise from participants trying to behave in a socially desirable manner (Jouriles et al., 2016a) or when expressing their opinion in front of the developers (Elias-Lambert et al., 2015).

Technical problems and other game limitations were also present in several studies. Technical limitations included requirements for Internet connectivity in schools, games were too slow, or the screen would freeze. Some of these technical problems occurred when the studies were conducted with prototypes, while their final versions were still being developed at the time of the studies. Other limitations found in the games included unclear instructions, resulting in players needing help to navigate the game, some buttons (e.g., the help button) not being clearly visible, a limited

range of interactions, and other improvements found in playability and user experience. For instance, “Green Acres High” had issues with frozen screens and non-visible parts of the game, along with unclear instructions (Bowen et al., 2014). An additional limitation in the studies that applied VR environments was the requirement of specific personnel (players and observers/coders) that increased costs, time, and labor, even more than traditional self-diagnostic questionnaires, so the use of such resources may not be feasible in large-scale evaluations.

Another limitation noted in some studies was the lack of follow-up studies to measure the long-term effects of the resources or to compare their efficacy with more traditional methods (Cabrera-González & Florido, 2020). A final limitation was that some studies did not include results of the validation of the games, but only a simple description of their characteristics (Pabón-Guerrero et al., 2019). The latter happens with different games that, although they have significant investments, seem to have neglected the studies or simply decided not to make them public.

5 Discussion

Gender-themed digital resources were scarce and difficult to locate. Most of the results found are written in English, and we only located one in Spanish (Cabrera-González & Florido, 2020). Although there may be more results in other languages, those results should be not very relevant, as most databases automatically translate search terms and article titles delivering results in different languages. This led us to find less than a dozen results in languages such as Chinese, Portuguese and German, most of which were translated versions of articles already found.

Aligning with their development in English, most resources found in the review came from the USA. This may be related to the significant budget of the Office of Gender Equality and Women’s Empowerment,[14] the office in charge of gender issues in the USA, which through US AID, has access to some percentage (not specified) of the $19.6 billion dollars that this agency receives on average annually (US AID, 2021).[15] Considering Europe some games developed in this continent are used as a support tool in other less developed countries. A relevant example is Jesse, a 3D game developed by "None in Three", a project led by the University of Huddersfield (UK), in conjunction with the Global Challenges Research Fund (UK). This game is primarily oriented to young people living in the Caribbean region (Barbados) to educate and raise awareness about domestic violence (Smith et al., 2017).

Regarding evaluation methodologies, results show a strong tendency towards pre- and post-game questionnaires. This may be since, compared to post-questionnaire interviews, or the applicator’s annotations of each of the digital resources, the conjunction of pre- and post- questionnaires makes it possible to quantify the impact of the tools. Unlike these pre-post questionnaires, the tools that only use post-game questionnaires have nothing to contrast the results with

[14] https://www.usaid.gov/what-we-do/gender-equality-and-womens-empowerment

[15] https://www.usaid.gov/sites/default/files/documents/1881/FY2021_Budget_FactSheet.pdf

and could lose valuable information on the change in participants' perception of the topics addressed. In this regard, a very relevant option for future research is the use of Learning Analytics (Papamitsiou & Economides, 2014) collected from players' interactions, even combined with the data previously obtained (questionnaires, annotations), to obtain more detailed information about players. At the same time, the collection of data about players' actions would allow researchers to detect areas of opportunity regarding the development and playability of digital resources (Alonso-Fernández et al., 2019).

The results obtained clearly show the need for more research on tools for gender issues, as the results of our search were scarce. The lack of scientific validation studies, follow-up studies, funding, the disappearance of companies or individuals sponsoring the initiatives, and even public health issues (such as the COVID-19 pandemic) result in the loss of important tools for education and awareness about gender violence and stereotypes. Such is the case of Chuka,[16] a serious game designed and developed to teach children in Mexico to address child sexual abuse with 5.4 million cases per year (OECD[17], 2017). The game, developed in Mexico in collaboration with OHCHR, has reached more than 200,000 users since its public release, and yet it does not have any type of related scientific study, which does not allow us to know the impact it has had on its users. Although the tool may be functional within its own scope, it lacks impact, for instance, to help in the implementation of other similar digital tools, as they do not inform of the methodology used to reach that many users. Another relevant aspect to consider is distribution. Even when digital tools can be very useful in different contexts, many of them remain within their local application (provinces, states, and even educational campuses, such as Campus Craft), depriving people in other socio-cultural contexts of their contribution.

The significant gap found between the high relevance of the social problem and the scarcity of resources for its treatment is also present in other fields: such is the case of cyberbullying, a relatively recent problem but of great impact on both the physical and emotional health of the victims (Kim & Leventhal, 2008) for which there are also very few digital resources that address the issue. In particular, a literature review on games to prevent and detect bullying and cyberbullying found only 33 relevant resources (Calvo-Morata et al., 2020).

While a certain level of satisfaction can be noted in the discussions and conclusions of the studies, it is not clear whether the resources used were as effective as expected. An in-depth analysis of which digital resource better promotes learning would be required. Although it is difficult to determine which kind of digital resource is the most effective, we perceive an inclination of the authors of these resources towards videogames. By playing a videogame, users' interest and motivation increases and learning becomes active and abiding (Cóndor-Herrera et al., 2021). Creating attractive tools like videogames, they can be used as playful applications

[16] http://www.chukagame.com/blog/chuka-el-juego-que-esta-ayudando-a-miles-de-ninas-y-ninos-a-enfrentar-el-abuso-infantil

[17] https://www.oecd.org/about/secretary-general/presentacion-del-estudio-ocde-sobre-politicas-de-genero-en-mexico.htm

and be well accepted for their entertainment, without neglecting the educational part or being considered a mandatory activity (Jozkowski & Ekbia, 2015).

6 Limitations

As in any other literature review, our work is limited by the selected search terms. We tried to minimize the limitations, regarding the databases, by including a wide range of alternative terms (for both gender issues and digital resources) and modifying the query according to the needs of each database. The choice of languages is an additional limitation: our results are restricted only to works published in English or Spanish.

Additionally, some of the resources found were not scientifically validated. It would be worthwhile to perform a further review of these games without validation, to try to determine whether they serve their purpose, even without a solid scientific basis. A possible reason to explain the lack of associated scientific studies is the need for more economic support, since this situation occurs more frequently in resources developed in countries that are not considered to be of high or very high human development, according to the United Nations Development Program.[18]

As a final limitation, the diversity and variety of the tools and results of the studies included in our review limits the possibility to issue definitive general conclusions. Even if comparing different tools merely related to the gender issues addressed by them is complicated, we have drawn some general conclusions that allow us to provide an overview of the (already scarce) resources that focus on gender-related issues.

7 Conclusions

The results obtained in the review are heterogeneous but can open a relevant analysis, as gender issues are increasingly visible and new tools are being developed to address them, particularly, digital resources like serious games. As previously mentioned, we found no other systematic literature reviews regarding games and digital resources to address gender issues. Therefore, as few studies have addressed this topic, we considered it particularly important to recover what has been advanced on the subject, as well as to create a baseline for future research. It is noteworthy the acceptance of digital resources over other types of learning scenarios (classroom, workshops, courses, etc.), due to their popularity among the young adult population (Jozkowski & Ekbia, 2015).

Most of the studies found aimed to raise awareness or change players' behaviors about gender-based violence by using serious games targeted at teenagers or young adults. The use of digital tools has multiple advantages over face-to-face courses on gender issues, which are taught in some higher education institutions. School-based courses require a lot of time and resources and, if made mandatory to reach a broad

[18] https://www1.undp.org/content/undp/es/home/

number of students, it would only increase the use of resources, which in many cases are severely limited. To reach a broader student body, it is suggested that Sexual Assault Prevention Education Programs appeal to the target population (Jozkowski & Ekbia, 2015). We consider that the popularity of videogames and digital resources among teenagers and young adults may be key to address this factor.

The evaluation studies carried out with the digital resources were varied, including the use of pre- and post-game questionnaires to provide a means to measure the effect of each intervention. Control groups were also applied in many of the studies; we recommend the use of a control group together with the application of pre-post questionnaires, which will allow us to perform an in-depth analysis of both the immediate effect of the digital tool as well as its impact compared to more traditional approaches (e.g., lectures). To obtain resources with long-term impact, we also recommend adding a follow-up sometime after the application of the tool to ensure that the immediate effects of its application are sustained over time. Finally, it is also necessary to promote that the developed resources are openly available to increase their reach and impact in the society, together with the information and tools to adequately measure their effectiveness and impact on players. The availability of open code validated projects could help other researchers and developers to produce better games or to adapt those games according to cultural differences to be used in other parts of the world (e.g., Playmint.) (Hagerer et al., 2020).

While the number of articles found may be limited, this is not unexpected. The limitations encountered in our review, including the lack of initiatives with scientific/academic validations and follow-ups, or the lack of budget, restrict the possible impact of the few developed resources. Further research is needed regarding digital resources for gender education, validating the resources developed and establishing clear means to assess the impact they may have on their target players. These requirements would ensure that the benefits of games and digital resources for learning and awareness are adequately translated into their application in the field of gender equality education.

Data availability Authors can confirm that all relevant data are included in the article and/or its supplementary information files.

Declarations

Conflict of interest The authors declare that there is no conflict of interest.

References

References marked with an asterisk indicate studies included in the review.

*Almeida, L. R., Machado, L. S., Medeiros, A. T., Coelho, H. F. C., Andrade, J. M., & Moraes, R. M. (2018). The Caixa de Pandora Game: Changing behaviors and attitudes toward violence against women. *Computers in Entertainment, 16*(3), 1–13. https://doi.org/10.1145/3236493

Alonso-Fernández, C. Ana., Cano, Rus, Calvo-Morata, Antonio, Freire, Manuel, Martínez-Ortiz, Iván., & Fernández-Manjón, Baltasar. (2019). Lessons learned applying learning analytics to assess serious games. *Computers in Human Behavior, 99*, 301–309. https://doi.org/10.1016/j.chb.2019.05.036

Alonso-García A., Ayala Ramírez A., Vázquez Navarrete L., Abascal-Mena R. (2020) Habitar: A Collaborative Tool to Visualize, Distribute, Organize and Share Domestic Tasks Towards Reducing the Gender Gap in Household Labor. In: Agredo-Delgado V., Ruiz P. H., Villalba-Condori K. O. (eds) *Human-Computer Interaction. HCI-COLLAB 2020. Communications in Computer and Information Science,* vol 1334, pp. 136–145. Springer, Cham. https://doi.org/10.1007/978-3-030-66919-5_14

*Aguilar, A. A. Á., Ortega, B. C., Loranca, I. A. J., & Olmos, L. E. A. (2019). Enredados: an analogue-digital board game to rethink gender violence in social networks. In *Proceedings of the IX Latin American Conference on Human Computer Interaction* (pp. 1–6). ACM. https://doi.org/10.1145/3358961.3358994

*Andrade, V., De Barros, M. A., Vieira, F., De Sousa, R. B., & De Sousa Almeida, L. (2019). INES&Us: Endless love alternate reality game to build utopic new worlds. In CSEDU 2019 - Proceedings of the 11th International Conference on Computer Supported Education. https://doi.org/10.5220/0007770405650572

Bailey, E. & Graves, K. (2016). Gender and education. In *American educational research association, review of research in education*, March 2016, Vol. 40 (pp. 682–722). https://doi.org/10.3102/0091732X16680193

Barrera Yañez, A. G., Alonso-Fernandez, C., & Fernandez Manjon, B. (2020). Review of serious games to educate on gender equality. *Eighth International Conference on Technological Ecosystems for Enhancing Multiculturality*. https://doi.org/10.1145/3434780.3436592

*Beltran, K., Rowland, C., Hashemi, N., Nguyen, A., Harrison, L., Engle, S., & Yuksel, B. F. (2021). Reducing implicit gender bias using a virtual workplace environment. In *Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems* (pp. 1–7). ACM. https://doi.org/10.1145/3411763.3451739

*Boduszek, D., Debowska, A., Jones, A. D., Ma, M., Smith, D., Willmott, D., … Kirkman, G. (2019). Prosocial videogame as an intimate partner violence prevention tool among youth: A randomised controlled trial. *Computers in Human Behavior, 93*, 260–266. https://doi.org/10.1016/j.chb.2018.12.028

*Bowen, E., Walker, K., Mawer, M., Holdsworth, E., Sorbring, E., Helsing, B., … Jans, S. (2014). "It's like you're actually playing as yourself": Development and preliminary evaluation of 'Green Acres High', a serious game-based primary intervention to combat adolescent dating violence+. *Psychosocial Intervention, 23*(1), 43–55. https://doi.org/10.5093/in2014a5

Calvo-Morata, A., Alonso-Fernández, C., Freire, M., Martínez-Ortiz, I., & Fernández-Manjón, B. (2020). Serious games to prevent and detect bullying and cyberbullying: A systematic serious games and literature review. *Computers & Education*. https://doi.org/10.1016/j.compedu.2020.103958

Calvo-Morata, A., Freire-Morán, M., Martínez-Ortiz, I., & Fernández-Manjón, B. (2019). Applicability of a cyberbullying videogame as a teacher tool: Comparing teachers and educational sciences students. *IEEE Access, 7*(2019), 55841–55850.

Cóndor-Herrera, O., Acosta-Rodas, P., & Ramos-Galarza, C. (2021). Gamification teaching for an active learning. In *Intelligent human systems integration* (pp 247–252). https://doi.org/10.1007/978-3-030-68017-6_37

*Crecente, D. (2014). Gaming against violence: A grassroots approach to teen dating violence. *Games for Health Journal, 3*(4), 198–201. https://doi.org/10.1089/g4h.2014.0010

*Debnam, K. J., & Kumodzi, T. (2021). Adolescent perceptions of an interactive mobile application to respond to teen dating violence. *Journal of Interpersonal Violence, 36*(13–14), 6821–6837. https://doi.org/10.1177/0886260518821455

Djaouti, D., Alvarez, J., Jessel, J. P., & Rampnoux, O. (2011). Origins of serious games. In *Serious games and edutainment applications* (pp. 25–43). Springer. https://doi.org/10.1007/978-1-4471-2161-9_3

*Do, H. J., Yang, S. H., Choi, B.-G., Fu, W. T., & Bailey, B. P. (2021). Do you have time for a quick chat? Designing a conversational interface for sexual harassment prevention training. In *26th International Conference on Intelligent User Interfaces* (pp. 542–552). ACM. https://doi.org/10.1145/3397481.3450659

Eid, M., El Saddik, A., Laamarti, F. (2014). An overview of serious games. Hindawi Publishing Corporation. *International Journal of Computer Games Technology, 2014*. https://doi.org/10.1155/2014/358152

*Elias-Lambert, N., Boyas, J. F., Black, B. M., & Schoech, R. J. (2015). Preventing substance abuse and relationship violence: Proof-of-concept evaluation of a social, multi-user, tablet-based game. *Children and Youth Services Review, 53*, 201–210. https://doi.org/10.1016/j.childyouth.2015.04.007

Boyle, E. A., Hainey, T., Connolly, T. M., Gray, G., Earp, J., Ott, M., Lim, T., Ninaus, M., Ribeiro, C., & Pereira, J. (2016). An update to the systematic literature review of empirical evidence of the impacts and outcomes of computer games and serious games. *Computers & Education, 94*, 178–192. https://doi.org/10.1016/j.compedu.2015.11.003

Dillon, R. (2013). Serious Games And Fun : An Analysis. *International Journal of Innovative Research & Development, 2*(5).

Fisher, J. (2016). Toward a political economic framework for analyzing digital development games: A case study of three games for Africa. *Communication, Culture & Critique, 9*(1), 30–48. https://doi.org/10.1111/cccr.12128

*Fisher, J. (2017). Digital games, African development, and gender equality: A comparative analysis of family values and Moraba. *Studies in Comparative International Development, 52*(2), 155–173. https://doi.org/10.1007/s12116-017-9244-z

*da Fonseca, R. M. G. S., dos Santos, D. L. A., Gessner, R., Fornari, L. F., de Oliveira, R. N. G., & Schoenmaker, M. C. (2018). Gender, sexuality and violence: Perception of mobilized adolescents in an online game. *Revista Brasileira De Enfermagem, 71*(suppl 1), 607–614. https://doi.org/10.1590/0034-7167-2017-0561

Gertner, A., Zaromb, F., Schneider, R., Roberts, R., & Matthews, G. (2016). Development and evaluation of an assessment instrument for the measurement of cognitive bias (16–0956). https://www.mitre.org/sites/default/files/publications/pr-16-0956-the-assessment-of-biases-in-cognition.pdf. Accessed March 2021

*Gilliam, M., Jagoda, P., Jaworski, E., Hebert, L. E., Lyman, P., & Wilson, M. C. (2016). "Because if we don't talk about it, how are we going to prevent it?": Lucidity, a narrative-based digital game about sexual violence. *Sex Education, 16*(4), 391–404. https://doi.org/10.1080/14681811.2015.1123147

*Cabrera-González, M. Á. C., & Florido, B. P. (2020). "Diana frente al Espejo": Una Propuesta de Videojuego para la Prevención de la Violencia de Pareja entre jóvenes. In CEUR Workshop Proceedings.

*Hagerer, I., Treffers, T., Hoffmann, A., Richly, C., Baier, S., & Welpe, I. M. (2020). PlayMINT - Still playing or already leading? Design of a digital learning game to promote female STEM Students' innovative work behavior and digital leadership. In Proceedings of the 14th International Conference on Game Based Learning, ECGBL 2020. https://doi.org/10.34190/GBL.20.177

Heilman (2012). Gender stereotypes and workplace bias. *Research in Organizational Behavior, 32*, 113–135. https://doi.org/10.1016/j.riob.2012.11.003

Horban, O., Maletska, M. (2019). Videogames as means of increasing students' motivation. In The Modern Higher Education Review № 4, 2019. https://doi.org/10.28925/2518-7635.2019.4.8

Hosse, I. R., & Zuanon, R. (2015). *Games for change: The strategic design of interactive persuasive systems* (pp. 442–453). International Conference on Universal Access in Human-Computer Interaction. https://doi.org/10.1007/978-3-319-20684-4_43

*Jouriles, E. N., Kleinsasser, A., Rosenfield, D., & McDonald, R. (2016a). Measuring bystander behavior to prevent sexual violence: Moving beyond self reports. *Psychology of Violence, 6*(1), 73–81. https://doi.org/10.1037/a0038230

*Jouriles, E. N., Rosenfield, D., Yule, K., Sargent, K. S., & McDonald, R. (2016b). Predicting high-school students' bystander behavior in simulated dating violence situations. *Journal of Adolescent Health, 58*(3), 345–351. https://doi.org/10.1016/j.jadohealth.2015.11.009

*Jozkowski, K. N., & Ekbia, H. R. (2015). "Campus Craft": A game for sexual assault prevention in universities. *Games for Health Journal, 4*(2), 95–106. https://doi.org/10.1089/g4h.2014.0056

Kim, Y. S., & Leventhal, B. (2008). Bullying and suicide. A review. *International Journal of Adolescent Medicine and Health, 20*(2), 133–154. https://doi.org/10.1515/IJAMH.2008.20.2.133

Kleffner, R., Flatten, J., Leaver-Fay, A., Baker, D., Siegel, J. B., Khatib, F., & Cooper, S. (2017). Foldit Standalone: A videogame-derived protein structure manipulation interface using Rosetta. *In Bioinformatics, 33*, 2017. https://doi.org/10.1093/bioinformatics/btx283

Krug, E. G., Dahlberg, L. L., & Mercy, J. A. (2002). *Zwi Anthony and Lozano Rafael*. World Health Organization.

*Lee, T. Y., Shek, D. T. L., Fan, C. L., Kwok, R. K. H., Cheng, C., Tsang, J. W. S., & Lau, R. K. L. (2019). Reducing gender stereotypes through a digital positive youth development game. *International Journal on Disability and Human Development*.

*Marda, M., Economou, D., & Bouki, V. (2018). Enhancing deeper learning using empathy and creativity in serious games role-play simulations. In Proceedings of the European Conference on Games-based Learning.

*Mason, R., & Turner, L. (2018). Serious gaming: A tool to educate health care providers about domestic violence. *Health Care for Women International, 39*(8), 859–871. https://doi.org/10.1080/07399332.2018.1464572

*Muller, D. A., van Kessel, C. R., & Janssen, S. (2017). Through pink and blue glasses: Designing a dispositional empathy game using gender stereotypes and virtual reality. In *Extended abstracts publication of the annual symposium on computer-human interaction in play* (pp. 599–605). ACM. https://doi.org/10.1145/3130859.3130862

Naranjo Ruiz, M., & Ospina Álvarez, J. S. (2021). Prácticas y performances postdigitales del ciberfeminismo en Colombia. *Esferas, 20*, 10. https://doi.org/10.31501/esf.v0i20.12383

*Navarro-Pérez, J. J., Carbonell, Á., & Oliver, A. (2019). The effectiveness of a psycho-educational App to reduce sexist attitudes in adolescents. *Revista De Psicodidáctica (english Ed.), 24*(1), 9–16. https://doi.org/10.1016/j.psicoe.2018.07.002

*Navarro-Pérez, J. J., Oliver, A., Carbonell, Á., & Schneider, B. H. (2020). Effectiveness of a mobile app intervention to prevent dating violence in residential child care. *Psychosocial Intervention*. https://doi.org/10.5093/pi2020a3

OECD Review of Gender Policies in Mexico (2017). https://www.oecd.org/about/secretary-general/presentacion-del-estudio-ocde-sobre-politicas-de-genero-en-mexico.htm. Accessed March 2021

OHCHR, Office of the High Commissioner for Human Rights (2021). https://www.ohchr.org. Accessed March 2021

*Pabón-Guerrero, A., Tobar-Munozt, H., & Gonzalez, C. (2019). Tsiunas: A videogame for increasing gender-based violence awareness. In *2019 International Conference on Virtual Reality and Visualization (ICVRV)* (pp. 189–192). IEEE. https://doi.org/10.1109/ICVRV47840.2019.00044

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. https://doi.org/10.1136/bmj.n71

Papamitsiou, Z., & Economides, A. (2014). Learning analytics and educational data mining in practice: A systematic literature review of empirical evidence. *Educational Tecnology & Society., 17*(4), 49–64. https://doi.org/10.1145/2858796.2858798

Pérez-de-Guzmán, V., Bas-Pena, E. & Machado-Casas, M. (2019). Gender Issues in Latin America and Spain. Multidisciplinary Perspectives. Peter Lang. ISBN: 978–1–4331–6102–5

Pastor-Moreno, G., & Ruíz, P. I. (2021). Medidas de contención de la violencia de género durante la pandemia de COVID-19. *Gaceta Sanitaria, 35*(4), 389–394. https://doi.org/10.1016/j.gaceta.2020.04.005

*Pearson, J., Wu, S., Royston, H., Smailes, H., Robinson, N., Cowell, A., & Jones, A. (2020). Designing a serious game to raise awareness of intimate partner violence among adolescents in the UK: The use of 'Good Games' principles for effective behavioural change (pp. 458–476). https://doi.org/10.1007/978-3-030-53294-9_33

*Potter, S. J., Demers, J. M., Flanagan, M., Seidman, M., & Moschella, E. A. (2021). Can videogames help prevent violence? An evaluation of games promoting bystander intervention to combat sexual violence on college campuses. *Psychology of Violence, 11*(2), 199–208. https://doi.org/10.1037/vio0000365

*Potter, S. J., Flanagan, M., Seidman, M., Hodges, H., & Stapleton, J. G. (2019). Developing and piloting videogames to increase college and university students' awareness and efficacy of the bystander role in incidents of sexual violence. *Games for Health Journal, 8*(1), 24–34. https://doi.org/10.1089/g4h.2017.0172

Rowe, L. S., Jouriles, E. N., & McDonald, R. (2015). Reducing sexual victimization among adolescent girls: a randomized controlled pilot trial of my voice, my choice. *Behavior Therapy, 46*(3), 315–327. https://doi.org/10.1016/j.beth.2014.11.003

Rugelj, J., & Lapina, M. (2019). Game design based learning of programming. international scientific conference innovative approaches to the application of digital technologies in education and research. *CEUR Workshop Proceedings 2494*. https://www.researchgate.net/publication/337199044_Game_Design_Based_Learning_of_Programming

Sabri, B., Sellke, R., Smudde, M., Bourey, C., & Murray, S. M. (2022). Gender-based violence interventions in low- and middle-income countries: A systematic review of interventions at structural, community, interpersonal, individual, and multiple levels. *Trauma, Violence, & Abuse*, 152483802211261. https://doi.org/10.1177/15248380221126181

Sadati, S. M. H., & Mitchell, C. (2021). Serious game design as research-creation to address sexual and gender-based violence. *International Journal of Qualitative Methods, 20*. https://doi.org/10.1177/16094069211046130

*Sargent, K. S., Jouriles, E. N., Chmielewski, M., & McDonald, R. (2020). Using virtual reality to create an observational assessment of adolescent resistance to antisocial peer pressure. *Journal of Clinical Child & Adolescent Psychology, 49*(2), 178–189. https://doi.org/10.1080/15374416.2018.1504296

*Scholes, L., Jones, C., Stieler-Hunt, C., & Rolfe, B. (2014). Serious games for learning: Games-based child sexual abuse prevention in schools. *International Journal of Inclusive Education, 18*(9), 934–956. https://doi.org/10.1080/13603116.2013.860195

*Smith, D., Ma, M., Jones, A., & Unver, E. (2017). None in three: The design and development of a low-cost violence prevention game for the caribbean region. In Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics). https://doi.org/10.1007/978-3-319-70111-0_24

*Sygel, K., Kristiansson, M., Furberg, R., & Fors, U. (2014). Reactions on Display/Intimate Partner Violence (RoD/IPV)—A study of a new interactive computer simulation program for the treatment of men convicted of intimate partner violence. *International Journal of Forensic Mental Health, 13*(4), 369–380. https://doi.org/10.1080/14999013.2014.951104

Trekels, J., Karsay, K., Eggermont, S., & Vandenbosch, L. (2018). How social and mass media relate to youth's self-sexualization: Taking a cross-national perspective on rewarded appearance ideals. *Journal of Youth and Adolescence*. https://doi.org/10.1007/s10964-018-0844-3

*Ugolotti, V. C., Brusk, J., & Engström, H. (2020). Crying in the Game- An inductive analysis of a game that portraits benevolent sexism. In Proceedings of the 14th International Conference on Game Based Learning, ECGBL 2020. https://doi.org/10.34190/GBL.20.046

UN WOMEN. Facts and figures: Ending violence against women (2021). https://www.unwomen.org/en/what-we-do/ending-violence-against-women/facts-and-figures. Accessed July 2021

United Nations. Equality and Non-discrimination (2022). https://www.un.org/ruleoflaw/thematic-areas/human-rights/equality-and-non-discrimination/. Accessed July 2022

US AID, U.S. Agency for International Development. Gender Equality and Women's Empowerment (2021). https://www.usaid.gov/what-we-do/gender-equality-and-womens-empowerment. Accessed July 2022

Vyas, A., Nagara, N., Genovese, J., Malhotra, G., Dubey, N., Hingorani, R., & Manning, L. (2020). The girl rising 'We Dream, We Rise' social media campaign in India: Reach, engagement and impact. *Journal of Creative Communications, 15*(1), 106–124. https://doi.org/10.1177/0973258619878354

Weinstein, T. I. (2020). Expuestas: Laborious expectations and the plight of feminist art in contemporary Mexico. *Signs: Journal of Women in Culture and Society, 45*(4), 903–929. https://doi.org/10.1086/707800

Zhonggen, Yu. (2019). A meta-analysis of use of serious games in education over a decade. *Hindawi International Journal of Computer Games Technology, 2019*, 4797032. https://doi.org/10.1155/2019/4797032

Authors and Affiliations

Alma Gloria Barrera Yañez[1] · Cristina Alonso-Fernández[2] · Baltasar Fernández-Manjón[1]

✉ Alma Gloria Barrera Yañez
almaba01@ucm.es

Cristina Alonso-Fernández
cristina.alonsof@uam.es

Baltasar Fernández-Manjón
balta@fdi.ucm.es

[1] Department of Software Engineering and Artificial Intelligence, Complutense University of Madrid, C/ Profesor José García Santesmases, 9, 28040 Madrid, Spain

[2] Department of Computer Science Engineering, Escuela Politécnica Superior, Universidad Autónoma de Madrid, Calle Francisco Tomás Y Valiente, 11, 28049 Madrid, Spain