



Review paper

Technological Effects on Gender Studies: An Intersectional Perspective

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ABSTRACT

This study offers a comprehensive and critical exploration of the intersections between technologization, digitalization, and gender dynamics in contemporary digital culture. Historically, feminist discourses have been rooted in socio-political paradigms; however, the emergence of cyberfeminism and the growing complexity of gendered experiences in digital environments have redefined both the epistemic and practical boundaries of gender studies. Through a systematic literature review of recent, high-impact research, the paper examines whether digital transformation represents a paradigmatic shift in the construction, performance, and contestation of gender identities. The analysis reveals that while digital technologies hold significant emancipatory potential—facilitating anonymity, accessibility, and expanded public participation—they frequently replicate and even intensify patriarchal norms. This occurs through mechanisms such as cyberviolence, algorithmic bias, digital exclusion, and the ongoing underrepresentation of women in STEM fields. The findings underscore those digital spaces are not ideologically neutral or inherently egalitarian; rather, they operate as contested terrains where power relations are renegotiated and embodied in novel forms. Furthermore, the review highlights geographic and disciplinary disparities in scholarly focus, as well as thematic patterns linking digital culture to structural disadvantages faced by women and marginalized gender identities. By integrating insights from sociology, feminist theory, communication studies, health informatics, and STEM education, the article argues for the urgent development of intersectional, gender-sensitive policies, as well as multi-stakeholder collaborations. Such frameworks are essential to resist the re-inscription of masculine dominance and to promote the emergence of inclusive, equitable technological ecosystems that foster genuine gender equality.

Keywords: technological effects, gender studies, digitalization, cyberfeminism, digital gender divide

Gender studies and the struggle for women's rights have historically evolved within the contours of socio-political agendas, and accordingly, the motivations, methodologies, and theoretical frameworks of related research have mirrored this trajectory. While the three waves of feminism -often conceptualized as distinct yet complementary movements - have largely operated within shared paradigmatic boundaries, the dizzying pace of technologization and digitalization in recent decades has catalysed significant transformations at both theoretical and practical levels. New theoretical currents such as cyberfeminism have emerged, offering alternative perspectives to classical feminist thought by centring on the reproduction of gender within digital environments.

Digital technologies are often regarded as possessing emancipatory potential in terms of gender equality, particularly because they appear to foster more egalitarian communication between individuals. Features such as

anonymity, spatial independence, and relatively easy access to virtual public spaces are argued to enhance women's public visibility and participation. However, dominant approaches to digital security and technological governance frequently reduce safety to the absence of identifiable threats, thereby privileging individualised and technocratic models of protection. Feminist and technofeminist perspectives challenge this reductionism by reframing vulnerability and care as relational, collective, and inherently political dimensions of hybrid offline–online environments (wessalowski et al., 2025).

Historical analyses of feminist techno-imaginaries further complicate this emancipatory narrative by demonstrating that women's liberation has often been discursively tied to technological adoption rather than to structural transformations of gender relations. Studies of interwar media discourse, for instance, reveal how emancipation was framed as a gradual and conditional process measured through access to domestic technologies, ultimately remaining dependent on economic capacity and male authority, thereby exposing the limits of technology-centred models of everyday emancipation (Fikejzová & Charvát, 2025).

These limitations are further intensified in contemporary digital contexts, where digitalization does not function as an equally liberating force for all individuals. Phenomena such as the digital divide—referring to unequal access to and effective use of digital technologies—digital surveillance as a mechanism of data-driven monitoring and control, algorithmic bias embedded in data-driven decision-making systems, and technology-facilitated forms of cyber violence introduce new and gendered spheres of vulnerability. The wholesale migration of real-world inequalities and patriarchal structures into virtual environments has led to the reinstitutionalisation of masculine rationality within digital culture.

This study is guided by a central research question: In what ways and to what extent do technologization and digitalization influence contemporary gender discourses? To address this question, a systematic literature review was conducted to assess the impact of digital culture on gender dynamics, with a particular focus on the positioning of women and other gender identities in digital environments compared to male users. Findings indicate that women face various forms of disadvantage in STEM fields, healthcare, and the use of technology. Furthermore, digital violence, exclusion, and representational inequities remain persistent. In light of these outcomes, the study argues for the necessity of gender-sensitive technical, legal, and policy frameworks to support the reconstruction of a more inclusive and equitable digital culture.

This study seeks to critically interrogate the ways in which contemporary processes of digitalization and technologization reconfigure gender relations within digitally mediated social structures. While existing scholarship frequently addresses discrete technological domains or isolated gender-related outcomes, the present article adopts an integrative and interdisciplinary approach by synthesizing recent high-impact research across multiple fields. Through a systematic review of Q1-ranked journal articles published in 2023, the study aims to trace dominant analytical trajectories, identify persistent structural asymmetries, and foreground underexplored dimensions of the gender–technology nexus. In doing so, the article contributes to the literature by offering a theoretically informed mapping of current debates, while simultaneously delineating conceptual and empirical gaps that call for further critical and policy-oriented inquiry.

THE INTERACTION BETWEEN TECHNOLOGY AND GENDER

The traces of technologization on social phenomena are often conceptualized through the term "technological impact," which has been observed in various socio-technical contexts to date. The multifaceted effects of technology on the phenomenon of gender are examined in two dimensions: technological and gender-based. The technological dimension encompasses efforts to render technological elements - such as automation, STEM, blockchain technologies, techno-parks, health informatics, wearable technologies, surveillance systems, and high-tech infrastructures- gender-sensitive. This perspective focuses on the technological opportunities for the discovery and representation of gender identity. Social media platforms, online forums, and virtual reality environments provide users with avenues to share gender-related experiences and express their identities more freely, thereby facilitating processes of gender identity formation.

Conversely, the gender dimension addresses the technologization of gendered phenomena such as sexist stereotypes, gender segregation, digital literacy, sexual violence, the gendering of technology, democratization, hierarchical structures, voluntarism, LGBTQI+ rights, sexual health, human-machine communication, parental roles, social inequality, self-perception, and STEM education. The rise of electronic and digital technologies signals the emergence of interdisciplinary socio-technical-digital formations (Işıklı & Küçükvardar, 2016). At the same time, dominant techno-imaginaries tend to privilege hegemonic and centralised visions of technological progress, marginalising feminist, queer, decolonial, and other peripheral perspectives. Feminist techno-imaginaries challenge this narrowing of sociotechnical imagination by foregrounding alternative, historically situated, and care-centred visions of technology that re-open possibilities for more inclusive and emancipatory futures (Čičigoj et al., 2025).

Academic studies on the technology–gender interaction often explore the correlations between one gender-related issue and one technological variable. This results in various research contexts such as perceptions of gender

by users, gender-based patterns of technological adoption, gendered preferences in technological careers, economic disparities based on gender in tech sectors, and consumption behaviours shaped by gendered content and devices. Nonetheless, there remain many uncharted, undefined, and under-explored phases of this interaction, particularly in relation to how gendered assumptions are embedded in algorithmic design processes, data infrastructures, and everyday human–technology interactions that operate beyond users’ immediate awareness.

Gender serves as a critical demographic variable in large datasets, which are used to analyse disease distribution across gender groups, identify gender-based health disparities, and design inclusive services. For instance, gender-disaggregated data enable researchers to detect differing health needs and risks between women and men, thereby facilitating the development of more equitable policies. However, existing datasets are often dominated by male-centric information (Aydemir, 2022: 125). Consequently, gender biases embedded in these incomplete datasets may be inadvertently encoded into AI systems, reinforcing harmful stereotypes and systemic inequalities. The persistent masculine mode embedded in big data obstructs the visibility of other users—an understandable outcome, as every form of cultural construction bears a masculine seal (Işıklı, 2025: 11).

The internet and social media have become powerful platforms for gender-related activism. Movements such as #MeToo and LGBTQI+ advocacy have gained significant traction through online engagement. Cyberfeminism refers to the use of internet technologies by women for any purpose, distinguishing itself from earlier feminist waves by harnessing the power of technology to combat gender inequality (Aydemir, 2021). Cyberspace, accessed via electronic circuits and computers, is a domain of informational flow. Cyberfeminists encourage women to use the internet and computers for feminist outcomes, such as empowerment, as well as for personal achievement (Gajjala & Mamidipudi, 1999). Technology-based online harassment and cyberbullying can disproportionately affect women and marginalised gender groups. Victims of cyber harassment tend to avoid online environments and digital communication (Işıklı, 2017).

Algorithms used in social media and digital advertising can reinforce traditional gender roles and propagate biases. Ryakitimbo (2022), for instance, highlights concern regarding data governance, surveillance, discrimination, and diminishing trust levels among women and non-binary individuals. Furthermore, research suggests that robots are often perceived as male by default, mirroring masculine stereotypes and revealing that men interact with robots more frequently than women (Widder, 2017).

Masculine reason reproduces itself not only in religious, political, and economic domains but also in technological software. Women’s social position is sustained by forms of domination updated through digital tools and algorithms (Işıklı, 2014). According to Cockburn, masculinity is constructed as physically strong, technically skilled, and inherently attuned to technology, whereas femininity is perceived as physically and technically deficient. Wajcman connects the cultural construction of gender to the male–machine bond. Tracing this trajectory, Foster posits those men are the “makers” of technology, whereas women remain passive “users.” Eveleth discovered that wearable technologies such as smartwatches were initially designed for male bodies, often excluding menstrual tracking features. Until recently, wearable health informatics systems that measured blood pressure, heart rate, or blood alcohol levels lacked such capabilities. Aydemir notes that pocketless designs in women’s clothing force them to carry phones in handbags, limiting the accuracy of step-tracking and related applications (Aydemir, 2022: 123–125). Technologies and services that ignore gender differences may fail to meet the diverse needs and preferences of users. On the other hand, radical feminist critiques—which attribute all global crises to men—locate masculine rationality at the origin of environmental problems and technological systems. Technology-based digital culture carries a high potential for the feminine intellect to reconstruct itself against masculine knowledge regimes and to participate as an equal partner (Işıklı, 2017). This perspective opens the door to reimagining women as technology developers. UNESCO further recommends the inclusion of women and girls in AI development.

The gender gap—defined as significant disparities between women and men in participation, access, rights, wages, and benefits—is particularly evident in low-income or underdeveloped regions, especially regarding technology access and use. Gender-biased data collection and algorithmic discrimination affect multiple sectors, including finance, healthcare, and justice. Without intervention, such biases risk exacerbating existing inequalities. Within the broader landscape of the technological gender gap, women remain underrepresented in both the creation of digital technologies and the cultivation of digital literacy. From a patriarchal perspective, this disparity is often attributed to an assumed disconnection between women’s nature and science or technology. In contrast, others argue that the issue lies not with “technology-blind” women, but with “women-blind” technologies produced by “women-blind” industries and investors (Perez, as cited in Aydemir, 2022). Research indicates that gender-blind technologies fail to provide equal opportunities for women and men; for example, women often refrain from highlighting their intelligence on social media (Işıklı, 2017). This reflects the digital reproduction of the patriarchal bias that associates rationality with men and emotionality with women.

Technology provides remote access to sexual and reproductive health, mental well-being services, and general healthcare. Online consultations for mental health conditions such as depression (McCall et al., 2023) and spiritual counseling (Işıklı & Ercan, 2020) are becoming more common. Health informatics encompasses the real-time,

continuous, or emergency collection, storage, management, and analysis of health data for treatment and prevention. Applied to areas such as hospital management, patient care, policy development, and research, internet-based technologies aim to optimize information flow. Telehealth and e-health technologies facilitate communication between patients and professionals, promote accessibility, and enhance healthcare delivery - especially for remote populations- via mobile consultations, remote monitoring, vital sign tracking, e-appointments, and e-prescriptions.

STUDY: SYSTEMATIC LITERATURE REVIEW (SLR)

This section of the study focuses on examining the scope and dimensions of the interaction between technology and gender, tracing the presence and influence of two key phenomena: (a) the impact of technology, and (b) the impact of gender. In order to identify the boundaries, key concepts, research topics, and categorical distinctions that define the relationship between these two domains, the Systematic Literature Review (SLR) method was employed. SLR involves a structured, transparent, and replicable process for identifying, analysing, and synthesizing all relevant academic literature on a specific research question. Such reviews are designed not only to deepen our understanding of the current state of knowledge but also to identify existing gaps and propose a roadmap for future scholarly work. The sources typically include peer-reviewed journal articles, book chapters, dissertations, and conference proceedings. By offering a comprehensive and critical overview of existing literature, SLR provides researchers with a reliable foundation for developing evidence-based arguments and theories.

Research questions

The study was guided by the following two interrelated questions:

1. In what ways does technology shape, transform, or reinforce gender and gender relations?
2. Conversely, how does gender influence the design, implementation, and consequences of technological systems?

Search strategy

To address these questions, an extensive and methodologically rigorous search strategy was developed. This included the selection of relevant keywords, appropriate databases, and temporal constraints. Specifically:

1. The Web of Science (WoS) database was selected as the primary source, focusing exclusively on Q1-ranked journals (according to the Journal Citation Indicator) published in the year 2023, in order to capture the most recent scholarly debates and empirical trends shaping contemporary discussions on technology and gender.
2. The search targeted academic articles that included the terms “technology” together with either “gender” or “women/woman” in their titles or keywords.

Screening, inclusion/exclusion, and quality assessment

Following the outlined strategy, a comprehensive literature search was conducted. The retrieved articles were reviewed based on pre-established inclusion and exclusion criteria. Additionally, the methodological rigor and potential biases of each article were evaluated. From an initial pool of 49 articles, 7 were excluded due to access restrictions, while another 6 were found to be irrelevant to the interaction between gender and technology. This left a final sample of 36 articles that directly supported the central research hypothesis and were included in the systematic analysis.

Data extraction and findings

The selected articles were analysed in detail, focusing on their conceptual frameworks, empirical findings, and theoretical contributions. This process revealed recurring patterns, key themes, and emerging research frontiers at the intersection of digital technology and gender dynamics. The analysis helped map how academic discourse reflects and responds to gendered experiences within digital environments.

Synthesis

The final stage involved synthesizing the findings across all included studies. This synthesis incorporated both qualitative insights and, where applicable, quantitative results. The combined findings offer a holistic understanding of how gender and technology co-evolve and interact in contemporary research, emphasizing the structural disadvantages faced by women and non-dominant gender identities in digital contexts.

RESEARCH FINDINGS

The systematic analysis conducted on the selected academic articles revealed a range of findings concerning the bidirectional relationship between digitalization/technologization and gender. These findings are organized around distinct thematic categories that emerged from the dataset. In total, 35 articles were examined, and the distribution of research topics across these studies was visualised in [Figure 1](#), which presents seven key categories of focus. The systematic review of 35 selected articles revealed that scholarly interest in the intersection of gender and digital technologies is primarily clustered around five thematic categories.

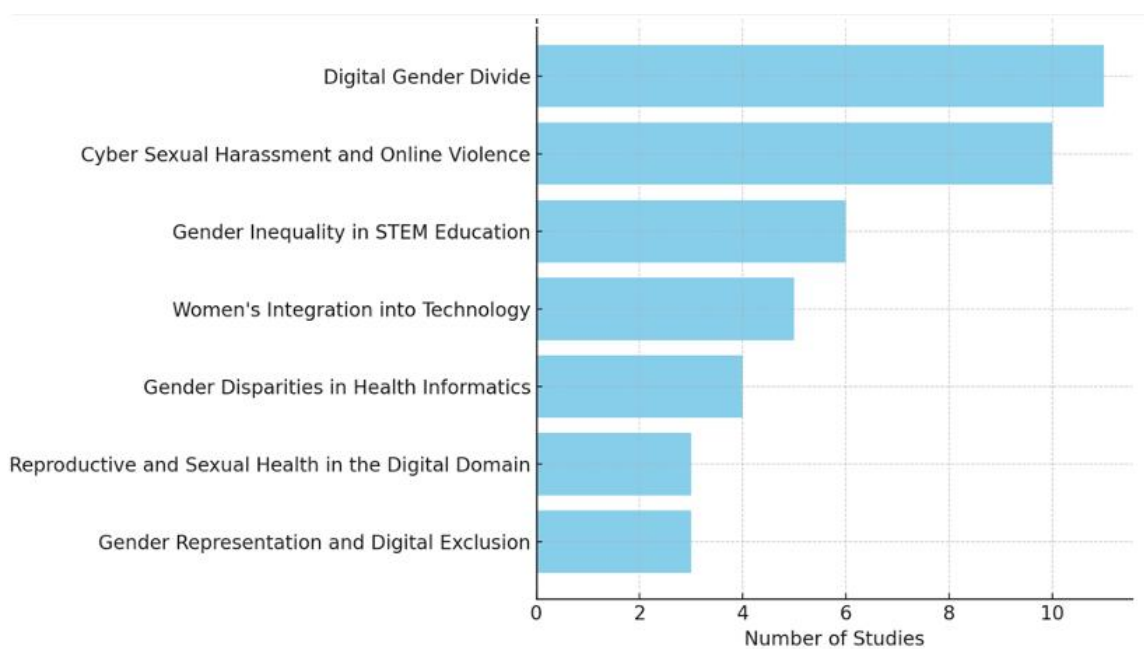
Thematic distribution of the literature

Research areas

As shown in [Figure 1](#), the most frequently addressed topics include the Digital Gender Divide and Cyber Sexual Harassment and Bullying. These categories reflect growing academic concern regarding structural inequalities in women's access to technology and the various forms of digital violence they face.

Figure 1

Distribution of research focus areas



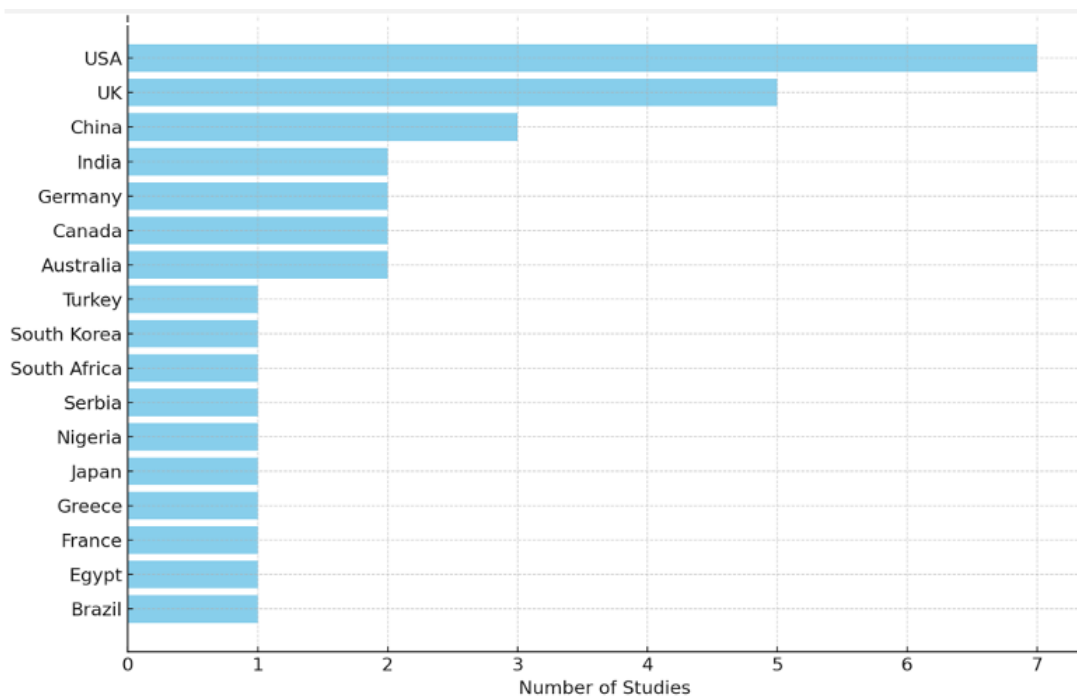
Additionally, gender disparities in STEM education, women's integration into technological domains, and gender-based differences in health informatics have emerged as significant focal points. The distribution of research attention illustrated in the chart highlights the multifaceted nature of gendered experiences within digital cultures and underscores the increasing scholarly focus on how technologization both reproduces and challenges existing gender dynamics.

Geographic distribution

A total of 35 studies examined in this systematic review span 17 different countries. Notably, one out of every three studies were conducted in either the United States or the United Kingdom, underscoring a pronounced dominance of Anglophone academic environments. As illustrated in [Figure 2](#), the geographic distribution of the reviewed studies reveals a strong concentration in Anglophone countries, particularly the United States and the United Kingdom, a pattern that closely corresponds to these regions' higher levels of economic development, technological infrastructure, and research capacity in digital innovation. These patterns align with feminist analyses that conceptualize digital technologies as gendered power structures shaped by platform governance, algorithmic visibility, and surveillance practices, thereby reinforcing the need for intersectional and gender-sensitive policy frameworks.

Figure 2

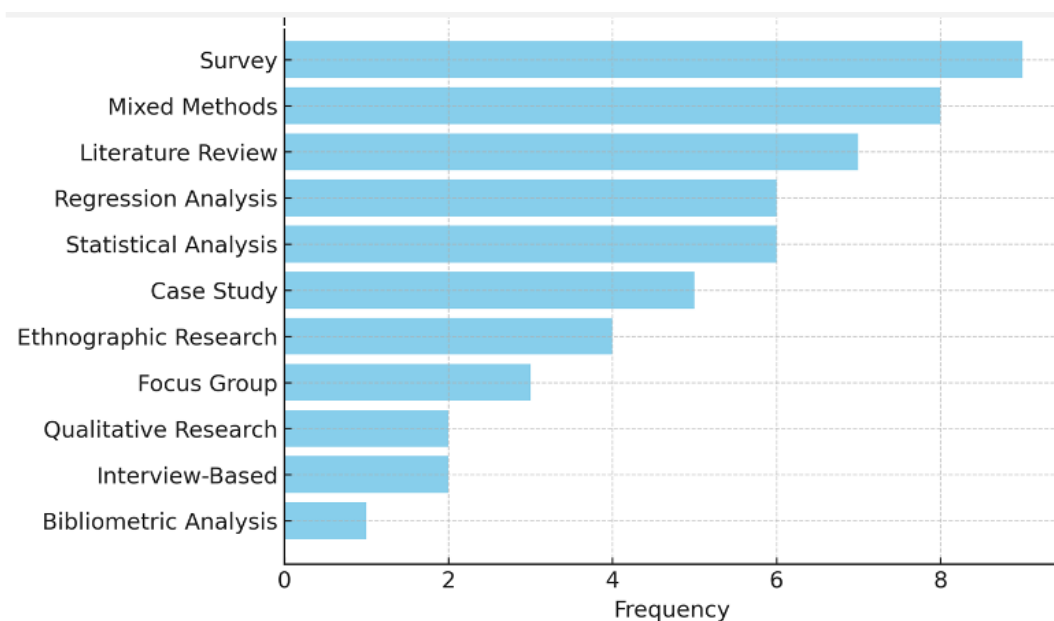
Geographic distribution of studies



The Balkans, the Middle East, and Africa were each represented by only a single study, suggesting a limited scholarly focus on the intersection of technology and gender in these regions. As illustrated in **Figure 3**, the Balkans, the Middle East, and Africa are each represented by only a single study, indicating a significant regional imbalance in the existing literature. This pronounced regional disparity highlights a need for more geographically inclusive research. The current dominance of perspectives from the Global North risks overlooking the diverse socio-technological realities of other regions, where gender and technology intersect under vastly different cultural, political, and infrastructural conditions. To achieve a holistic understanding of gendered digital experiences, future studies must intentionally incorporate underrepresented regions into their analytical frameworks.

Figure 3

Research methods used in the studies



The data presented in **Table 1** illustrates the wide interdisciplinary spread and growing academic interest in the interaction between gender and technology. The list includes journals from diverse academic fields such as sociology, psychology, education, criminology, feminist theory, health sciences, communication studies, and

business. This variety demonstrates that the topic of gender and technology is not limited to a single discipline but is instead of broad scholarly interest across both the social sciences and STEM fields. Furthermore, the inclusion of journals such as *Sex Roles*, *Violence Against Women*, and the *Journal of Medical Internet Research* reflects a strong orientation toward real-world social concerns.

Table 1

Academic journals in which the reviewed articles were published

1. Annals of the American Association of Geographers	11. Journal of Policy Modelling	21. Emotions in Education
2. Education XXI	12. Sex Roles	22. Gender, Technology and Development
3. Feminist Criminology	13. Social Science & Medicine	23. Information Systems Frontiers
4. Frontiers in Psychology	14. Technology, Pedagogy and Education	24. International Journal of Gender and Entrepreneurship
5. Information, Communication and Society	15. The Annual Review of Sociology	25. International Small Business Journal: Researching Entrepreneurship
6. Information Technology for Development	16. Theoretical Criminology	26. Journal of Agriculture and Food Research
7. International Journal of Information Management	17. Trauma, Violence, and Abuse	27. Journal of Design, Creative Process & the Fashion Industry
8. Journal of Adolescent Health	18. Violence Against Women	28. Knowledge Management & E-Learning
9. Journal of Computer-Mediated Communication	19. Computers in Human Behaviour	29. Technological Forecasting & Social Change
10. Journal of Financial Intermediation	20. Engineering Studies	30. Telecommunication Policy
		31. Journal of Gender Studies

Many of the articles deal with issues such as online harassment, digital exclusion, and the gendered impact of technological developments. This indicates that gender–technology studies are both theoretically grounded and practically relevant. The repeated appearance of certain journals, especially *Sex Roles* and *Journal of Medical Internet Research*, suggests a developing research agenda and the institutionalization of this interdisciplinary topic within specific academic venues. These journals appear to be key platforms for publishing gender-focused research related to digitalization and technological transformation. Additionally, the presence of internationally recognized and policy-oriented journals—such as *Information, Communication & Society*, *Telecommunications Policy*, and *Technological Forecasting & Social Change*—highlights the global relevance of gender–technology research. These publications emphasize the transnational nature of digital infrastructures and the necessity of addressing gendered inequalities across different socio-cultural and economic contexts.

Table 1 not only lists the academic outlets where related studies have been published but also reflects the increasing depth, diversity, and academic visibility of research at the intersection of gender and technology. It provides a useful overview of the scholarly platforms through which this emerging interdisciplinary field is developing.

Thematic synthesis of the reviewed literature

Although the reviewed studies do not capture the full complexity of the gender–technology nexus, they collectively illustrate five dominant thematic categories. These include gender disparities in health informatics, digital economy, STEM education and careers, technology-facilitated sexual harassment, and the reproduction of gender inequalities within the digital divide. Together, these categories reveal how technology both reflects and reinforces gendered structures across diverse sociotechnical domains.

Category 1: Gender differences in health informatics

The first category captures how digital technologies intersect with gender in the context of health informatics, particularly regarding access to sexual and reproductive healthcare. While not exhaustive, the selected studies highlight both the opportunities and limitations presented by digital health technologies from a gendered perspective. Sao et al. (2023), in their study titled “Utilizing Digital Health Technology to Increase Sexual Health Care Access...”, explore how digital health services can expand access to sexual healthcare, especially among youth. The research investigates the use of self-sampling and postal testing services among young people for sexually transmitted infections (STIs). Based on online interviews with participants who engaged with these services, the

authors identified notable concerns regarding automation-induced uncertainty, anxiety, and a perceived lack of clarity in the digital healthcare process—suggesting the need for significant improvements in both technological design and user experience. Although the study does not explicitly compare gender-based outcomes, its findings reveal how the design of digital health technologies may generate differentiated experiences of uncertainty, trust, and accessibility—dimensions that are highly relevant to gender-sensitive analyses of healthcare systems.

Similarly, Nijagi (2023), in “A Qualitative Approach to Interrogating the Age and Gender Divide in Digital SRHR Platforms in Kenya”, critiques how digital sexual and reproductive health and rights (SRHR) platforms reinforce exclusionary socio-cultural norms. The study found that these platforms often conceptualize sexuality as exclusively adult, thereby marginalising adolescent girls. Furthermore, such platforms were shown to replicate and perpetuate local patriarchal and punitive discourses around adolescent sexuality, reflecting broader systemic biases embedded in digital health ecosystems.

Matthias et al. (2023), in their article “Consideration of Sex, Gender, or Age on Outcomes of Digital Technologies...”, examine whether digital health systems account for gendered differences in health outcomes. Focusing on the use of digital technologies in the monitoring and treatment of Chronic Obstructive Pulmonary Disease (COPD), their findings reveal that sex, gender, and age are rarely considered as variables in the design and evaluation of such systems. This oversight poses a significant challenge to equitable healthcare delivery.

McCall et al. (2023), in their study “Attitudes Toward Seeking Mental Health Services and Mobile Technology to Support the Management of Depression...”, investigate the role of mobile and digital technologies in supporting mental health care, particularly among African American women. Findings indicate a strong preference for audio and video calls over SMS-based services, especially among individuals with moderate to severe depression. While online platforms emerged as increasingly preferred modes of support, the study also highlights substantial concerns around privacy, data security, communication quality, and the perceived emotional distance of non-face-to-face interactions.

Category 2: Women’s integration into technology

This category encompasses studies that critically examine gender-based disparities in access to, design of, and interaction with technology. The selected works address both structural and perceptual barriers that women face in digital environments, from wearable design to education and workplace engagement.

Hokka (2023), in her article “Gender and the Diversity of the Human Body as Challenges for the Inclusive Design of Wearable Technology”, investigates the tensions between gender diversity and inclusive design practices in wearable technology. She argues that early wearable forms—such as rings, wristwatches, and clothing—were initially gender-neutral or multi-gendered, but over time began to incorporate more female-oriented features. The study highlights how Finnish design companies frequently interpret inclusivity as “gender-neutrality,” yet encounter technical challenges when accommodating bodily differences shaped not only by biological sex but also by varying levels of sports participation. Additionally, the higher cost of inclusive production has contributed to a gender bias in sportswear, with male sports being more generously funded and catered to.

Tellhed et al. (2023), in their study “Tech-Savvy Men and Caring Women: Middle School Students’ Gender Stereotypes Predict Interest in Tech-Education”, explore how stereotypical gender schemas influence interest in technology education among Swedish middle school students. Their findings reveal a strong association between masculinity and technological competence, and between femininity and caregiving roles. More strikingly, students not only recognize these stereotypes but also internalize them, reinforcing gendered preferences and limitations at an early stage in the educational pipeline.

Zhang et al. (2023), in their research “Technology Acceptance Model (TAM) and Sports Bracelets Usage in Physical Education for Freshmen”, apply the TAM framework to analyse gender differences in wearable technology use among Chinese students. The study finds that female students show lower awareness and confidence in using sports bracelets as personal fitness tools, suggesting lower self-efficacy and internalized perceptions of technological inadequacy.

Kusuma (2023), in “The Role of Gender in Student Teachers’ Technology Integration in Teaching English Speaking Skills during the COVID-19 Pandemic”, investigates gender-based differences in technological competencies among Indonesian pre-service teachers. The findings indicate significant disparities in technology integration skills between male and female participants, highlighting an urgent need for gender-responsive digital training in teacher education programmes.

Özkan (2023), in “Sensing Productivity at Home...” explores how Turkish women use sensor technologies and self-tracking methods to make their domestic productivity visible within the context of neoliberal digital capitalism. The study reveals how the use of personal digital data challenges traditional gendered divisions of labour and questions the public–private dichotomy embedded in domestic work. The analysis underscores how data-driven visibility offers new forms of resistance to gender-based productivity assumptions and domestic labour invisibility.

Category 3: Gender inequality in STEM education

This category includes studies that focus on gender disparities in science, technology, engineering, and mathematics (STEM), particularly in relation to curriculum design, educational pathways, entrepreneurial initiatives, and sociocognitive barriers. The findings reflect how deep-seated stereotypes and systemic structures continue to shape women's engagement and representation in STEM fields.

Granota (2023), in “Early Influences and the Choice of College Major: Can Policies Reduce the Gender Gap in Scientific Curricula (STEM)?”, investigates the extent to which educational policies can influence gender disparities in STEM curriculum choices among high school students in Italy. The study shows that young women are less inclined to enrol in math- and technology-oriented programmes, which often lead to higher-paying technical careers. Interestingly, family and social networks appear to exert a stronger influence on high school major selection than anticipated, suggesting that early policy interventions targeting only female students may not be sufficient to bridge the gender gap in STEM participation.

Achtzehn et al. (2023), in their UK-based study “Do Enterprise Education Competitions Have Gendered Outcomes Amongst STEM Early-Career Researchers?”, examine the role of perceived gender barriers in shaping entrepreneurial intentions and self-efficacy among early-career researchers in STEM. While no significant differences were found in the level of entrepreneurial ambition between male and female researchers, gender-based stereotypes were found to have a substantial negative effect on women's confidence and intentions regarding entrepreneurship.

Tirado et al. (2023), in “Are Gender–Science Stereotypes Barriers for Women in Science, Technology, Engineering, and Mathematics?”, provide experimental evidence showing that gender-science stereotypes serve as cognitive barriers for women in STEM. Some engineering students, particularly women, reported feeling threatened by the prevailing stereotype that women are less competent in mathematics and science. This stereotype threat was associated with lower academic self-confidence and a tendency to opt for less demanding courses, ultimately contributing to the underrepresentation of women in high-demand scientific activities. The study also suggests that this cognitive barrier is more pronounced among individuals who view science as a product of “masculine reason.”

Pergelova et al. (2023), in “Entrepreneurship Education and Its Gendered Effects...”, analyse the gender-specific impacts of techno-entrepreneurial education among STEM students in Bulgaria. Their findings confirm that gender disparities persist across all STEM domains, including entrepreneurship. Nonetheless, the study notes that women are increasingly positioned to challenge and reshape the dominant masculine stereotypes that prevail in these fields.

Fernandez et al. (2023), in “Gender Inequality in Science, Technology, Engineering and Mathematics...”, explore gender-based differences in the perception and use of time in laboratory settings. Although female students believed they were spending as much time as their male peers, the study revealed that they engaged significantly less with technical equipment. These findings suggest that implicit gender roles may shape participation in hands-on scientific tasks, thereby reinforcing hidden forms of inequality even within seemingly egalitarian environments.

Category 4: Technology-facilitated sexual harassment and cyberbullying

This category focuses on gender-based violence that is mediated by technology, exploring its causes, manifestations, and the structural responses needed to combat it. Drawing from intersectional and feminist theoretical frameworks, these studies reveal how digital spaces can both reproduce and intensify gendered forms of abuse and marginalisation.

Reidy et al. (2023), in “Sexual Violence Against Sexual Minority Women in STEM: Compound Backlash”, apply intersectionality theory to explore the compounding effects of multiple marginalised identities. Their findings indicate that LGBTQ+ women in STEM experience a disproportionately high risk of sexual violence compared to individuals with singular marginalised identities. The study emphasizes how the intersection of gender, sexual orientation, and professional status creates unique vulnerabilities that hinder participation and equality in STEM fields—reinforcing systemic injustices in health, education, and employment.

Cookson et al. (2023), in “Fit for Purpose...”, assess the effectiveness of digital technology interventions aimed at preventing and responding to gender-based violence. The study critiques one-time or isolated interventions, arguing that they are largely ineffective in reducing online sexual harassment. Instead, it advocates for comprehensive, feminist-informed, and user-centered strategies that address sociocultural, political, and economic dimensions. When continuously refined based on user feedback, such technologies can significantly enhance awareness and link women to critical support services.

Ottemo et al. (2023), in “Gender, Passion, and ‘Sticky’ Technology in a Voluntaristically-Organized Technology Makerspace”, examine informal learning spaces such as makerspaces. Contrary to hopes that these environments would democratize access to technology and disrupt traditional gender norms in engineering, the study finds that

“technological passion” often reinforces masculinity. The emotional framing of tech as a toy or personal obsession contributes to a culture that marginalises alternative (especially feminine) ways of engaging with technology.

Oliver et al. (2023), in “Technology-Facilitated Sexual Harassment Against Women and Psychological Dysfunction”, investigate the psychological impact of online sexual harassment on young women. Their research links such harassment with disordered eating, alcohol misuse, and increased sexual dysfunction. Framed within Objectification Theory, the study argues that the persistent objectification of women’s bodies in digital spaces leads to internalized oppression and negative psychological outcomes, including anxiety and self-blame.

Martínez-Bacaicoa et al. (2023), in “The Role of Gender and Sexism in the Moral Disengagement Mechanisms of Technology-Facilitated Sexual Violence”, explore how different types of online sexual abuse—ranging from gender-based hate speech to image-based exploitation—are morally justified by perpetrators. The study finds that moral disengagement is highest in cases involving gendered hate speech, followed by gendered violence, digital harassment, image-based abuse, and cyberbullying. It also reveals that sexist beliefs amplify moral disengagement, particularly in scenarios where women are perpetrators and men are victims, and that sexist attitudes play a stronger role in women's disengagement compared to men's.

Sheikh & Rogers (2023), in their cross-regional study “Technology-Facilitated Sexual Violence and Abuse in Low and Middle-Income Countries”, emphasize the global scale of digital sexual abuse. Their analysis includes a broad range of behaviours such as image-based abuse, online harassment, sexual extortion, and the non-consensual distribution of sexual content, particularly in socioeconomically vulnerable regions.

Kim et al. (2023), in “Technology-Facilitated Sexual Violence in South Korea”, investigate the lived experiences of women subjected to digital sexual harassment. Their findings indicate that at least 7% of South Koreans have encountered such abuse, often perpetrated by former acquaintances or intimate partners. Victims report heightened anxiety, depressive symptoms, and difficulties coping—suggesting that cyber abuse has profound mental health consequences.

Powell & Flynn (2023), in “Technology-Facilitated Abuse Victimization”, analyse gender differences in exposure to digital sexual harassment in Australia. While general rates of online abuse are similar between men and women, the study finds that women are more frequently targeted with sexualized forms of harassment. Notably, community-wide online abuse may be mitigated through digital platform moderation, but abuse by intimate partners or acquaintances requires legal and criminal justice responses to be effectively addressed.

Category 5: The digital gender divide

This category comprises studies that examine how digitalization, across sectors such as education, employment, finance, agriculture, and governance, exacerbates or challenges gender-based inequalities. The digital divide is explored not only in terms of access to technology, but also through structural exclusions embedded in economic systems, algorithmic designs, and sociotechnical norms.

Lou et al. (2023), in “Does the Digital Economy Generate a Gender Dividend for Female Employment? Evidence from China”, argue that the digital economy offers significant opportunities for marginalised populations, including women. While digitalization appears to increase women’s employability overall, the study notes that mothers with young children benefit less due to the persistence of caregiving responsibilities, which hinder full engagement with digital work opportunities.

Philippi et al. (2023), in “Automation Technologies and the Risk of Substitution of Women”, investigate how automation affects employment security across genders in Europe. Their findings indicate that women face a slightly lower risk of job displacement (0.57 vs. 0.58 for men), but that institutional gender equality significantly mediates these risks. Where organisational structures are more gender equitable, the adverse effects of automation on female employment are mitigated.

Vaioa et al. (2023), in “Blockchain Technology and Gender Equality”, map the gendered dimensions of blockchain discourse in the scientific literature from 1990 to 2021. Their study reveals that women in developing countries continue to face financial exclusion and tradeoffs—such as sacrificing education or food to support household economies. The authors argue that blockchain technologies, by eliminating facial recognition and identity-based biases, hold promise for empowering women economically in contexts where conventional banking systems fail them.

Buchert et al. (2023), in “Persisting Inequalities in the Digitalized Society”, explore how digital public services in Finland reproduce gender inequalities, particularly for migrant women. The study finds that digital interfaces often lack sensitivity to diversity and inclusion, thereby reinforcing the digital gender gap and marginalising users with limited digital skills.

Shah & Krishnan (2023), in “Digital Gender Gap, Gender Equality and National Institutional Freedom”, demonstrate how unequal access to mobile technologies correlates with broader restrictions on women's freedoms in media, politics, and economics. Their analysis shows that the digital gender gap acts as both a symptom and a driver of gender inequality across institutional landscapes.

Neely et al. (2023), in “Social Inequality in High Tech: How Gender, Race, and Ethnicity...”, offer a sociological account of how inequality is embedded in high-tech work cultures. Drawing on ethnographic observations from Silicon Valley, they illustrate how major tech companies use pseudo-religious organisational practices—such as promoting a sense of “sacred purpose” at work—to blur the lines between personal and professional life. These practices foster burnout, high turnover rates, and hidden gender-based vulnerabilities, particularly for women, who are disproportionately affected by unstable employment cycles.

Gharagozloo et al. (2023), in “The Role of Digitalization in Decreasing Gender Gap in Opportunity-Driven Entrepreneurship”, link high national Digital Readiness Index scores with increased female participation in the digital economy. Their results show that digitalization is positively correlated with higher per capita income and reduced fear of failure among women entrepreneurs. However, despite a rising number of women entering entrepreneurship, the number of new businesses founded by women remains significantly lower than that of men.

Addison et al. (2023), in “Uptake and Income Distribution Effects of Targeted Farm Technologies on Rice...”, explore the role of gender in determining the impact of agricultural technologies on income in Ghana. The study finds that women farmers consistently earn less than their male counterparts, primarily due to the unequal distribution of domestic reproductive labour. As the burden of childcare increases, women’s capacity to use farm technologies and cultivate land diminishes, leading to lower income per hectare.

Chen et al. (2023), in “The Fintech Gender Gap”, find that 29% of men compared to only 21% of women use financial technology services. The study attributes this disparity to a mismatch between fintech product designs and women’s needs and preferences. Attitudinal differences, rather than access alone, contribute significantly to this gap, suggesting that fintech services have yet to effectively reach and resonate with female users.

Warren & Gibson (2023), in “Struggles over Skills: Lived Experiences of Evolving Technologies and Gendered Hierarchies at Work”, offer a feminist labour geography perspective on how gendered skill hierarchies persist in technologically advanced workplaces. Drawing on ethnographic research in automotive workshops, they demonstrate how men’s skills are framed as formal and high-status, while women’s are considered natural and subordinate. This framing reinforces structural barriers to women’s advancement and perpetuates gender-based inequality in skill recognition and reward systems.

Cortés et al. (2023), in “The Digital Gender Gap in Secondary School”, explore gender differences in digital self-efficacy among Spanish high school students. The study finds that boys exhibit higher perceived digital competencies, while girls believe they excel more in academic and communicative skills. This supports the hypothesis that a digital gender divide continues to exist, placing girls at a disadvantage in technology-driven contexts. Finally, Birkett (2023), in “Gendering the Carceral Web: Public Sector Reform, Technology and Digital (In)justice”, critically examines the digitalization of the UK justice system. Birkett argues that e-government platforms are designed to be gender-blind, reproducing the structural invisibility of women—particularly impoverished women—within carceral institutions. The study warns that technology-driven reforms risk deepening inequality when digital justice systems ignore the gendered dimensions of poverty and access.

CONCLUSION

The systematic review of the literature reveals that women encounter persistent barriers in accessing, utilizing, and pursuing careers in digital and technological domains. These obstacles manifest through digital exclusion, gender-based harassment, symbolic invisibility, discriminatory practices, and internalized limitations that continue to shape women’s experiences with technology.

In the context of health informatics, studies show that while digital technologies can increase access to sexual and reproductive healthcare for youth, they also generate anxiety and uncertainty in automated systems. In Kenya, digital sexual health platforms demonstrate age and gender biases by failing to provide adequate services for adolescent girls. Similarly, gender and age remain largely unaddressed variables in digital health technologies for managing chronic diseases such as COPD. In the realm of mental health, women—particularly African American women—prefer video or voice-based communication over SMS in managing depression through mobile health tools, though concerns over privacy, data security, and emotional detachment persist.

Regarding women’s integration into technology, research highlights the design challenges of creating gender-inclusive wearable technologies, particularly in accommodating diverse body types and usage contexts. Stereotypes such as “tech-savvy men” and “caring women” persist among middle school students, who tend to internalize gendered beliefs about technological and caregiving competencies. Chinese female students exhibit lower confidence in using wearable tech, while studies from Indonesia report significant gender gaps in pre-service teachers’ technological integration skills. In Turkey, women have turned to sensor-based technologies to make their domestic productivity visible—challenging traditional gendered divisions of labour. Together, these findings underscore the need for comprehensive and inclusive policies to prevent the reproduction of gender inequality through technological systems.

Within STEM fields, studies continue to confirm the persistence of masculinized perceptions of science and technology (Tirado et al., 2023). Gender stereotypes negatively affect women's self-efficacy, interests, and performance in STEM, contributing to underrepresentation. Research has also documented differences in entrepreneurial intent and self-efficacy, reflecting the structural and symbolic barriers women face. These insights point to the urgent need for structural reforms that promote gender equity across all levels of STEM education and practice. Findings related to technology-facilitated sexual harassment and cyberbullying demonstrate that women face disproportionately higher risks of digital abuse. These forms of violence mirror and amplify offline gender-based inequalities, raising serious concerns about digital safety and justice. The literature supports calls for policy interventions that not only address symptoms of abuse but tackle the underlying social structures that enable digital gender violence.

Finally, research highlights the persistence and depth of the digital gender divide, which encompasses disparities in access to, use of, and benefits from digital technologies. Women are shown to be disadvantaged in digital economies, less able to access financial systems, and underrepresented in technology-related employment. The gendered design of fintech products, limited access to agricultural technologies, and gender-blind justice reforms all contribute to this divide. In short, the digital gender gap manifests as a socio-technical reality shaped by factors such as gendered fears of entrepreneurship, the disproportionate impact of automation on women, exclusionary fintech interfaces, and the masculinization of emerging digital institutions.

DISCUSSION AND POLICY IMPLICATIONS

These findings underscore the urgent need for inclusive and equitable technological policies aimed at advancing gender justice. To reduce the digital gender gap, policymakers must not only promote gender-equal access but also challenge entrenched stereotypes and discriminatory norms through awareness-raising initiatives and educational reform. Digital health platforms must reflect local socio-cultural gender norms (Nijagi, 2023), as digital spaces often reproduce offline inequalities and power dynamics (Yang & Henderson, 2024). This affirms the hypothesis that sociological realities in the "real space" are frequently reconstituted in cyberspace as virtual inequalities. As such, interventions to combat cyber harassment must address the offline social structures that sustain digital violence (Cookson et al., 2023).

The reproduction of gender stereotypes in STEM, as confirmed by numerous studies, lends empirical support to the claim that modern science has been shaped by masculinized reasoning, often at the expense of alternative epistemologies (Author 2014). Although gender gaps in many social domains have narrowed in recent decades, women remain underrepresented in STEM fields (Granota, 2023; Ribeirinha et al., 2024; Deiri & Burkhard, 2025). This results in two critical societal consequences: (1) A shortage of scientific talent; and (2) the continuation of wage inequality in the labour market. In times of economic transformation, women's participation becomes increasingly vital for national prosperity. In fact, during periods of economic growth, digitalization tends to function as a more effective equalizer between male and female entrepreneurs (Gharagozloo et al., 2023).

The origins of gender inequality in science and technology can be traced to early socialized choices, underscoring the importance of early intervention. Effective support for girls in developing technical and digital competencies should begin during secondary education (Cortés et al., 2023). By age 14, girls' educational choices often shape their career trajectories and future earning potential (Granota, 2023). Therefore, strategies to increase girls' participation in STEM should include promoting egalitarian gender norms at home and educating parents about their influence on their children's aspirations. Expanding the number of women in STEM professions and increasing the visibility of female role models can further help close the gender gap (Pergelova et al., 2023; Katz, 2026; Acar et al., 2025). Women should not remain merely consumers or users of digital culture; they must be positioned as founding subjects—an ontological as well as an epistemological demand (Author, 2014).

In relation to cyber harassment, current legal and policy frameworks remain insufficient in protecting victims' physical and psychological well-being (Kim et al., 2023). Discrimination and stigmatization based on gender identity, physical disability, obesity, or poverty may be exacerbated by digital labels. These intersecting marginalised identities often serve as "punishments" for deviating from prescribed gender norms, acting as mechanisms of gender role enforcement (Reidy et al., 2023; Banton et al., 2025).

In sum, the reciprocal relationship between gender and technology is currently unfolding to the detriment of women. Technological innovation is largely aligned with masculine desires and priorities. To shift this paradigm, women need not only more greatly access to and proficiency with digital tools, but also the confidence and cultural support to fully participate in shaping technological futures. Moreover, confronting challenges such as uncontrolled rapid digitalization and social media disinformation exceeds the capacity of modern philosophy when it remains confined to historically dominant epistemological frameworks often described as "masculine intellect" (Işıklı, 2025: 8). Addressing these challenges requires epistemological plurality and the inclusion of alternative modes of knowledge production that have long been marginalized. The participation of the feminine intellect as an equal partner in digital culture is inevitable.

LIMITATIONS OF THE STUDY

While this systematic review offers a focused overview of recent high-impact research on technology and gender, its scope is subject to certain limitations. The analysis is limited to Q1-ranked journals indexed in the Web of Science and to publications from 2023, a choice that ensures academic quality and contemporaneity but may exclude relevant studies published elsewhere or in earlier periods. In addition, the reviewed literature is geographically uneven, with a strong concentration in Anglophone contexts, particularly the United States and the United Kingdom. Finally, due to the scope of the selected studies, variations among different demographic groups of women could not be examined in equal depth. These limitations point to the need for more geographically diverse and longitudinal research in future studies.

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Ethical statement

This study is a systematic literature review and does not involve human participants, personal data collection, or experimental intervention. Therefore, ethical approval and IRB review were not required.

Competing interests

The authors declare that they have no competing interests.

Author contributions

Şevki Işıklı: Conceptualization, methodology, literature review, formal analysis, writing – original draft, writing – review & editing. Esra Fatma Fazlıoğlu: Data collection, screening and coding of studies, validation, writing – review & editing, visualization.

Data availability

All data used in this study are derived from publicly accessible academic sources. No new datasets were generated. Extracted study lists and coding materials are available from the authors upon reasonable request.

AI disclosure

Artificial intelligence tools (such as ChatGPT) were used only to support language refinement and formatting at later stages of manuscript preparation. All ideas, arguments, analyses, and conclusions presented in this article are solely those of the authors. The authors take full responsibility for the content.

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