

Supplementary Information: A scoping review of gender bias in digital occupational health management

Reinsch, Lina; Hecker, Raoul Maximilian; Olbrecht, Thomas; Thielscher, Christian

Contents:

Supplement Table 1: Selection criteria for the databases

Supplement Table 1: Literature research

Supplement Table 3: Literature review inclusion-criteria

References for the 62 included sources of evidence

Supplement Table 2: Selection criteria for the databases

Databases/ Journals	Selection criteria	
	Advantages	Disadvantages
PubMed	• Comprehensive coverage of medical literature • Access to current articles	• Focus on basic biomedical research
Cochrane Library	• Focus: Medicine, healthcare, and health sciences • Structured summaries of international systematic reviews • High-quality reviews	• Reviews only, no original studies • Few new studies (delayed publication) • Focus on interventions
Springer Link	• Full-text access to German- and English-language journals and books in the fields of medicine, public health, and social and health sciences • German-language coverage	• Fewer international reviews • Fewer filter options
Google Scholar	• Extensive, interdisciplinary database • Full-text and citation search	• A general-purpose search engine without quality standards • Not suitable as the sole basis for literature research • Algorithmic sorting (not by subject)
EBSCO	• Multiple subject-specific databases in a single interface • Filters by study type, full text, language, and year of publication	• Licenses depending on the database
European Institute for Gender Equality (EIGE)	• Gender Statistics	• No primary research

	• Database containing indicators on gender equality, employment, and health in the EU • Gender Equality Index as a consistent measurement framework for structural gender gaps	
Bundesinstitut für Arzneimittel und Medizinprodukte (BfArM)	• National studies on digitalization and medical devices • Regulatory reports	• Highly specific • Official reports only
The Lancet of Digital Health	• High-impact journal featuring peer-reviewed original studies and reviews • High-quality, up-to-date research	• Highly specific • Not all articles are open access
World Health Organisation (WHO)	• Global-health standards and health definitions	• Global perspectives • Fewer empirical studies

Supplement Table 3: Literature research

Databases	Search terms	Results	Title/Abstract	Search-Criteria	Full-texts	Excluding-Criteria	Included
PubMed/MedLine	Digitalisierung	172	26	last 5 years, German and English	8	Duplicates; Not Germany; Focus on special illnesses (e.g, COVID-19, adipositas, transplantations); Focus on special medical fields (e.g. vaccinations, pediatrics, radiology; No focus on gender; not work-related; Not digital-work; Not open-access / full-text	1
	Digital Health + Gender bias	123	20		8		1
	Gender Bias + digitization	186	27		15		1
	Betriebliches Gesundheitsmanagement + Gender bias	0	0		0		0
	Gender Bias + digital Technologies	50	11		7		1
Google Scholar	Digitalisierung + Gender-Bias	3,642	341	last 5 years, German and English + Open Access	62		41
	Betriebliches Gesundheitsmanagement + Gender bias	237	26		18		1
Springer Link	Digitalisierung + Gender	134	21		6		2
	Betriebliches Gesundheitsmanagement + Gender	3	0		0		0
	Digitalisierung + Gender-Bias	10	2		0		0
EBSCO	Digitalisierung + Gender	31	14	last 5 years, German and English + full-text	10		4
	Digitalisierung + Gender-Bias	1	1		1		1
	Betriebliches Gesundheitsmanagement + Gender	8	4		4		4

The Lancet Digital Health	Gender + Digital	118	11	Last 5 years, German and English + Open Access	5		2
Cochrane Library	Digitization	54	1		0		0
WHO	Gender + Digital Health	2	2		2		2
EIGE	Gender Bias	4	1		1		1
Studies: Bundesinstitut für Arzneimittel und Medizinprodukte (BfARM)	Digitalisierung	100	5	Article, last 3 years	0		0
	Gender + Digitalisierung	3	0		0		0
	Digitalisierung + Gesundheitswesen	57	4		0		0
	Gender	9	0		0		0
Total Results		4,944	517		147		62

Supplement Table 3: Literature review inclusion-criteria

ID	Author, Year	Title	Journal	Inclusion-criteria
1	Bartig, S., Kalkum, D., Le, H. M., Lewicki, A., 2021	Diskriminierungsrisiken und Diskriminierungsschutz im Gesundheitswesen – Wissensstand und Forschungsbedarf für die Antidiskriminierungsforschung		• Discrimination arising from differences in the treatment of women and men, for example women with myocardial infarction and men with depression, pp. 32–33. • Pain in women is often underestimated or not taken seriously, p. 33. • Studies are often conducted only with male participants. Diagnostic criteria, treatment options, and medication dosages are therefore geared towards men. Animal studies also frequently use only male animals, pp. 32–33.
2	Bearman, M., Ajjawi, R., 2025	Artificial intelligence and gender equity: An integrated approach for health professional education	Medical Education	• As artificial intelligence (AI) increasingly integrates into health work-places, evidence suggests AI can exacerbate gender inequity, p. 1049. • Healthcare cannot avoid the rise of artificial intelligence (AI). AI has been present in our everyday social interactions for years¹ and algorithmic-intensive practices are already integrated into many health workplaces within decision-making, administrative and image-making applications, p. 1049.

				The gender divide within AI technologies can be understood in two ways: in the AI outputs that are produced and the AI processes that underpin this production. Systematic reviews into gender bias within AI present a sobering picture of how the feminine and the female are represented in AI outputs, p. 1051.
3	Beck, P., 2020	Begrifflichkeiten und Abgrenzungen, In: Matusiewicz, D., Kardys, C., Nürnberg, V. (Hrsg.), Betriebliches Gesundheitsmanagement: analog und digital, pp. 14–19	MWV Verlag	Workplace health promotion (WHP): Definitions (explanation of terminology), p. 16.
4	Becker, K., 2020	Gender Health Gap als Folge ungleicher Vernutzungsbedingungen von Arbeitskraft und Arbeitsvermögen	Gender – Zeitschrift für Geschlecht, Kultur und Gesellschaft	- Gender role stereotypes and gendered attributions of competence in the world of work; men are ascribed greater technical expertise and assertiveness, women are expected to be friendly and empathetic; differing levels of appraisal and differing requirement levels. - Women: paid employment, additional health burdens; in the fields of paid work as well as care work and housework, women are confronted with higher health risks and are disadvantaged relative to men in this

				respect. These health risks are the result of high and numerous burdens. Gender Health Gap, pp. 107–117 + 120.
5	Bundesministerium für Familie, Senioren, Frauen und Jugend (BMFSFJ), 2021	Gender Mainstreaming	https://www.bmfsfj.de/bmfsfj/themen/gleichstellung/gleichstellung-und-teilhabe/strategie-gender-mainstreaming/gender-mainstreaming-80436 , access: 03.08.2024	Gender Mainstreaming: explanation of the term.
6	Bundesvereinigung Prävention und Gesundheitsförderung e.V., 2025	Gesundheitliche Chancengerechtigkeit als Schlüsselthema in der Politik – Empfehlungen der Arbeitsgruppe „Gesundheitliche Chancengerechtigkeit“		Equal opportunities, with measures adapted to different needs related to gender, disability, or age, without creating systematic exclusion.

7	Carstensen, T., 2023	Digitalisierung der Arbeit – eine Zwischenbilanz aus Geschlechterperspektiven	WSI Mitteilungen	• Will digitalisation finally eliminate all gender inequalities? • The compatibility of work and family life, the re-evaluation and remuneration of work, new forms of visibility and career opportunities, but also new mechanisms of discrimination and the risk of unemployment due to automation. • Location-flexible work and working from home, platform-mediated work, automation and new skill requirements, discrimination through algorithms and artificial intelligence, and the lack of diversity and persistent inequalities in technology development. • Gender inequalities persist both in the world of work and in research on the digitalisation of work. • However, the more sophisticated the software applications become, the greater the differences between genders. • A lack of diversity and global inequalities in technology development.
8	Carstensen, T., Ganz, K., 2023	Vom Algorithmus diskriminiert? – Zur Aushandlung von Gender in	Hans Böckler Stiftung	• How algorithmic bias arises, and why ethical guidelines and statutory regulation are necessary, p. 30.

		Diskursen über Künstliche Intelligenz und Arbeit		• Although the discourse is partly shaped by stereotypes, it also raises awareness of the opportunities and risks of AI from a gender perspective. It therefore contributes to broader societal awareness of the challenges associated with the use of AI in the workplace. • The removal of gender-based barriers and stereotypes. • Bias in many datasets, as well as a lack of transparency, traceability, and verifiability. • With regard to bias prevention, AI systems should never be considered fully completed, and the training data should reflect relevant real-world conditions.
9	Carstensen, T., Ganz, K., 2023	Gendered AI: German news media discourse on the future of work	AI & Society	• Discourse on AI, gender, and work closely links AI to the issue of algorithmic discrimination. • Illustrate AI's potential for gender-based, racist, and intersectional discrimination and illustrate the idea of biases introduced through training data.
10	Carstensen, T., Prietl, B., 2021	Digitalisierung und Geschlecht: Traditionslinien feministischer Auseinandersetzung mit neuen Technologien und gegenwärtige Herausforderungen	Freiburger Zeitschrift für Geschlechter Studien	• Algorithmic discrimination. • Fundamental inequalities in access to and opportunities to shape digital technologies, p. 38.

11	Catala, A. B., 2024	Gleichstellung, In: Sozialbericht 2024 – Ein Datenreport für Deutschland, p. 294–303	Bundeszentrale für politische Bildung	• Gender has both direct and indirect effects on human health. In addition to biological factors, behaviours and lifestyles shaped by gender roles have a considerable influence on health and life expectancy. • In 2022, the employment rate among women aged 15 to 64 reached a record high of 73.0%, p. 300. • Women also perform a considerably greater share of unpaid work. • Introducing health-promotion programmes specifically targeted at men could help increase male life expectancy.
12	Chauhan, A. et al., 2024	Identifying Race and Gender Bias in Stable Diffusion AI Image Generation, 2024 IEEE 3rd International Conference on AI in Cybersecurity (ICAIC), Houston, TX, USA, pp. 1–6	IEEE	• Algorithms that are trained on datasets reflecting societal stereotypes serve only to perpetuate existing inequalities.
13	Dratva, J. et al., 2024	Digitale Gesundheitskompetenz der Bevölkerung in Deutschland: Aktueller Stand, Konzepte und Herausforderungen	Bundesgesundheitsblatt	• In an international comparison based on a multidimensional digital health indicator, Germany ranked only 16th among the 17 countries analysed. • The term eHealth literacy, eHL, is increasingly being replaced by digital health literacy, DHL.

				• The German Health Literacy Survey, HLS-GER 2. • According to HLS-GER 2, 76% of the population in Germany has limited digital health literacy, including 9% with problematic and 66% with inadequate digital health literacy. • Digital health literacy is a key prerequisite for ensuring the successful digital transformation of health systems and for realising the potential of digitalisation. • In efforts to strengthen digital health literacy, ensuring digital equity is essential to prevent the emergence of new social gradients or risk factors, pp. 277–282.
14	Do Nascimento, I. J. B. et al., 2025	Transforming women's health, empowerment, and gender equality with digital health: evidence-based policy and practice	The Lancet Digital Health	• Digital health technologies (DHTs) enhance health-care delivery through increased access to care and a better experience for end-users. • Digital technologies directly affected women's empowerment and gender equality either as a skills acquisition system or as a health education portal or health literacy platform, p. 7.
15	EIGE, 2025	Gender Equality Index 2025	Publications Office of the European Union	• The gender employment gap is closely tied to occupational segregation and the presence of far fewer women in leadership roles., p. 43.

				• Table 9: Indicators of the domain of work, EU-27. • it will take at least another 70 years to achieve equality in employment and working life, p. 113. • Annex 3. Gender Equality Index 2025: breakdown by indicators Table 26: Indicators of the domain of work, p. 155.
16	Efimov, I. et al., 2023	Status quo der betrieblichen Gesundheitsförderung in Inklusionsbetrieben. Potenziale und Herausforderungen für die Zukunft	Prävention und Gesundheitsförderung	• Workplace health promotion measures may aim to change both individual behaviour (Behavioural Prevention), and working conditions (Structural Prevention).
17	Figueroa, C. A. et al., 2021	The need for feminist intersectionality in digital health	The Lancet Digital Health	• Dangerous gender and racial biases can sneak into algorithms that are used by apps for decision making. • Women and people with racial or ethnic minority backgrounds have been under-represented in medical research for decades,⁴⁸ and the artificial intelligence algorithms reflect the biases of medical research., p. 528. • To our knowledge, statistics about female leadership and intersectional differences in academic digital health research have not been published.

				• As a result of gender inequality in digital health leadership, most digital health applications are built and funded by men. • digital health gender gap, women, especially those from marginalised backgrounds, need to be included in the design and testing of apps. • Excluding biases from design and algorithms, p. 530. • Digital health can have an enormous positive effect on women's wellbeing. However, lower access to technology, exclusion from leadership, and harmful societal norms currently impede digital health gender equity and risk increasing health inequities.
18	Gaiswinkler, S., 2020	Gendersensible Betriebliche Gesundheitsförderung. Kriterien aus der Literatur und Beispiele aus der Praxis	GÖG Österreich	• In their daily lives, women and men face health-related demands arising both from their living and working environments and from the challenges of reconciling work and private life. • Women have considerably higher rates of part-time employment than men and more often face multiple burdens arising from paid work and caregiving responsibilities. Men, by contrast, are more frequently exposed to work pressure that can adversely affect their

				health. This may result in psychological strain associated with an increased risk of depression or suicide, p. 9. • From a gender perspective, the question arises as to whether and how unequal gender positions in family work and paid employment are reproduced within organisations, and whether and how new inequalities are created. • To promote the health of working women and men in a way that reflects their needs and requirements, gender must be systematically considered alongside other dimensions of diversity, including age, ethnicity, religion, physical or intellectual disability, and sexual orientation. • Deficits in recognising the need for gender-sensitive practice, as well as insufficient commitment, resources, and competencies to address the gender dimension appropriately.
19	Gernert, M. et al., 2024	Network development in workplace health promotion – empirically based insights from a cross-company network	BMC Public Health	• For successful and sustainable networks, targeted network management is supposed to be an important factor for network development.

		promoting physical activity in Germany		• Relevance of inter-organisational networking in (workplace) health promotion, as a way to increase health promotion capacity of small companies., p. 12.
20	GESIS Leibniz-Institut für Sozialwissenschaften, 2025	Gleichstellungsplan 2025–2029 nach Ziffer 9 der Ausführungsvereinbarung zum GWK-Abkommen über die Gleichstellung von Frauen und Männern	GESIS	• Gender-inclusive language to promote equal opportunities as a core principle, p. 39. • Raising awareness of and supporting gender equality, diversity, and the reconciliation of work with family and caregiving responsibilities. • Training on gender-related issues. • Within workplace health management, equality initiatives focus on the potential burdens faced by employees combining work and family responsibilities, sexual harassment, and discrimination against women.
21	Ginsburg, O. et al., 2023	Women, power, and cancer: a Lancet Commission	The Lancet	• Of the 2·3 million women who die prematurely from cancer each year, 1·5 million premature deaths could be averted through primary prevention or early detection strategies, while a further 800 000 deaths could be averted if all women everywhere could access optimal cancer care.

				• Women are more likely to experience financial catastrophe due to cancer, with dire consequences for their families, even if quality cancer care is available. • Globally, men are over-represented in the leadership positions of hospitals, treatment centres, and research institutes. The same is true for editors-in-chief of cancer research journals, and lead authors of cancer research papers. Gender bias, racism, and other forms of discrimination in cancer research and knowledge production can be addressed by creating awareness, ensuring equitable access to research opportunities and resources, and by implementing policies mandating that sex and gender dimensions are considered in research and research policy making. p. 2114. • cancer affects women who are also marginalised due to geography, race, and ethnicity, and suggested that cancer in women has unmeasured far-reaching effects on society and economies. p. 2115.
22	Gjellestad, M. et al., 2023	Women's Health and Working Life: A Scoping Review	International Journal of Environmental	• Work participation is linked to several socio-economic factors affecting living conditions and public health; worklife is an important field for the equalisation of social differences and gender inequalities; UN's sustainable

			Research and Public Health	development goals regarding health, equality and work, p. 1. • Women and men face different health challenges due to differences in biology and physiology; women's health has not been sufficiently explored in the context of work. • Hormonal changes and menstruation-related ailments, pregnancy and reproductive matters and chronic and complex disorders were all found to impact the occupational setting., p. 12. • difficult working conditions, this might lead to reduced work ability and high levels of sickness absence. Women's health and working life constitute a complex connection with the potential for the development of new knowledge, and the scope of this connection should be considered from a broader perspective of living conditions and public health. • more knowledge on the associations and connections between health and work and the possible differences between women and men in these interaction.
23	Gjellestad, M. et al., 2024	Women's health at work: a qualitative study on women's	BMC Public Health	• Women constitute half of the potential workforce, and improvement of public health and gender equality is

		health issues in relation to work participation		addressed in the context of working life specifically in two of the United Nations Development Goals: Gender Equality and Decent Work and Economic Growth. • Historically, medical and health research has largely been conducted on men and considered ‘gender neutral’, with the consequence of not taking female biology into consideration. A result of this is that we still know less about women’s health in general and how it impacts the work context, p. 2. • International research has shown that women’s health issues can negatively affect work participation, work ability and sickness absence, but more knowledge is needed both on the specific conditions and the complexity of women’s health in the context of work. • the invisibility of women’s health issues in the workplace was confirmed by the managers; there was no general focus on the topic in the work environment and little openness around the specific conditions. • role conflicts between work and family life resulted in bad conscience for both, and how this was worsened by the expectations and attitudes they perceived from society, p. 9.
--	--	---	--	---

				• we suggest that complexity, lack of recognition and invisibility of women's health can influence women's participation in working life, p. 13. • We argue that to improve gender equality in working life, women's work environment and occupational health must be recognised and considered based on knowledge of female physiology. This will benefit individuals, organisations and society and lead to a health promoting and sustainable working life.
24	Gössl, S. L., Yakar, S., 2023	Geschlechterneutrale KI. Eine Handreichung	Ministerium Schleswig-Holstein	• Artificial intelligence is generally understood as an umbrella term for a wide range of computer programs based on different technologies that imitate human behaviour and decision-making, or even surpass humans in these respects, and can therefore be compared with human intelligence, p. 8. • The first cause is bias that already exists in the datasets, referred to as pre-existing bias or representation bias. Datasets consist of information drawn from society. This information also contains socially embedded prejudices, stereotypes, and stigmas, which the algorithm adopts through the datasets and processes as a basis during the training phase, p. 55.

				• Bias may similarly arise before data processing begins, when a person evaluates the datasets, as this evaluation may involve subjective judgement. • Bias resulting from the overrepresentation or underrepresentation of particular characteristics that the algorithm uses for categorisation. • The autonomous logic of data mining presents a problem because it evaluates and organises data according to patterns in the data without considering the broader social context. A particular problem arises when an algorithm treats findings derived from a limited sample and a defined period as generalisable results, p. 64. • Human decisions may also be incorporated into datasets and lead to biased results. • Inadequate or one-sided datasets, technical errors, and the black-box nature of self-learning AI systems can lead AI to adopt the stigmas, stereotypes, and unequal treatment embedded in human decisions and continue using them as a basis for subsequent decisions, p. 71. • The complexity and opacity of how AI systems function and learn autonomously make it difficult for both users and providers to understand their operation, p. 75.
--	--	--	--	---

				Datasets may reflect social biases and thereby reinforce discrimination. To counteract this, datasets must be diverse, current, and representative, p. 97.
25	Health and Safety Executive, 2025	Work-related stress, depression or anxiety statistics in Great Britain	HSE	- A British study found that women in every age group experience more anxiety, stress, and depression at work than men. - The highest prevalence of work-related stress, depression, or anxiety occurs among employees aged 25 to 34. For every 100,000 employed people, 2,930 men and 4,270 women are affected, p. 15.
26	Ho, J. Q. H. et al., 2025	Gender biases within Artificial Intelligence and ChatGPT: Evidence, Sources of Biases and Solutions	Computers in Human Behavior: Artificial Humans	- The use of Artificial Intelligence (AI) has influenced almost every field and industry, from healthcare, to education, to private businesses, p. 1. - Biases in AI models are not just technical issues but are intertwined with societal norms and prejudices that AI systems, in particular, chatbots can perpetuate. These biases can manifest in various forms, such as the reinforcement of stereotypical gender roles, the use of gendered language, and differential treatment of users based on perceived gender. Such biases often arise from the training data used to develop these models, which

				may reflect existing societal biases if not carefully curated. Moreover, the design and testing processes, if not inclusive of diverse perspectives, can embed these biases into the final product. Once deployed, biased chatbots can perpetuate and exacerbate these issues, influencing user interactions in ways that reinforce harmful stereotypes and contribute to the marginalization of certain groups., p. 10.
27	Holzgreve, F. et al., 2025	Inklusion und Gesundheit am Arbeitsplatz	Zbl Arbeitsmed	• Workplace health promotion is based on the Ottawa Charter for Health Promotion. Under the goal of “Health for All”, the Ottawa Charter seeks to strengthen individual autonomy and create living conditions that promote health, p. 254. • Workplace health promotion includes measures both to improve working conditions, structural prevention, and to promote health-conscious behaviour among employees, behavioural prevention. • The development of health-promoting interventions should be guided by the needs of the organisation and the target group, while taking gender-sensitive and culturally sensitive aspects into account, p. 255.

28	Horstmann, S. et al., 2024	DIVERGesTOOL – Entwicklung einer Toolbox zur Erfassung geschlechtlicher Vielfalt in der quantitativen Gesundheitsforschung	Bundesgesundheitsblatt	• In our society, gender is one of the categories that substantially shape how we live together. It influences a person's social role, relationships, and the characteristics and behaviours that others attribute to and expect of them. Social gender relations also have a clear impact on the resources to which a person has access and the opportunities available to them in life. Gender has major implications for health. The effects of the various biological and social dimensions of gender on health have been demonstrated extensively across all fields of medicine and public health, p. 1054. • The DIVERGesTOOL toolbox was developed through a participatory process. • The DIVERGesTOOL toolbox is intended to undergo further development and expansion. It contributes to improving research validity by encouraging researchers to use advanced questionnaire instruments for recording gender. This is necessary to establish gender-equitable quantitative health research in the long term and to support more scientifically robust health promotion, prevention, and healthcare.
----	----------------------------	--	------------------------	--

29	Initiative D21, 2020	Digital Gender Gap – Lagebild zur Gender(un)gleichheiten in der digitalisierten Welt	Initiative D21	• From a gender perspective, similarities and differences between genders emerge depending on personal attitudes and access, educational background, age, and economic and cultural conditions. • Studies of digitalisation in society require a detailed examination of existing evidence on gender equality in relation to technology use, technology-related education and training, and technical occupations, as well as, conversely, education and employment in the social sciences and humanities, p. 8. • Develop gender-equitable quality standards for digital competencies. • Recognise and reward gender-equitable concepts for future digital working environments. • Implement gender-responsive continuing education for educational professionals, pp. 30–31.
30	Initiative D21, 2022	D21-Digital-Index 2022/2023 Jährliches Lagebild zur Digitalen Gesellschaft	Initiative D21	• Research on gender inequality in the labour market has found that women’s jobs generally have a lower substitution potential than men’s jobs. This is mainly attributable to the high proportion of women employed in social and care-related occupations. However, this does

				not apply equally across all occupational segments, and the pattern varies by field of work. In some occupations typically performed by women, the growing use of technologies, particularly mobile collaborative robots and self-learning computer programs, is increasing the potential for substitution. Women frequently perform administrative and clerical tasks, many of which can now be fully automated.
31	Lott, Y., 2023	Der Gender Digital Gap in Transformation? – Verwendung digitaler Technologien und Einschätzung der Berufschancen	WSI Report	• A gender digital gap exists in the use of software in the workplace. • Career opportunities in a digitalised labour market, since women, compared with men, are less likely to feel well prepared for it or to see good job prospects there. • The gender digital gap is therefore above all a gender part-time digital gap. One reason for this could be that women reduce their working hours far more often than men for family reasons (Figure 9) and are thus more frequently exposed to stigmatisation, which apparently leads to occupational disadvantages, including with regard to the use of digital technologies.

				• Women and men work in different occupational positions and sectors and perform different tasks.
32	Lübken, A., Wiemer, M., 2025	KI-Diskriminierung begegnen: Inklusion und KI	Springer	• For digital systems, even when they operate in a mathematically correct manner, do not emerge in a vacuum. They are developed by people, fed with data, optimised towards particular goals, and thereby inevitably charged with societal assumptions, values, and power structures. It is precisely these entanglements that make them susceptible to distortions, unequal treatment, and systemic exclusion. Discrimination through technology is therefore not a rare phenomenon but an expression of societal inequalities. These structures are not automatically dismantled by digital systems but are frequently reproduced or even exacerbated. When an artificial intelligence is trained on incomplete or one-sided datasets, when it imposes normative standards on people, or when diversity is lacking in the development teams, systems arise that disadvantage, exclude, or produce erroneous assessments. • Discrimination in digital systems does not arise from individual technical malfunctions but from a complex interplay of different structural levels. These range from

				data collection through the architecture of the models to the interfaces at which people interact with the system. In order to understand these mechanisms, it is necessary to examine the individual elements in detail and to make their interactions visible. • The discriminatory effects of AI systems are not random but an expression of structural patterns in data, models, and development cultures. Those who recognise these patterns can deliberately avoid exclusions. • Fairness metrics, audits, and explainable systems can support equitable technology design, but without the right attitude, diversity, and participation they have no effect. • Power relations, normative conceptions, and default assumptions shape every technical system. They must be made visible and critically questioned as early as the development process. • A lived culture of error and the assumption of responsibility form the basis for adaptive, equitable AI. Feedback is not a risk in this context but a prerequisite for improvement. • Inclusive AI emerges when participation, justice, and social diversity are incorporated from the outset, not as
--	--	--	--	---

				an add-on but as a constitutive component of technical design.
33	Luy, M., 2024	Das Geschlechterparadoxon in der gesundheitlich beeinträchtigten Lebenszeit – Ende eines Mythos?	Bundesgesundheitsblatt	• the generally prevailing “gender paradox”. • This is directly related to one of the central ideas of the gender paradox, namely that women, despite their lower mortality, spend more years of life in impaired health than men, p. 512. • the higher number of life-years spent with health impairments for women compared with men results above all from their higher life expectancy. • That the picture of a general gender paradox persists so stubbornly, despite the doubts mentioned in the introduction, is probably attributable to the fact that, despite the numerous studies, very little is still known about its causes or mechanisms. • women’s greater sensitivity and their more pronounced openness in reporting health problems have long been among the attempts to explain the gender paradox, p. 518.
34	Mauvais-Jarvis, F. et al., 2020	Sex and gender: modifiers of health, disease, and medicine	The Lancet	• what clinicians know about the diagnosis, treatment, and prevention of disease originates from studies mostly done on male cells, male mice, and men.

				• medical research and care have been centred on male physiology. The assumption was that male and female cells and animals were biologically identical, and evidence-based medicine was defined by clinical trials done predominantly in men. • sex differences in disease prevalence, manifestation, and response to treatment are rooted in the genetic differences between men and women. Genetic sex differences start at conception when the ovum fuses with a sperm cell carrying an X or a Y chromosome, resulting in an embryo carrying either XX or XY chromosomes, p. 565. • gender, according to the Global Health 50/50 definition, refers to the socially constructed norms that impose and determine roles, relationships, and positional power for all people across their lifetime. • For example, heart failure disproportionately contributes to coronary heart disease mortality in women,²⁷ potentially due to undiagnosed ischaemic heart disease in women. The strength of the association with cardiovascular risk factors differ by sex. p. 567. • Sex and gender disparity in enrolment in clinical trials continues to be a substantial challenge. p. 577.
--	--	--	--	--

				• Sex and gender are the foundation of precision medicine, and their inherent differences should inform decision making to promote gender equity in health., p. 578.
35	Mangelsdorf, M., Lang, S., 2021	Digitalisierung (geschlechter-) gerecht gestalten?, In: FZG – Freiburger Zeitschrift für Geschlechter Studien	Freiburger Zeitschrift für Geschlechter Studien	• In its most basic definition, digitalisation means the capture, processing, and storage of analogue information on a digital storage medium. • only a proportionate minority possess the technical or programming expertise needed to actively shape digital and virtual worlds and to derive financial benefit from the ‘digital revolution’. p. 9. • The relationship between gender and digitalisation from an intersectional perspective, for instance the digitalisation of working environments, feminist internet policy, and the tentative shift of structural gender inequality between online and offline worlds, p. 15.
36	Musizvingoza, R., Handforth, C., 2021	The Digital Gender Gap in HealthCare: Progress, Challenges, and Policy Implications	United Nations University	• The digital gender gap, if left unaddressed, has the potential to exacerbate existing health inequities. Closing the digital gender gap requires a multifaceted approach to address all the intersectional inequalities faced by women and girls from diverse backgrounds. This entails

				finding ways and solutions on how to include women and girls in the design of digital health interventions. • Digital technologies, services, products, and skills are transforming people’s lives and livelihoods. However, despite the rapid proliferation of digital tools and services, significant challenges remain in ensuring women’s meaningful use of digital technology in their lives and society. • The digital gender gap persists beyond mobile phone ownership and internet access. Women have lower levels of digital skills than men and use digital technologies for a smaller number of complex task, p. 3. • The digital gender gap is driven by unequal gender power relations and discrimination commonly found offline in many societies. These are further reinforced by a complex set of social, cultural, economic, political, and legal barriers that negatively affect women and girls’ access to and ownership of digital technologies, p. 3. • address gender norms and barriers. This involves understanding and addressing the root causes of the gender digital gap and addressing the harmful gender norms, practices, and stereotypes that hinder women’s
--	--	--	--	--

				safe and meaningful use of digital technology in their lives and society. • establish more inclusive and gender-equal digital skills education and training. Digital training and education should focus on the specific needs of women— including providing training in socially acceptable spaces, within small groups to encourage peer-to-peer learning, and with women trainers who act as relatable role models. p. 5. • Develop policies to close the gender gap in the digital sector. • Collect gender-disaggregated data on the digital gender gap. • Invest in digital technology infrastructure. • Addressing the digital gender gap is critical to realizing the significant potential health benefits that digital technologies can bring for women, their communities, and the broader society. p. 6.
37	Oertelt-Prigione, S., 2020	Putting gender into sex- and gender-sensitive medicine	EClinicalMedicine	• Sex- and gender-sensitive medicine (SGSM) focuses on the role that biological differences (sex) and socio-cultural power structures (gender) play in healthcare.

				How both sex and gender affect health behavior, the development of diseases, their diagnosis, management and long-term effects. • although the knowledge and methods are increasing [9], we are still lacking sound and systematic instruments for the analysis of gender in medicine. It does not help that gender can be broken down into numerous sub-categories; such as gender identity, gender norms, gender relationships just to name a few. • Gender affects access to healthcare, social dynamics, health behaviors, and it shapes the work environment we find ourselves in. Gender impacts our chances of survival, in single families according to birth order and gender representation. • To change unequal practices, which generally disadvantage women, approaches should be participatory and include knowledge rooted in communities (Hazra et al., in this collection). Health promotion interventions should target structural barriers to transform gender stereotypes rather than focusing solely on individual behavior.
--	--	--	--	--

				Gender is not a unidimensional variable; it is complex, intertwined with our lived realities and affects all aspects of our health. Including gender into our work is essential to achieving that “state of complete physical, mental and social well-being” for all; it’s time to make it a priority., p. 1.
38	Oertelt-Prigione, S., 2023	Der Einfluss von Geschlecht auf Gesundheit, Krankheit und Prävention, In: Facetten von Gesundheitskompetenz	Springer	Consideration of gender medicine in research, diagnostics, and therapy for years.
39	Oertelt-Prigione, S., 2024	Geschlechtersensible Medizin	Bundesstiftung Gleichstellung	- For a long time, medical research was oriented above all towards male bodies. The diseases affecting male bodies were researched more intensively, and the symptoms reported by patients were regarded as the standard. This led to insufficient consideration of diseases that primarily or exclusively affect women, and to delayed and sometimes incorrect diagnoses in people who do not correspond to the male standard. - Currently, the need to take intersectionality into account is also frequently emphasised (Hankivsky/Reid et al. 2010). This means recognising the fact that not all women

				(and other genders) constitute a homogeneous group, but rather that their health experiences can differ greatly on the basis of age, sexual orientation, migration experience, disability, social situation, and many other factors (Kapilashrami/Hankivsky 2018). • The so-called gender data gap points to the lack of sex-specific data that would be necessary for individualised therapy. In order, for example, to address the recurring question of the potential need to adjust drug therapies according to sex, precise sex-differentiated data from clinical trials would be required, but these are often not available in sufficient quantity or with sufficient precision. • Owing to a lack of knowledge about sex-specific symptomatology, patients and physicians may potentially not even suspect a disease in the first place. This was more often the case with heart attacks in women in the early 1990s. • A similar situation can be described for men with autoimmune diseases. Because these diseases affect men far less frequently than women, are seen as “female”, so to speak, and their symptoms can partly
--	--	--	--	--

				differ, men with autoimmune diseases often receive a diagnosis only belatedly. • A relevant point for reducing the gender data gap and generating practice-relevant information is representing the diversity of the general population in research. • The differentiated and individualised consideration of the needs of all patients, regardless of their sex and of other intersectional factors, is a fundamental component of equitable and discrimination-free health care and thus one of the overarching goals of an equality-oriented society, p. 7.
40	Phillips, S. et al., 2023	Women suffer but men die: survey data exploring whether this self-reported health paradox is real or an artefact of gender stereotypes	BMC Public Health	• Women often describe poorer self-rated health (SRH) than do men, but when it comes to the most objective of all health indicators, they universally outlive men. • Women were more reflective overall, and thought more broadly and deeply about each possible determinant of individual health. Perhaps this deeper reflection moved women beyond the prevailing medical paradigm of equating poor health with the presence of disease. • Finally, male participants may have been less introspective and self-aware, defaulting to gender

				stereotypes of stoicism, denial of adversity and avoidance of delving into areas that might reveal weakness. • that relative to women, men are less introspective and self-aware, and default to the gender stereotypes of ‘stiff upper lip’, stoicism, denial of adversity, and avoidance of delving into areas that might reveal weakness. • Divergence of current results from earlier ones is in keeping with gender being dynamic and fluctuating with changes in social norms and realities over time. • Solving that enigma remains for others although we can say that sex/gender differences in SRH and SRMH are real and not artefactual p. 9.
41	Regitz-Zagrosek, V., 2023	Grundlagen einer sex- und gendersensiblen Diagnose und Therapie.	Springer	• Women are under-represented and insufficiently considered in medical research.
42	Richardson, S. et al., 2022	A framework for digital health equity,	NPJ Digital Medicine	• Decades of research have identified health differences, based on one or more health outcomes, that adversely affect several defined populations, including rural populations, persons with low incomes, racial and ethnic, and sexual and gender minorities.

				• Access to digital health is becoming an increasingly important determinant of health. • They impact digital health equity, which is equitable access to digital healthcare, equitable outcomes from and experience with digital healthcare, and equity in the design of digital health solutions. • the rapid digital transformation of healthcare may contribute to increased inequality. Health interventions often lead to intervention-generated inequalities as they are typically adopted unevenly with disparity populations lagging behind.
43	Robert Koch-Institut, 2023	Gesundheitliche Lage der Frauen in Deutschland – wichtige Fakten auf einen Blick.	RKI	• Measures to improve the social situation of disadvantaged women can help to reduce health inequalities. Strengthening opportunities for social participation, in particular through educational provision, is important. Targeted prevention and health-promotion measures can likewise contribute to reducing health inequalities. Concrete support services must be tailored to the needs of socially disadvantaged women in very different life situations, for example single mothers, p. 49.

				• A better fit of services for health information, prevention, and care can also contribute to strengthening women's health in Germany. This concerns, for example, accessibility of health care for women with disabilities and improvements in information about early-detection services, p. 64. • Four out of five participants in prevention courses in the areas of nutrition, physical activity, stress management, and substance use are women, p. 32. • More often than men, women make use of workplace health-promotion services relating to back health, information or advice on healthy nutrition, and stress management / relaxation.
44	Rother, J. et al., 2025	Psychische Gesundheit und Burnout-Risiko bei weiblichen Beschäftigten verschiedener Berufsgruppen mit hohem Anteil an Interaktionsarbeit.	Zbl Arbeitsmed	• Emotional exhaustion shows an average degree of severity in the overall sample as well as among the female childcare workers and the female medical assistants. • In each of these occupational groups, almost one in five female participants showed impaired mental health. • Among 36% of respondents, some burnout symptoms occur several times a month, and 4% are at risk of

				burnout, with female childcare workers showing the highest value at 5%. Targeted prevention measures to strengthen mental health and minimise the risk of burnout are necessary and should be established, particularly for employees in health and social professions.
45	Sachverständigenkommission, 2021	Digitalisierung geschlechtergerecht gestalten. Gutachten für den Dritten Gleichstellungsbericht der Bundesregierung.	Bundesregierung	- In the course of digitalisation, which improves the possibility of mobile working that is flexible in terms of place and time and independent of the company workplace, working from home in particular is cited as a suitable way towards a better reconciliation of work and family.²⁹ However, part-time employees receive devices for mobile working less often than full-time employees (30 percent compared with about half of employees).³⁰ Moreover, a flexibilisation of paid work does not always lead to a gender-equitable distribution of unpaid care work. - Working from home, both women and men expanded their unpaid care work, but women more so than men. When paid work and care work are strongly intertwined, both women and men tend towards self-endangerment of their health.

				• Equal opportunities for self-realisation in the digital transformation process, irrespective of sex, presuppose equal access to digitalisation-related resources. In view of the low share of women employed in the digital sector, the report emphasises the great importance of early education, p. 14. • Dismantling gender stereotypes as a cause of gender-induced inequalities in social participation and in participation in working life is an essential part of equality policy. The STEM support programmes for women should be continued. The aim should be to further increase the share of women in the digital economy – particularly at leadership level and among founders. Measures aimed at dismantling gender stereotypes in this field should begin as early as in early-childhood education (for example, coding at school). • Recommended action: promote gender-equitable and participatory technology development.
46	Sayed, M., Brandes, I., 2021	Betriebliches Gesundheitsmanagement: analog und digital	MWV Verlag	• Prevention Act: goals of reducing social and sex-related inequalities in workplace health promotion (WHP), the consideration of mental and physical health dimensions in the sense of the biopsychosocial model, p. 20.

				• small companies face major challenges in implementation, p. 22. • equal opportunities, cross-setting concepts, pp. 25, 26.
47	Siegel, A. et al., 2021	Attitudes of Company Executives toward a Comprehensive Workplace Health Management—Results of an Exploratory Cross-Sectional Study in Germany	IJERPH	• In Germany, workplace health management (in German: Betriebliches Gesundheitsmanagement) is often referred to as a guiding ideal for implementing a comprehensive combination of health-related measures in companies and other organizations. The term ‘workplace health management’ encompasses the integration and management of all operational processes in a company with the aim of creating healthy working conditions and promoting the health of its employees. • From numerous studies that have been conducted in Germany and other high-income countries in the preceding two decades we know that implementation of workplace health management measures depends on company size: the more employees a company has, the more likely it is that workplace health management measures are implemented [4,32–42]. In Germany’s small and medium-sized companies(for a definitioncf.

				[43]) and in particular in small and microenterprises, even legally required measures are often lacking.
48	Stachwitz, P., Debatin, J. F., 2023	Digitalisierung im Gesundheitswesen: heute und in Zukunft	Bundesgesundh heitsblatt	• The opportunities of digitalisation arise from increased efficiency and time savings. • in rural regions, access to medical care is improved, and digital tools can structure work and health processes in companies.
49	Schaeffer, D. et al., 2021	Gesundheitskompetenz der Bevölkerung in Deutschland – vor und während der Corona Pandemie: Ergebnisse des HLS- GER 2.	Universität Bielefeld	• Of the 2,151 respondents in total in the HLS-GER 2 study, 14.7 percent have excellent health literacy and 26.5 percent have sufficient health literacy. These respondents have little or no difficulty in locating needed information, understanding it, appraising it, and using it to maintain their health. By contrast, problematic health literacy is found in 30.4 percent of respondents and even inadequate health literacy in 28.4 percent. Overall, according to the survey conducted at the end of 2019/beginning of 2020, 58.8 percent of the population in Germany therefore have limited health literacy (Figure 2).¹³ Compared with the HLS-GER 1 study from 2014, the health literacy of the population in Germany has thus deteriorated.

50	Schlieter, H. et al., 2022	Digitale Gesundheitsanwendungen (DiGA) im Spannungsfeld von Fortschritt und Kritik.	Informatik Spektrum	• DiGA (digital health applications) follow the concept of the “app on prescription”; like medicines, they could thus be prescribed to prevent, treat, alleviate, or delay. • Digital health research and computer science are called upon here to pave the way for technologies that are needs-based, effective, and user-friendly while taking ethical and data-protection questions into account.
51	Staut, S., 2020	Betriebliches Gesundheitsmanagement: analog und digital	MWV Verlag	• Workplace health management (WHM) combines workplace health promotion (WHP), company integration management (Betriebliches Eingliederungsmanagement, BEM), and occupational health and safety, p. 3. • Health insurance funds provide workplace health promotion and health-promoting measures.
52	Treier, M., 2025	Analog trifft digital: Betriebliches Gesundheitsmanagement im Spiegel der Arbeitswelt 4.0. In Innenansichten der Verwaltungsreform und Verwaltungspraxis: Zehn Jahre Forschung für die moderne Verwaltung	Springer	• Effects of working from home are an improved work-life balance, self-determination, social isolation, and an increase in psychological strain. • Behavioural and structural prevention, the strengthening of health literacy. • provided that sufficient digital health literacy is in place, pp. 78–81.

53	UNESCO, 2024	Challenging systematic prejudices: an Investigation into Gender Bias in Large Language Models	UNESCO	• This briefing specifically addresses the pervasive issue of gender bias against women and girls within AI systems, offering insights into the systemic challenges and avenues for progress. It emphasizes that the increased complexity of AI systems necessitates more rigorous efforts to achieve equity in AI-driven decisions and interactions. Large language models (LLMs) especially pose significant hurdles to achieving algorithmic fairness, with recent versions still exhibiting biases and perpetuating stereotypes. Recent research shows that these problems could escalate in more advanced models, potentially leading to even more severe consequences²¹. Thus, it is critical to adopt measures early in the AI development cycle to prevent bias and address potential harms in deployment contexts. • Bias in AI can be introduced at any stage of its development, from design and modelling decisions, to data collection, processing, and the context of deployment. These biases generally fall into three categories: Biases in data, algorithm selection, development.
----	--------------	---	--------	---

54	Urban, M., 2020	Geschlechtersensible Gestaltung digitaler Gesundheitsförderung	Springer	• The category of sex/gender is of central importance for health. Sex-specific differences arise both in morbidity and mortality and in disease courses as well as in the use of preventive services [7]. Gender-sensitive perspectives have therefore been part of the standard in health promotion and prevention for years, in order to increase the fit of interventions and to reduce health inequality.
55	Wacker, E., 2023	Zusammenhänge von Burnout, Geschlechtsidentität und Geschlecht.	Zeitschrift für Arbeitswissenschaf	• To date, however, it is regarded as a central shortcoming that binding quality seals for apps are lacking. Interventions can therefore incorporate unsuitable or faulty materials (e.g. underlying studies or assumptions about the target group), whereupon algorithms based on these can generate misleading or even incorrect recommendations or health prognoses. • Secondly, studies indicate that misleading or even incorrect recommendations or health prognoses do not affect all genders equally: women and intersex and transsexual people were under-represented for a long time in medical and health-science research. • Most digital technologies for health promotion are designed for all genders. Nevertheless, as qualitative

				studies show, usage behaviours also differ along gender lines. • The studies in the review indicate that gender-sensitive approaches are relevant for digital interventions in order to reduce unintended negative effects and to avoid the deepening of structural inequalities. • The core elements of gender-sensitive approaches to health promotion, as differentiated at the outset, provide a basis for this: firstly, this would mean ensuring the gender-mainstreaming principle in technology development, which fosters a consistently gender-sensitive design. Secondly, the interlinking of gender and diversity sensitivity should be established as a criterion of good interventions. Thirdly, participatory, user-oriented technology development fosters interventions that correspond to the heterogeneous needs of different genders, needs, and population groups.
56	Winter, R., Riedl, R., 2022	Chancen und Herausforderungen eines digitalen betrieblichen Gesundheitsmanagements	Prävention und Gesundheitsförderung	• In the course of digitalisation, an increasing number of digital tools have been developed in recent years to support workplace health management (WHM). • The first opportunities concern the advantages of a complete digital WHM system. Through the ability to

				manage all sub-areas of WHM centrally in a single system [8], companies can simplify the handling of their WHM and improve outcomes. • Independence of time and place is also essential here, since this is a prerequisite for many of the identified opportunities [11], for example reaching a broader target group, such as shift workers or field-service employees. • In addition, the implementation of such systems entails costs. Although space costs decrease, personnel costs and costs for the technical infrastructure often increase.
57	World Health Organization, 2011	Gender mainstreaming for health managers: a practical approach.	WHO	• Gender inequality puts the health of millions of women and girls at risk globally. Addressing gender equality helps to counter the historic burden of inequality and deprivation of rights faced by women and girls in households, communities, workplaces and health care settings. Addressing gender equality in health enables the important work to improve the health of women. • Gender mainstreaming is essential to realizing the right to health and it puts people at the centre of public health programmes and policies!

				ensure that all research, policies, programmes, projects and initiatives with WHO involvement address gender issues. This will contribute to increasing the coverage, effectiveness, efficiency and, ultimately, the impact of health interventions for both women and men, while at the same time contributing to achievement of the broader United Nations goal of social justice.
58	World Health Organization, 2021	Global strategy on digital health 2020-2025	WHO	- This strategic objective advances digital health literacy, gender equality and women's empowerment and inclusive approaches to adoption and management of digital health technologies. - strengthen gender equality and health equity approaches and accessibility for people with disabilities to promote inclusive digital society with enhanced digital health skills. When planning and prioritizing digital health interventions, relevant factors of inequality should be assessed in order to ensure that the introduction of digital health technologies does not aggravate these ("do no harm") and that access for specific population groups is guaranteed. - Develop a digitally capable and gender- balanced health workforce.

				landscape of projects and initiatives that use population health management and gender-equality approaches through digital health solutions to move health and well being from reactive care models to active community-based models.
59	Wortmann, L. et al., 2023	Gender medicine teaching increases medical students' gender awareness: results of a quantitative survey	GMS Journal for Medical Education	- Teaching gender awareness and gender-specific content has so far been insufficiently integrated into the medical curriculum in Germany. - The statistically significant impact of the student university on gender awareness shows that the implementation of gender medicine can have a positive impact on the gender competencies of medical students and physicians.
60	Wortmann, L., 2023	Probleme und Potenziale gendermedizinischer Operationalisierung von Geschlecht.	GENDER Journal	- Gender medicine has gained increasing importance over the past decades. - The perception of sex/gender can be understood as a key question of gender medicine, which negotiates the operationalisation of sex/gender intradisciplinarily. - In addition, a rigid understanding of sex/gender also entails a gap in intersectional analyses of health and disease aspects. Intersectionality as a research

				perspective and practice can be understood as an epistemic and methodological concept that views the research object and the knowledge generated in a multidimensional, context-dependent, and dynamic way. • While gender medicine has critically analysed and deconstructed the androcentric knowledge production of biomedicine, it nevertheless currently still adheres to rigid understandings of objectivity, rationality, and truth. The “operationalisation paradigm” of biomedicine is reflected in the efforts of gender-medical operationalisation of sex/gender.
61	Yao, R. et al., 2022	Inequities in Health Care Services Caused by the Adoption of Digital Health Technologies: Scoping Review	J Med Internet Res	• However, contrary to expectations, their rapid adoption appears to have led to health inequities, with differences in health conditions or inequality in the distribution of health care resources among different populations. • The findings provide a comprehensive starting point for future research, allowing for further investigation into how digital health technologies may influence the unequal distribution of health care services. The interaction between individual subjective factors as well as social support and influencing factors should be included in future studies. Specifically, access to and availability of

				digital health technologies for socially disadvantaged groups should be of paramount importance.
62	Yfantidou, S. et al., 2023	Uncovering Bias in Personal Informatics. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies	ACM Proceedings	• Today,such systems are used by billions of users for monitoring not only physical activity and sleep but also vital signs and women’s and heart health. • According to our results, the most affected minority groups are users with health issues, such as diabetes, joint issues, and hypertension, and female users, whose data biases are propagated or even amplified by learning models, while intersectional biases can also be observed. • For instance, the first algorithm described would be biased against women since it assigns them fewer high-activity goals compared to men. • This is particularly relevant for health tracking and vulnerable populations,such as those with chronic illnesses, mental health conditions, and women facing fertility challenges, where the association of goals with identity and critical outcomes may increase the propensity for rumination. • As illustrated by our findings, pre-existing historical biases are present in digital biomarkers, due to well-

				documented phenomena, such as the global inequality in physical activity and the digital divide, leading to data generation that is not representative of the general population. This is indeed the case in the MyHeart Counts dataset, where female, non-white, underweight, overweight or obese, young, and hypertensive users, are undersampled. • Unacknowledged biases in PI applications for health and well-being can have critical personal and societal consequences; they can perpetuate health disparities [69], result in misdiagnoses or delayed diagnoses [74], affect resource allocation and access to healthcare services [88], or reinforce stereotypes and stigma.
--	--	--	--	---

References for the 62 included sources of evidence

Numbering corresponds to the ID column in Supplementary Table 3. DOIs are provided where available.

1. Bartig, S., Kalkum, D., Le, H. M. & Lewicki, A. *Diskriminierungsrisiken und Diskriminierungsschutz im Gesundheitswesen – Wissensstand und Forschungsbedarf für die Antidiskriminierungsforschung* (2021).
2. Bearman, M. & Ajjawi, R. Artificial intelligence and gender equity: an integrated approach for health professional education. *Med. Educ.* **59**, 1049–1057 (2025). <https://doi.org/10.1111/medu.15657>
3. Beck, P. Begrifflichkeiten und Abgrenzungen. in *Betriebliches Gesundheitsmanagement: analog und digital* (eds Matusiewicz, D., Kardys, C. & Nürnberg, V.) 14–19 (MWV Medizinisch Wissenschaftliche Verlagsgesellschaft, 2020).
4. Becker, K. Gender Health Gap als Folge ungleicher Vernutzungsbedingungen von Arbeitskraft und Arbeitsvermögen. *GENDER – Zeitschrift für Geschlecht, Kultur und Gesellschaft* **12**, 107–123 (2020). <https://doi.org/10.3224/gender.v12i3.08>
5. Bundesministerium für Familie, Senioren, Frauen und Jugend. Gender Mainstreaming. <https://www.bmfsfj.de/bmfsfj/themen/gleichstellung/gleichstellung-und-teilhabe/strategie-gender-mainstreaming/gender-mainstreaming-80436> (2021); accessed 3 August 2024.
6. Bundesvereinigung Prävention und Gesundheitsförderung e.V. *Gesundheitliche Chancengerechtigkeit als Schlüsselthema in der Politik – Empfehlungen der Arbeitsgruppe „Gesundheitliche Chancengerechtigkeit“* (BVPg, 2025).
7. Carstensen, T. Digitalisierung der Arbeit – eine Zwischenbilanz aus Geschlechterperspektiven. *WSI-Mitteilungen* **76**(5) (2023).
8. Carstensen, T. & Ganz, K. *Vom Algorithmus diskriminiert? Zur Aushandlung von Gender in Diskursen über Künstliche Intelligenz und Arbeit*. Forschungsförderung Working Paper 274 (Hans-Böckler-Stiftung, 2023).

9. Carstensen, T. & Ganz, K. Gendered AI: German news media discourse on the future of work. *AI & Society* (2023). <https://doi.org/10.1007/s00146-023-01747-5>
10. Carstensen, T. & Prietl, B. Digitalisierung und Geschlecht: Traditionslinien feministischer Auseinandersetzung mit neuen Technologien und gegenwärtige Herausforderungen. *Freiburger Zeitschrift für GeschlechterStudien* **27**, 29–44 (2021). <https://doi.org/10.3224/fzg.v27i1.03>
11. Catala, A. B. Gleichstellung. in *Sozialbericht 2024 – Ein Datenreport für Deutschland* (eds Statistisches Bundesamt (Destatis), Wissenschaftszentrum Berlin für Sozialforschung (WZB) & Bundesinstitut für Bevölkerungsforschung (BiB)) 294–303 (Bundeszentrale für politische Bildung, 2024).
12. Chauhan, A. et al. Identifying race and gender bias in Stable Diffusion AI image generation. in *2024 IEEE 3rd International Conference on AI in Cybersecurity (ICAIC)* 1–6 (IEEE, 2024). <https://doi.org/10.1109/ICAIC60265.2024.10433840>
13. Dratva, J., Schaeffer, D. & Zeeb, H. Digitale Gesundheitskompetenz der Bevölkerung in Deutschland: aktueller Stand, Konzepte und Herausforderungen. *Bundesgesundheitsblatt* **67**, 277–284 (2024). <https://doi.org/10.1007/s00103-024-03841-5>
14. Borges do Nascimento, I. J. et al. Transforming women's health, empowerment, and gender equality with digital health: evidence-based policy and practice. *Lancet Digit. Health* **7**, 100858 (2025). <https://doi.org/10.1016/j.landig.2025.01.014>
15. European Institute for Gender Equality. *Gender Equality Index 2025* (Publications Office of the European Union, 2025).
16. Efimov, I., Kordsmeyer, A.-C., Harth, V. & Mache, S. Status quo der betrieblichen Gesundheitsförderung in Inklusionsbetrieben. Potenziale und Herausforderungen für die Zukunft. *Prävent. Gesundheitsförderung* **18**, 535–542 (2023). <https://doi.org/10.1007/s11553-022-01003-6>

17. Figueroa, C. A., Luo, T., Aguilera, A. & Lyles, C. R. The need for feminist intersectionality in digital health. *Lancet Digit. Health* **3**, e526–e533 (2021). [https://doi.org/10.1016/S2589-7500\(21\)00118-7](https://doi.org/10.1016/S2589-7500(21)00118-7)
18. Gaiswinkler, S. *Gendersensible Betriebliche Gesundheitsförderung. Kriterien aus der Literatur und Beispiele aus der Praxis* (Wissen 16) (Gesundheit Österreich GmbH / Fonds Gesundes Österreich, 2020).
19. Gernert, M., Fohr, G. & Schaller, A. Network development in workplace health promotion – empirically based insights from a cross-company network promoting physical activity in Germany. *BMC Public Health* **24**, 1560 (2024). <https://doi.org/10.1186/s12889-024-19025-4>
20. GESIS – Leibniz-Institut für Sozialwissenschaften. *Gleichstellungsplan 2025–2029 nach Ziffer 9 der Ausführungsvereinbarung zum GWK-Abkommen über die Gleichstellung von Frauen und Männern (AV-Glei)* (GESIS, 2025).
21. Ginsburg, O. et al. Women, power, and cancer: a Lancet Commission. *Lancet* **402**, 2113–2166 (2023). [https://doi.org/10.1016/S0140-6736\(23\)01701-4](https://doi.org/10.1016/S0140-6736(23)01701-4)
22. Gjellestad, M., Haraldstad, K., Enehaug, H. & Helmersen, M. Women's health and working life: a scoping review. *Int. J. Environ. Res. Public Health* **20**, 1080 (2023). <https://doi.org/10.3390/ijerph20021080>
23. Gjellestad, M., Enehaug, H., Haraldstad, K., Nilsen, V. & Helmersen, M. Women's health at work: a qualitative study on women's health issues in relation to work participation. *BMC Public Health* **24**, 1750 (2024). <https://doi.org/10.1186/s12889-024-19241-y>
24. Gössl, S. L. & Yakar, S. *Geschlechterneutrale KI. Eine Handreichung* (Ministerium für Soziales, Jugend, Familie, Senioren, Integration und Gleichstellung des Landes Schleswig-Holstein, 2023).
25. Health and Safety Executive. *Work-related Stress, Depression or Anxiety Statistics in Great Britain, 2025* (HSE, 2025).

26. Ho, J. Q. H., Hartanto, A., Koh, A. & Majeed, N. M. Gender biases within Artificial Intelligence and ChatGPT: evidence, sources of biases and solutions. *Comput. Hum. Behav. Artif. Hum.* **4**, 100145 (2025). <https://doi.org/10.1016/j.chbah.2025.100145>
27. Holzgreve, F. et al. Inklusion und Gesundheit am Arbeitsplatz. *Zentralbl. Arbeitsmed.* **75**, 252–258 (2025). <https://doi.org/10.1007/s40664-025-00575-2>
28. Horstmann, S. et al. DIVERGesTOOL – Entwicklung einer Toolbox zur Erfassung geschlechtlicher Vielfalt in der quantitativen Gesundheitsforschung. *Bundesgesundheitsblatt* **67**, 1054–1061 (2024). <https://doi.org/10.1007/s00103-024-03915-4>
29. Initiative D21. *Digital Gender Gap – Lagebild zu Gender(un)gleichheiten in der digitalisierten Welt* (Initiative D21 e.V. / Kantar, 2020).
30. Initiative D21. *D21-Digital-Index 2022/2023. Jährliches Lagebild zur Digitalen Gesellschaft* (Initiative D21 e.V., 2022).
31. Lott, Y. *Der Gender Digital Gap in Transformation? Verwendung digitaler Technologien und Einschätzung der Berufschancen in einem digitalisierten Arbeitsmarkt*. WSI Report 81 (Wirtschafts- und Sozialwissenschaftliches Institut der Hans-Böckler-Stiftung, 2023).
32. Lübken, A. & Wiemer, M. *KI-Diskriminierung begegnen: Inklusion und KI* (Springer, 2025).
33. Luy, M. Das Geschlechterparadoxon in der gesundheitlich beeinträchtigten Lebenszeit – Ende eines Mythos? *Bundesgesundheitsblatt* **67**, 512–520 (2024). <https://doi.org/10.1007/s00103-024-03877-7>
34. Mauvais-Jarvis, F. et al. Sex and gender: modifiers of health, disease, and medicine. *Lancet* **396**, 565–582 (2020). [https://doi.org/10.1016/S0140-6736\(20\)31561-0](https://doi.org/10.1016/S0140-6736(20)31561-0)
35. Mangelsdorf, M. & Lang, S. Digitalisierung (geschlechter-)gerecht gestalten? *Freiburger Zeitschrift für GeschlechterStudien* **27**, 7–19 (2021). <https://doi.org/10.3224/fzg.v27i1.01>

36. Musizvingoza, R. & Handforth, C. *The Digital Gender Gap in Healthcare: Progress, Challenges, and Policy Implications*. Policy Brief (United Nations University, 2021).
37. Oertelt-Prigione, S. Putting gender into sex- and gender-sensitive medicine. *EClinicalMedicine* **20**, 100305 (2020). <https://doi.org/10.1016/j.eclinm.2020.100305>
38. Oertelt-Prigione, S. Der Einfluss von Geschlecht auf Gesundheit, Krankheit und Prävention. in *Facetten von Gesundheitskompetenz in einer Gesellschaft der Vielfalt* (eds Baumeister, A., Schwegler, C. & Woopen, C.) 97–110 (Springer, 2023).
39. Oertelt-Prigione, S. *Geschlechtersensible Medizin* (Bundesstiftung Gleichstellung, 2024).
40. Phillips, S. P., O'Connor, M. & Vafaei, A. Women suffer but men die: survey data exploring whether this self-reported health paradox is real or an artefact of gender stereotypes. *BMC Public Health* **23**, 94 (2023). <https://doi.org/10.1186/s12889-023-15011-4>
41. Regitz-Zagrosek, V. Grundlagen einer sex- und gendersensiblen Diagnose und Therapie. in *Gendermedizin in der klinischen Praxis* (Springer, 2023).
42. Richardson, S., Lawrence, K., Schoenthaler, A. M. & Mann, D. A framework for digital health equity. *npj Digit. Med.* **5**, 119 (2022). <https://doi.org/10.1038/s41746-022-00663-0>
43. Robert Koch-Institut (ed.). *Gesundheitliche Lage der Frauen in Deutschland – wichtige Fakten auf einen Blick. Gesundheitsberichterstattung des Bundes* (RKI, 2023).
44. Rother, J., Darius, S., Thielmann, B. & Böckelmann, I. Psychische Gesundheit und Burnout-Risiko bei weiblichen Beschäftigten verschiedener Berufsgruppen mit hohem Anteil an Interaktionsarbeit. *Zentralbl. Arbeitsmed.* **75**, 10–21 (2025). <https://doi.org/10.1007/s40664-024-00551-2>

45. Sachverständigenkommission für den Dritten Gleichstellungsbericht der Bundesregierung. *Digitalisierung geschlechtergerecht gestalten. Gutachten für den Dritten Gleichstellungsbericht der Bundesregierung* 2nd edn (Geschäftsstelle Dritter Gleichstellungsbericht, 2021).
46. Sayed, M. & Brandes, I. BGM vor dem Hintergrund des Präventionsgesetzes und des digitalen Wandels. in *Betriebliches Gesundheitsmanagement: analog und digital* (eds Matusiewicz, D., Kardys, C. & Nürnberg, V.) 20–28 (MWV Medizinisch Wissenschaftliche Verlagsgesellschaft, 2021).
47. Siegel, A., Hoge, A. C., Ehmann, A. T., Martus, P. & Rieger, M. A. Attitudes of company executives toward a comprehensive workplace health management—results of an exploratory cross-sectional study in Germany. *Int. J. Environ. Res. Public Health* **18**, 11475 (2021). <https://doi.org/10.3390/ijerph182111475>
48. Stachwitz, P. & Debatin, J. F. Digitalisierung im Gesundheitswesen: heute und in Zukunft. *Bundesgesundheitsblatt* **66**, 105–113 (2023). <https://doi.org/10.1007/s00103-022-03642-8>
49. Schaeffer, D. et al. *Gesundheitskompetenz der Bevölkerung in Deutschland – vor und während der Corona-Pandemie: Ergebnisse des HLS-GER 2* (Interdisziplinäres Zentrum für Gesundheitskompetenzforschung (IZGK), Universität Bielefeld, 2021).
50. Schlieter, H. et al. Digitale Gesundheitsanwendungen (DiGA) im Spannungsfeld von Fortschritt und Kritik. Diskussionsbeitrag der Fachgruppe „Digital Health“ der Gesellschaft für Informatik e.V. *Informatik Spektrum* **45**, 391–400 (2022).
51. Staut, S. Historische Entwicklung des BGM. in *Betriebliches Gesundheitsmanagement: analog und digital* (eds Matusiewicz, D., Kardys, C. & Nürnberg, V.) 3–13 (MWV Medizinisch Wissenschaftliche Verlagsgesellschaft, 2020).
52. Treier, M. Analog trifft digital: Betriebliches Gesundheitsmanagement im Spiegel der Arbeitswelt 4.0. in *Innenansichten der Verwaltungsreform und Verwaltungspraxis: Zehn Jahre Forschung für die moderne Verwaltung* 75–101 (Springer Fachmedien, 2025).

53. UNESCO. *Challenging Systematic Prejudices: An Investigation into Gender Bias in Large Language Models* (UNESCO, 2024).
54. Urban, M. Geschlechtersensible Gestaltung digitaler Gesundheitsförderung. *Prävent. Gesundheitsförderung* **16**, 157–162 (2020).
<https://doi.org/10.1007/s11553-020-00798-6>
55. Wacker, E. Zusammenhänge von Burnout, Geschlechtsidentität und Geschlecht. *Zeitschrift für Arbeitswissenschaft* **77**, 640–651 (2023).
<https://doi.org/10.1007/s41449-023-00390-6>
56. Winter, R. & Riedl, R. Chancen und Herausforderungen eines digitalen betrieblichen Gesundheitsmanagements – Literaturreview und Experteninterviews. *Prävent. Gesundheitsförderung* **17**, 7–12 (2022). <https://doi.org/10.1007/s11553-021-00830-3>
57. World Health Organization. *Gender Mainstreaming for Health Managers: A Practical Approach* (WHO, 2011).
58. World Health Organization. *Global Strategy on Digital Health 2020–2025* (WHO, 2021).
59. Wortmann, L., Haarmann, L., Yeboah, A. & Kalbe, E. Gender medicine teaching increases medical students' gender awareness: results of a quantitative survey. *GMS J. Med. Educ.* **40**, Doc45 (2023). <https://doi.org/10.3205/zma001627>
60. Wortmann, L. Probleme und Potenziale gendermedizinischer Operationalisierung von Geschlecht. *GENDER – Zeitschrift für Geschlecht, Kultur und Gesellschaft* **15**, 104–118 (2023). <https://doi.org/10.3224/gender.v15i1.08>
61. Yao, R. et al. Inequities in health care services caused by the adoption of digital health technologies: scoping review. *J. Med. Internet Res.* **24**, e34144 (2022). <https://doi.org/10.2196/34144>
62. Yfantidou, S., Sermpezis, P., Vakali, A. & Baeza-Yates, R. Uncovering bias in personal informatics. *Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.* **7**, 1–30 (2023). <https://doi.org/10.1145/3610914>