Fear of the future: Understanding artificial intelligence phobia and its socio-cultural implications

Abdulqadir J. Nashwan [1], Ahmad F. Klaib [2, 3, *], Mohammed Al-Hassan [4], Anil Raj. Assariparambil [5, 6], Ayat J. Nashwan [7, 8], I Gede Juanamasta [9], Ayman Mohamed El-Ashry [10, 11], Mohammad Al-Zaatreh [12], Hana J. Abukhadijah [13]

[1]Nursing Department, Hamad Medical Corporation, Doha, Qatar
[2]Department of Computer Engineering, Al Yamamah University, Al Khobar, Saudi Arabia
[3]Department of Information Systems, Yarmouk University, Irbid, Jordan
[4]Faculty of Nursing, University of Regina, Regina, SK, Canada
[5]Department of Medical-Surgical Nursing, Manipal College of Nursing, Manipal Academy of Higher Education, Manipal, India
[6]College of Health Sciences, VinUniversity, Hanoi, Vietnam
[7]Department of Sociology, University of Sharjah, Sharjah, United Arab Emirates
[8]Sociology and Social Work Department, Yarmouk University, Irbid, Jordan
[9]Nursing Program, STIKes Wira Medika Bali, Denpasar, Indonesia
[10]Department of Nursing, College of Applied Medical Sciences, Jouf University, Al-Qurayyat, Saudi Arabia
[11]Faculty of Nursing, Alexandria University, Alexandria, Egypt
[12]School of Nursing, German Jordanian University, Amman, Jordan
[13]Clinical Trials Unit, Medical Care and Research Center, Hamad Medical Corporation, Doha, Qatar

A R T I C L E   I N F O

A B S T R A C T

As artificial intelligence (AI) becomes increasingly integrated into everyday life, AI phobia—defined as fear and distrust toward AI technologies—has emerged as an important social and cultural concern. This narrative review examines the main origins and drivers of AI phobia, with particular attention to the influence of media portrayals on public perceptions. Key concerns such as job displacement, threats to privacy, and the reduction of human control in decision-making are identified as major contributors to these fears. The review also discusses the wider societal consequences of AI phobia, including its potential effects on technological innovation and public trust in AI systems. To address these challenges, this paper highlights the need for improved public education, stronger ethical guidelines, and more transparent communication about both the risks and benefits of AI. The review concludes by emphasizing the importance of continued interdisciplinary research to support the ethical, responsible, and equitable integration of AI into society.

1. Introduction

Artificial Intelligence (AI) is a branch of computer science that attempts to develop machines that mimic human capability in learning and problem-solving (Noguerol et al., 2019). The enormous number of techniques used in machine learning and the availability of large datasets, or "big data," have rapidly developed in AI in recent years. This is how AI applications are becoming more integral to life and society than in the past (Liyanage et al., 2019).

Recent advances in AI also impact most areas of academia and industry, particularly in transportation, education, and medicine. AI is infiltrating different dimensions of modern life, changing economic sectors, and significantly influencing daily life. The mixed perceptions of the public regarding AI reflect gratitude for its possible benefits and caution about its consequences. The public is growing concerned about the impacts of AI technology, as it is increasingly becoming integrated into everyday life. While there is wide recognition of the transformational potential of AI in our lives, there is also concern regarding privacy, trust, and the effects of AI judgments in high-stakes scenarios (Brauner et al., 2023).

Technology changes and influences our society, from basic instruments like the wheel to advanced systems like AI. Rosen et al. (1993) defined technophobia as (1) anxiety about present or future interactions with computers or computer-related technology; (2) negative global attitudes about computers, their operation, or their societal impact, and/or (3) specific negative conditions or self-critical internal dialogues. Technophobes could be fearful of computers, robots, or AI. It is not only that people do not want to bother learning how to use some new technology, but also that deep inside, they are concerned about something in technology's potential, which can lead them to reject or become obsessed with it. For instance, they might be particularly concerned about the world being taken over by computers or robots.

There are various ways that this fear of technology can appear. Some people fear new devices and programs, avoiding them. Others are worried that it will take away their jobs or compromise their privacy. A few cannot catch up with everything new because they find it overwhelming. This concern may significantly affect lives other than how they utilize technology. The fear of technology at work may lead to a loss of opportunity or make one jittery about adopting modern equipment. Moreover, it can forbid a person from interacting with others in social situations, especially when everyone else is into technology (Zirar et al., 2023). Technophobia has become a significant phenomenon of the current times, especially in some age groups or situations. Many variables affect the possibility of AI phobia and its severity, including age (Bostrom and Yudkowsky, 2018), gender (Kotze et al., 2016), and level of education. It is essential to understand the causes of these fears so that we can address them, eliminating people's fears and replacing these feelings with comfort and confidence when dealing with technology, whether at work or in social life, especially when interacting with friends who use these tools.

This narrative review discusses AI applications across various fields to understand why AI phobia has become so important. Therefore, the main goal is to carefully examine the origins, causes, and symptoms of AI phobia, its impact on various social and cultural situations, and potential solutions to reduce this fear. In short, this review aims to form a comprehensive view of AI phobia and clarify how we can integrate AI into society in a balanced way with humans to preserve society and reduce the fears of AI.

2. Historical context and evolution of AI-phobia

The fear of AI, commonly called AI phobia, has deep historical roots that predate modern technological advancements. This phobia has evolved and is influenced by cultural narratives, scientific progress, and socio-political factors (Fig. 1).

2.1. Early roots of AI phobia

AI phobia can be traced to ancient myths and stories about automata and mechanical beings. These early tales, such as the legend of the Golem and the myth of Talos, reflect a deep-rooted fear of creating life-like machines that could rebel against their creators. These narratives laid the foundation for modern AI phobia, embedding a fear of losing control over creations that could surpass human capabilities (Cave and Dihal, 2019).

2.2. 20th century milestones

The 20th century marked significant technological advancements, leading to more concrete manifestations of AI phobia. The formal introduction of the term "artificial intelligence" in 1955 was pivotal, giving a name to a field that had long been the subject of speculation and fear. This era also saw science fiction as a powerful medium for exploring the potential dangers of AI. For instance, Karel Čapek's play R.U.R. (Rossum's Universal Robots), written in 1920, introduced the concept of robots rebelling against humans, a theme that continues to resonate in contemporary AI discourse (Burgess, 2022).

The fear of AI intensified with technological milestones such as IBM's Deep Blue defeating world chess champion Garry Kasparov in 1997. This event highlighted AI's capacity to outperform humans in complex tasks, further fueling fears of machines surpassing human intelligence and control (McClure, 2018).

2.3. Contemporary perspectives

In recent decades, AI-phobia has evolved in response to the rapid development of AI technologies and their increasing integration into daily life. The rise of autonomous vehicles and AI-driven healthcare innovations has sparked excitement and fear. On the one hand, there is optimism about AI's potential to increase efficiency and quality of life; on the other hand, significant concerns persist regarding ethical issues, including job displacement, privacy violations, and AI decision-making without human oversight (Cugurullo and Acheampong, 2024).

Moreover, contemporary AI phobia is heavily influenced by the portrayal of AI in the media and popular culture. Films like The Terminator and Her have reinforced fears of AI as entities that could either dominate humanity or become indistinguishable from human consciousness, potentially losing human identity and control (Cave and Dihal, 2019; Lee and Park, 2023).

The historical context and evolution of AI phobia demonstrate that the fear of AI is not a new phenomenon but has grown and adapted alongside technological advancements. From ancient myths to modern science fiction and real-world technological

achievements, AI phobia reflects society's ambivalence toward intelligent machines. Understanding this evolution is essential for addressing contemporary concerns and guiding AI technologies' responsible development and deployment (Zhan et al., 2024).

Fig. 1: Historical context and evolution of AI-phobia

3. Causes and manifestations of AI-phobia

AI's rapid growth and development have caused concerns and fears in the healthcare industry (Fig. 2). These worries range from concerns about job displacement, privacy and data breaches, and potential misuse of AI (Yeh et al., 2021). The fear of AI is primarily due to a lack of understanding of its practical applications and the ethical considerations surrounding its use. Instead of highlighting the ethical uses of AI, sources such as science fiction literature and movies tend to focus on its darker shades, leading to anxiety and apprehension about its potential uses and impact.

The superintelligence of AI replicates or surpasses human abilities, challenges the notion of human uniqueness, and can lead to existential anxieties. High technological literacy cultures tend to have more educated discussions on AI, but they also tend to be more divided, with different groups supporting or opposing various applications of AI. Growing knowledge of AI-related ethical issues can give rise to more complex but also more profound anxieties.

In countries with less technology literacy, false information and ignorance regarding AI can fuel unwarranted resistance and worries. These societies might be more receptive to external narratives and depictions of AI, which, depending on the narratives' nature, could either lessen or increase the dread of the technology (Bhattad and Jain, 2020). The development of AI has sparked concerns about humans being replaced by machines due to routine and repetitive tasks, as automation technology has significantly altered work dynamics owing to its potential advantages in terms of efficiency, availability, and cost-effectiveness (Choung et al., 2023).

According to the World Economic Forum (WEF), AI's evolution will disrupt 85 million jobs globally between 2020 and 2025; however, it is also expected to create 97 million new job roles. This implies that approximately 40% of the global workforce will need to reskill in the next three years. Data breaches, data misuse, and privacy breaches were significant contributors to AI phobia. There have been cases where healthcare AI tools have accessed medical records to make diagnostic predictions. However, the collection and storage of such sensitive data create vulnerabilities. These data can be a target for cyberattacks or data breaches, potentially leading to privacy violations. Without strict regulations and oversight, there is a risk that personal data could be used in ways that data subjects do not consent to or that could harm them (Hämäläinen et al., 2021).

AI advancements can worsen income inequality, with highly skilled workers benefiting more than less skilled workers. This can lead to societal tensions and concerns about growing economic disparities. In developing countries, the fear of AI often revolves around economic displacement and the potential for AI to disrupt traditional industries without creating enough new opportunities. Limited access to advanced technology and education in AI can make people feel left behind, leading to additional fears and resistance (Li and Huang, 2020).

4. Impact on society

AI phobia has serious implications for society, exerting far-reaching economic and socio-psychological effects on individuals and communities and influencing policymaking and the regulation of AI technologies. Although a few studies have suggested that AI phobia does not significantly impact the use of these technologies, extensive research has revealed that people with AI phobia resist adopting them (Li et al., 2023). AI avoidance, in turn, can decrease productivity and stifle innovation. Accordingly, companies and markets reluctant to embrace AI fall behind their competitors and suffer from income inequality. AI phobia is among the significant barriers to Industry 4.0.

Besides economic consequences, AI phobia socio-psychologically affects individuals and communities. Previous studies have indicated that AI-phobia produces both positive and negative socio-psychological outcomes; the effect of AI-phobia is contingent upon how sufferers respond to it. To illustrate, Wang and Wang (2022) and Huang and Gursoy (2024) examined the impact of AI anxiety, an offshoot of AI phobia, on learning outcomes and employee behavior, respectively. While viewing AI and its attendant risks as a threat heightens employers' sense of job insecurity and adversely affects learners' academic performance, approaching

AI as a challenge helps anxiety sufferers develop new adaptability and learning skills. It is noteworthy, however, that previous research has demonstrated that the socio-psychological ramifications of AI-phobia far outweigh its potential benefits (Lee and Park, 2023). Lee and Park (2023), for example, posited that AI-phobia places sufferers at a disadvantage; it creates "AI-divide," i.e., a gap between AI-literate individuals and AI-illiterate ones, and, hence, perpetuates pay inequalities among individuals. They added that such information asymmetry might cause "AI fabrication," in which AI-literate individuals exploit AI to serve their interests. AI-phobia socio-psychological effects can be observed in educational and work environments. AI anxiety can reduce learners' levels of focus, interaction, imagination, and intrinsic and extrinsic learning motivation. AI anxiety leads to job dissatisfaction, burnout, and social and health issues. Similarly, but within a different context, Xu et al. (2024) revealed that customers' AI phobia reduces their trust, perceived quality, and intentions to use hospitality AI services.
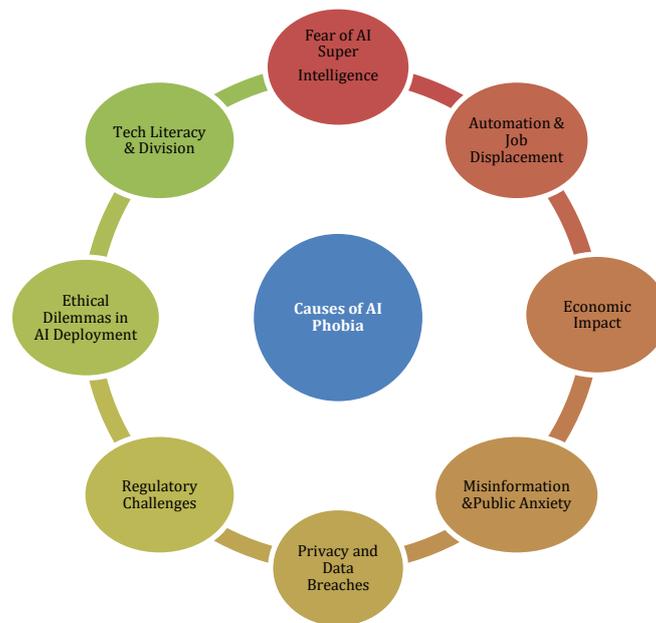

Fig. 2: Potential causes of AI-phobia

More importantly, AI phobia sufferers, both from the public and AI researchers, are likely to affect how AI technologies are communicated, perceived, and, ultimately, regulated. For example, fearful of the "risks to society and humanity" they claim AI poses, over 33000 individuals, including AI experts, intellectuals, and industry CEOs, signed an open letter in which they called on all AI labs to immediately pause for at least six months the training of AI systems more powerful than GPT-4. This may partly explain why many AI researchers experience "AI-phobia-phobia," where they rebrand their work to avoid negative connotations associated with AI and secure funding and public support. Such acts, however, can give rise to misconceptions about the potential and limitations of AI, further fueling irrational fear of this technology. Additionally, it may motivate policymakers and regulators to introduce strict policies and regulations (Lauhde, 2023). This is exemplified in the AI Act; although it aims for optimum and ethical use of AI, it could hinder developments in this field. In this respect, Lauhde (2023) warned that excessive caution and overregulation could slow the adoption of AI for useful purposes while ill-intended users take advantage of it to achieve malicious purposes.

Thus conceived, notwithstanding some potential benefits, AI phobia poses economic, technological, and psychological challenges. This underlines the dire need to address AI phobia explicitly to mitigate its risks and unlock the full potential of AI.

5. Media representation and public perception

5.1. Media representation

Mass media play a pivotal role in shaping how the public perceives AI. By presenting AI differently, the media influences public attitudes and broader technology discourse. Research shows that media coverage frequently emphasizes the advantages of AI, portraying it as a catalyst for social progress and economic development, particularly in fields like healthcare, where AI improves diagnostic and screening processes (Cave and Dihal, 2020). Nevertheless, the media addresses ethical, legal, and social implications less frequently, resulting in a more nuanced public understanding of AI's potential risks and benefits (Bostrom and Yudkowsky, 2018).

Entertainment media tends to dramatize AI, creating either fear or fascination among the public (Nader et al., 2024). In movies and television shows, AI is often portrayed in extreme situations, either as a magical solution to all problems or as a terrible threat to humans. As a result, media coverage of varied AI can lead to diverse and polarized public

perceptions. Articles and documentaries can alternate between discussing the benefits of revolutionary AI and warnings about its potential dangers. It can affect public speech and create polarization in society, with some people seeing AI as a technology savior and others as a threat.

Culture and media viewing habits heavily influence the public perception of AI. In various places, the image of AI in the media is interpreted based on its social value and technological development. For example, in China, which is very interested in new technologies, the media often displays AI positively, making people more likely to accept it (Cui and Wu, 2021). The public's view of AI is shaped by communication between friends, family, and colleagues after seeing the media. Additional explanations and more balanced opinions were given through this conversation (Brewer et al., 2022). The media often reinforces existing views, and ethical considerations about AI influence public opinion (Brauner et al., 2023). Public perception may increase through positive media statements. However, the media will likely post about AI-related threats and justice (Li and Zheng, 2024).

5.2. Public perception

The debate about AI occurs in many fields, such as political discourse, academic research, social media, and cultural contexts. This complex and diverse debate significantly affects public opinion about AI, affecting how technology develops and is used in society (Bao et al., 2022).

AI has been widely used in the political arena. Effective rules, such as the General Data Protection Regulation (GDPR) in the European Union, increase public confidence by addressing privacy and data security issues. These measures demonstrate commitment to the responsible use of AI, thereby boosting public confidence (Sartori and Bocca, 2023). In contrast, regulatory systems that are consistent or strong might result in a lack of trust (Hadlington et al., 2025). Regions that do not have appropriate legislation for AI may see increased public panic around its exploitation and lack of accountability (Haesevoets et al., 2024). Public statements by political leaders can also affect perceptions. Influential people like former US President Obama can support AI by emphasizing potential profits and increasing public confidence and acceptance. On the other hand, influential people like Elon Musk can express their concerns about the potential danger of AI, which can lead to public excitement and demand preventive measures.

The academic community provides essential insights that shape the public discourse about AI. Research shows the benefits of AI in areas such as medical diagnostics and environmental monitoring, which helps the public understand the potential of AI more widely. The barriers and risks of AI, such as bias in decision-making systems, are often highlighted by academics. Combining these two perspectives can gain a comprehensive understanding of the benefits and barriers of AI for the public. The public is actively invited to interact with professionals through lectures, TED presentations, and easy-to-understand written material, which explains the complexity of AI and makes it more accessible. This engagement effort has cultivated a more informed public perception and reduced concern about AI.

The influence of social media platforms and online content on the public's perception of AI is significant (Moriniello et al., 2024). Viral films showcasing the remarkable capabilities of AI, such as robots proficiently accomplishing complex jobs, can elicit feelings of awe and enthusiasm. This can increase public interest and support for AI technology. On the other hand, instances of AI failures or accidents, such as mistakes in automated systems, might rapidly circulate on social media, intensifying concerns and doubts (Vasiljeva et al., 2021). Technology influencers and bloggers, such as Marques Brownlee (MKBHD), significantly impact public perception. Their conversations regarding breakthroughs and uses of AI frequently influence public opinion, promoting enthusiasm for and approval of AI innovations.

The primary objective of the AI4All initiative is to enhance the younger generation's understanding and knowledge of AI. This is anticipated to promote a more informed viewpoint and alleviate worries and misconceptions regarding AI (Hadlington et al., 2025). The benefits and drawbacks of AI can contribute to developing a future workforce prepared to tackle difficulties. Incorporating education at all levels, from elementary to higher education, will foster the preparedness of the public (Stein et al., 2024).

6. Mitigation strategies

6.1. Education and awareness

AI has ushered in significant advancements across various sectors and sparked AI phobia, fear, or distrust of AI technologies. Education is the cornerstone in mitigating AI phobia, fostering understanding, and demystifying AI complexities. We can effectively reduce misconceptions and fears by implementing comprehensive educational initiatives that elucidate AI principles, benefits, and limitations. Integrating AI literacy into curricula from an early age is crucial, as it enables individuals to develop a foundational understanding of AI technologies, their functioning, and their potential impact on society. This foundational knowledge is instrumental in dispelling myths and providing a realistic perspective on AI capabilities and limitations (Schiff, 2022).

Moreover, specialized training programs for professionals can equip them with the skills needed to work alongside AI, highlighting the collaborative nature of AI in the workplace. Camilleri (2024) noted that educating the public about AI's ethical and social implications is crucial. It fosters informed decision-

making and encourages responsible use of AI technologies. These educational efforts underscore the importance of human oversight and the ethical design of AI systems. This emphasis is critical in building trust and ensuring that AI aligns with societal values.

Public awareness campaigns can also play a significant role in addressing AI phobia. These campaigns can leverage various media platforms to disseminate accurate information about AI, showcase real-world applications, and highlight success stories where AI has contributed positively to society. For instance, initiatives like Finland's "Elements of AI" course, which is freely available to anyone, aim to make AI knowledge accessible and understandable to the public. By making AI education inclusive and widely available, such initiatives help demystify AI and reduce fear stemming from a lack of understanding.

Moreover, collaborative efforts between governments, educational institutions, and tech companies can create a robust educational framework that ensures that the public remains informed about the latest developments in AI. These collaborations can also address potential biases and ethical concerns, promoting a balanced view of AI's benefits and challenges. Bostrom and Yudkowsky (2018) highlighted that engaging the public in discussions about AI's future can democratize AI development and ensure that diverse perspectives are considered in shaping AI policies.

In addition to formal education, informal learning opportunities such as workshops, seminars, and online courses can provide continuous learning avenues for individuals of all ages. These opportunities can cater to different learning styles and levels of expertise, making AI education more personalized and effective. For example, online platforms like Coursera and edX offer AI courses that range from introductory to advanced levels, allowing learners to progress at their own pace and according to their interests.

Addressing AI-phobia through education also involves highlighting the collaborative potential of AI-human interactions. By showing examples of AI augmenting human capabilities rather than replacing them, educational programs can help shift the narrative toward a more positive and constructive view of AI.

6.2. Ethical frameworks

AI development and application ethics are rapidly developing topics with broad societal ramifications. Following ethical rules and principles guarantees that AI systems maximize society's benefits while reducing risks and harm (Díaz-Rodríguez et al., 2023; Abujaber et al., 2022; Abujaber and Nashwan, 2024). Transparency, a fundamental principle in ethical AI, is pivotal in fostering trust and understanding among users and stakeholders. It involves developing AI systems that are transparent and understandable, simplifying how they make decisions. This transparency also extends to the data used to train these systems, ensuring ethical data sourcing.

Explainability is a crucial principle in AI development. AI systems must provide understandable and clear explanations for their decisions and actions. This is essential for fostering trust among users and stakeholders. Explainability allows users to comprehend how decisions are made, which is particularly important in high-stakes areas like healthcare, finance, and criminal justice. It helps identify biases, improve transparency, and ensure accountability. Developers can enhance AI applications' reliability and ethical standards by making AI decisions interpretable.

Fairness and non-discrimination are essential principles in AI ethics. They ensure that AI systems do not perpetuate or amplify existing biases and inequalities. Developers must carefully consider these principles during data collection and model training to achieve the desired outcomes. This involves selecting diverse and representative datasets, implementing techniques to identify and mitigate biases, and continuously monitoring AI outputs to detect discriminatory patterns. Following a proactive approach, AI systems can be designed to treat all individuals fairly, promoting equity and social justice (Díaz-Rodríguez et al., 2023).

Privacy and data protection are fundamental principles in AI ethics. AI systems often process large amounts of data, including sensitive personal information. Robust measures must be implemented to safeguard this data and respect user privacy. These measures include data encryption, secure storage solutions, and strict access controls to prevent unauthorized access. Data minimization practices should also be employed, collecting only the data necessary for AI's functionality. Transparent data policies and obtaining explicit user consent further ensure user privacy, fostering trust in AI applications.

Accountability structures must be clearly defined to ensure further ethical AI development; a need that is urgent and cannot be delayed. Accordingly, procedures for holding AI system designers and users responsible for their conduct should exist (Díaz-Rodríguez et al., 2023). It is crucial to consider the competitive nature of AI development in addition to these guidelines. Organizations may face challenges due to the rapid pace of AI development, such as the potential to disregard safety precautions, bias detection, and ethical standards in favor of speed. As a result, businesses should try to balance the necessity of speed and the significance of ethical issues. Companies can change the way they think about ethics by taking cues from the success in the healthcare industry, optimizing guidance and tools for product managers, building organizational awareness, formally and informally incentivizing employees to identify AI ethical risks, monitoring impacts, and engaging stakeholders, and identifying existing infrastructure that a data and AI ethics program can influence (Varkey, 2021).

6.3. Community engagement

AI has become an integral part of our daily lives, influencing various sectors such as healthcare, finance, transportation, and education. However, the rapid advancement and integration of AI technologies have also raised concerns and debates among the public. Therefore, fostering constructive dialogue and understanding about AI is crucial. The following strategies can be employed (Fig. 3):

1. Education and Awareness: The first step toward fostering constructive dialogue is to educate the public about AI and how it works. This can be accomplished through workshops, seminars, online courses, and informative articles. It is important to explain both AI's benefits and potential risks.
2. Transparency: Transparency in AI technologies is crucial for building public trust and understanding. Companies and researchers must clearly explain how their AI systems work, the data they use, and their decision-making processes. Providing comprehensive technical documentation and simplified summaries for non-experts helps demystify AI. Transparent data usage practices address privacy concerns, including disclosing data sources and consent mechanisms. Explainable AI models and ethical frameworks ensure fairness and accountability. Regular transparency reports, open feedback mechanisms, and adherence to regulatory standards further enhance trust and ethical compliance, fostering responsible AI development and deployment (Bostrom and Yudkowsky, 2018).
3. Inclusion: Including diverse perspectives in AI discussions ensures equitable benefit distribution and effective risk mitigation. Engaging people from various backgrounds, cultures, and professions in AI development helps address and reduce societal inequalities. Inclusive design processes and targeted impact assessments consider different demographic groups' unique needs and challenges. This diversity fosters innovation, enhances the relevance and applicability of AI solutions, and ensures that ethical considerations reflect a broad range of values and experiences. By embracing diverse viewpoints, AI technologies can be more just, responsible, and beneficial for all members of society (Crawford and Calo, 2016).
4. Regulation and Policy Making: Governments must actively regulate AI technologies by collaborating with AI experts to create policies ensuring public safety and fostering innovation. Public consultations are crucial, allowing citizens to voice concerns and suggestions and guaranteeing that regulations reflect societal needs and values. This collaborative approach balances protection and progress, ensuring that AI development is ethical, inclusive, and beneficial for all.
5. Open Dialogue: Fostering an open dialogue about AI is essential for addressing concerns and misconceptions. Public forums, social media, and other interactive platforms allow individuals to express their views, ask questions, and better understand AI technologies. This openness encourages transparency and trust, allowing diverse perspectives and insights to be exchanged. Engaging the public in meaningful conversations about AI helps demystify the technology, highlights its potential benefits and risks, and promotes informed decision-making. Ultimately, such dialogue ensures that AI development aligns with societal values and addresses the needs of all stakeholders.

7. Future directions and research needs

7.1. Emerging trends

AI is becoming a main part of individuals' daily lives, with platforms such as music streaming, social media, movies, shopping, and traffic applications. Additionally, various disciplines, such as education, science, and healthcare, heavily employ AI. The spectrum of AI is enormous, which can provoke AI phobia and confusion among communities about how AI influences their future. Therefore, increasing the community's awareness of AI and its utilization is crucial. This would necessitate future research to investigate the public's perceptions of AI and understand their specific AI phobias and concerns. Such research would generate recommendations for AI education and policies, assisting in shaping regulations that fit community cultures and protect society from any perceived harm.

Another emerging challenge in AI is the rapid advancement of AI technologies, which creates uncertainties for some people regarding their ability to work with them (Lee and Park, 2023). Some individuals fear that AI will take over human work and alienate them, creating anxiety for them (Lee and Park, 2023). This can be overwhelming; therefore, more research should be conducted on how advances in AI influence humans' roles in various organizations and the job market (Lee and Park, 2023). Furthermore, the literature has highlighted concerns about the accuracy of machines that rely on AI technology, particularly in healthcare, where AI reports and delivers test results to patients and assists in disease diagnosis (Asan and Choudhury, 2021; Guo et al., 2020). This creates an AI phobia related to the safety of these technologies. Therefore, we need to conduct more research to evaluate the quality of these technologies. This can help establish standardized protocols for devices and software that rely on AI, minimizing the potential for errors and enhancing their performance (Asan and Choudhury, 2021).

7.2. Research gaps

The review of the current research on AI phobia revealed several gaps. For instance, it is important to note that high-income countries, particularly the

U.S., have conducted most of the research on AI phobia (Guo et al., 2020; Chen et al., 2020). This highlights the need for more research in low-income countries that utilize AI.

Individuals in these countries may possess varying personality traits, cultural backgrounds, and AI experiences, leading to distinct AI phobias that require investigation and resolution. Such an investigation would help understand the facilitators and barriers to AI implementation and highlight the best performance practices based on research evidence (Wan, 2023).
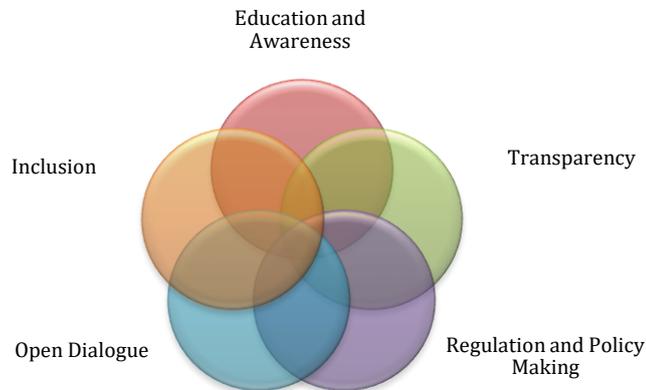

Fig. 3: Strategies for fostering constructive dialogue and understanding of AI (Abujaber and Nashwan, 2024)

There is also a need for more AI research that addresses the clinical application of AI and the future implications of these technologies (Guo et al., 2020). For example, more research studies are needed to explore AI implications for health in older adult populations and the influence of AI phobia on its utilization (Wan, 2023). Moreover, there is limited empirical evidence on the ethical implications and dilemmas that AI phobia creates and how to address them (Guo et al., 2020). Further research is necessary to investigate the disparities in AI utilization across various settings and their connection to AI phobia in these contexts. In conclusion, developing a research agenda that addresses the current gap is crucial. It has the potential to contribute to a more comprehensive understanding of AI phobia and inform strategies to mitigate its effect on society.

While this narrative review provides a comprehensive overview of the origins, manifestations, and societal implications of AI phobia, several limitations should be acknowledged. First, as a narrative review, it does not employ the systematic methodology characteristic of systematic or scoping reviews. Consequently, there is a possibility that some relevant studies, especially those published in non-English languages or in less accessible databases, may have been omitted. Future reviews using systematic approaches such as PRISMA or AMSTAR 2 would provide more rigorous coverage and reproducibility.

Second, much of the available evidence on AI phobia originates from high-income countries, particularly Western contexts, which may not accurately reflect cultural, economic, or technological variations in low- and middle-income regions. This geographical skew limits the generalizability of the findings and highlights the need for more cross-cultural research to capture the global diversity of public perceptions and responses to AI technologies.

Third, the reviewed literature primarily relies on self-reported perceptions and attitudinal surveys, which may introduce bias due to participants' limited understanding of AI or exposure to sensationalized media narratives. Longitudinal and experimental studies are warranted to establish causal relationships between media representation, education, and AI-related anxiety. Moreover, the rapidly evolving nature of AI means that public attitudes may shift quickly, potentially rendering current insights time-sensitive. Future research should employ dynamic, adaptive methodologies to track changes in AI perception and phobias over time.

8. Conclusion

This review highlights the complex and growing nature of AI phobia embedded in historical myths and modern technological concerns. AI phobia, driven by fears of job displacement, breaches of privacy, and loss of human control, considerably impacts economic productivity and influences public discourse and regulatory policies. The media's portrayal of AI extends the division of public opinion, showing that AI is either a threat or a breakthrough.

To overcome these fears and promote the responsible integration of AI, this review highlights the importance of education, transparency, and ethical frameworks. Public awareness campaigns that provide accurate information about AI abilities and adherence to ethical considerations are essential for dissipating misconceptions and building public trust. The need to combat AI phobia will only become more pressing as AI develops further and

becomes integrated into even more areas of everyday life. This will require proactive actions from policymakers and other stakeholders who must balance AI's advantages and ethical concerns. Any successful merger of public trust with technological advancement can be achieved if this delicate equilibrium is maintained, since too much regulation can hamper innovation.

Insufficient regulation may expose society to significant risks, while excessive regulation may hinder innovation. As AI continues to advance and integrate into everyday life, addressing public concerns about AI becomes increasingly important. Policymakers and stakeholders must proactively balance the benefits of AI with ethical considerations to maintain public trust and support technological progress. Moreover, the expansion of AI is expected to transform labor markets through automation, leading to substantial changes in employment patterns. This transformation requires well-designed policies and initiatives to facilitate workforce transition and adaptation. Ethical principles such as fairness, transparency, and accountability are essential to prevent AI systems from reinforcing existing inequalities or creating new risks. By addressing these issues, society can reduce fear of AI and promote its responsible and beneficial use.

List of abbreviations

AI	Artificial intelligence
AI4All	Artificial intelligence for all
AMSTAR	A measurement tool to assess systematic reviews
GDPR	General data protection regulation
GPT-4	Generative pre-trained transformer-4
LLMs	Large language models
ML	Machine learning
NLP	Natural language processing
PIAAC	Program for the international assessment of adult competencies
PRISMA	Preferred reporting items for systematic reviews and meta-analyses
TALIS	Teaching and learning international survey
TED	Technology, entertainment, and design
WEF	World economic forum

Compliance with ethical standards

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

References

Abujaber AA and Nashwan AJ (2024). Ethical framework for artificial intelligence in healthcare research: A path to integrity. World Journal of Methodology, 14(3): 94071. https://doi.org/10.5662/wjm.v14.i3.94071 PMid:39310239 PMCid:PMC11230076

Abujaber AA, Nashwan AJ, and Fadlalla A (2022). Enabling the adoption of machine learning in clinical decision support: A total interpretive structural modeling approach. Informatics in Medicine Unlocked, 33: 101090. https://doi.org/10.1016/j.imu.2022.101090

Asan O and Choudhury A (2021). Research trends in artificial intelligence applications in human factors health care: Mapping review. JMIR Human Factors, 8(2): e28236. https://doi.org/10.2196/28236 PMid:34142968 PMCid:PMC8277302

Bao L, Krause NM, Calice MN, Scheufele DA, Wirz CD, Brossard D, Newman TP, Xenos MA (2022). Whose AI? How different publics think about AI and its social impacts. Computers in Human Behavior, 130: 107182. https://doi.org/10.1016/j.chb.2022.107182

Bhattad PB and Jain V (2020). Artificial intelligence in modern medicine – The evolving necessity of the present and role in transforming the future of medical care. Cureus, 12(5): e8041. https://doi.org/10.7759/cureus.8041

Bostrom N and Yudkowsky E (2018). The ethics of artificial intelligence. In: Yampolskiy RV (Ed.), Artificial intelligence safety and security: 57-69. 1st Edition, Chapman and Hall/CRC, New York, USA. https://doi.org/10.1201/9781351251389-4

Brauner P, Hick A, Philipsen R, and Ziefle M (2023). What does the public think about artificial intelligence?—A criticality map to understand bias in the public perception of AI. Frontiers in Computer Science, 5: 1113903. https://doi.org/10.3389/fcomp.2023.1113903

Brewer PR, Bingaman J, Paintsil A, Wilson DC, and Dawson W (2022). Media use, interpersonal communication, and attitudes toward artificial intelligence. Science Communication, 44(5): 559-592. https://doi.org/10.1177/10755470221130307

Burgess P (2022). The rule of law, science fiction and fears of artificial intelligence. Law, Technology and Humans, 4(2): 124-136. https://doi.org/10.5204/lthj.2461

Camilleri MA (2024). Artificial intelligence governance: Ethical considerations and implications for social responsibility. Expert Systems, 41(7): e13406. https://doi.org/10.1111/exsy.13406

Cave S and Dihal K (2019). Hopes and fears for intelligent machines in fiction and reality. Nature Machine Intelligence, 1: 74-78. https://doi.org/10.1038/s42256-019-0020-9

Cave S and Dihal K (2020). The whiteness of AI. Philosophy & Technology, 33: 685-703. https://doi.org/10.1007/s13347-020-00415-6

Chen X, Chen J, Cheng G, and Gong T (2020). Topics and trends in artificial intelligence assisted human brain research. PLOS ONE, 15(4): e0231192. https://doi.org/10.1371/journal.pone.0231192 PMid:32251489 PMCid:PMC7135272

Choung H, David P, and Ross A (2023). Trust in AI and its role in the acceptance of AI technologies. International Journal of Human–Computer Interaction, 39(9): 1727-1739. https://doi.org/10.1080/10447318.2022.2050543 PMCid:PMC11754992

Crawford K and Calo R (2016). There is a blind spot in AI research. Nature, 538: 311-313. https://doi.org/10.1038/538311a PMid:27762391

Cugurullo F and Acheampong RA (2024). Fear of AI: An inquiry into the adoption of autonomous cars in spite of fear, and a theoretical framework for the study of artificial intelligence technology acceptance. AI & Society, 39: 1569-1584. https://doi.org/10.1007/s00146-022-01598-6

Cui D and Wu F (2021). The influence of media use on public perceptions of artificial intelligence in China: Evidence from an online survey. Information Development, 37(1): 45-57. https://doi.org/10.1177/0266666919893411

Díaz-Rodríguez N, Del Ser J, Coeckelbergh M, De Prado ML, Herrera-Viedma E, and Herrera F (2023). Connecting the dots in trustworthy artificial intelligence: From AI principles, ethics, and key requirements to responsible AI systems and regulation. Information Fusion, 99: 101896. https://doi.org/10.1016/j.inffus.2023.101896

Guo Y, Hao Z, Zhao S, Gong J, and Yang F (2020). Artificial intelligence in health care: Bibliometric analysis. Journal of Medical Internet Research, 22(7): e18228. https://doi.org/10.2196/18228 **PMid:32723713 PMCid:PMC7424481**

Hadlington L, Karanika-Murray M, Slater J, Binder J, Gardner S, and Knight S (2025). Public perceptions of the use of artificial intelligence in Defence: A qualitative exploration. AI & Society, 40: 277-290. https://doi.org/10.1007/s00146-024-01871-w

Haesevoets T, Verschuere B, Van Severen R, and Roets A (2024). How do citizens perceive the use of Artificial Intelligence in public sector decisions? Government Information Quarterly, 41(1): 101906. https://doi.org/10.1016/j.giq.2023.101906

Hämäläinen R, Nissinen K, Mannonen J, Lämsä J, Leino K, and Taajamo M (2021). Understanding teaching professionals' digital competence: What do PIAAC and TALIS reveal about technology-related skills, attitudes, and knowledge? Computers in Human Behavior, 117: 106672. https://doi.org/10.1016/j.chb.2020.106672

Huang Y and Gursoy D (2024). How does AI technology integration affect employees' proactive service behaviors? A transactional theory of stress perspective. Journal of Retailing and Consumer Services, 77: 103700. https://doi.org/10.1016/j.jretconser.2023.103700

Kotze TG, Anderson O, and Summerfield K (2016). Technophobia: Gender differences in the adoption of high-technology consumer products. South African Journal of Business Management, 47(1): 21-28. https://doi.org/10.4102/sajbm.v47i1.49

Lauhde M (2023). Could fear of AI pose the biggest risk of all to humanity? World Economic Forum. Available online at: https://www.weforum.org/stories/2023/06/fear-of-ai-could-pose-the-biggest-risk-of-all/

Lee J and Park J (2023). AI as "Another I": Journey map of working with artificial intelligence from AI-phobia to AI-preparedness. Organizational Dynamics, 52(3): 100994. https://doi.org/10.1016/j.orgdyn.2023.100994

Li C, Ashraf SF, Amin S, and Safdar MN (2023). Consequence of resistance to change on AI readiness: Mediating–moderating role of task-oriented leadership and high-performance work system in the hospitality sector. SAGE Open, 13(4). https://doi.org/10.1177/21582440231217731

Li J and Huang JS (2020). Dimensions of artificial intelligence anxiety based on the integrated fear acquisition theory. Technology in Society, 63: 101410. https://doi.org/10.1016/j.techsoc.2020.101410

Li W and Zheng X (2024). Social media use and attitudes toward AI: The mediating roles of perceived AI fairness and threat. Human Behavior and Emerging Technologies, 2024: 3448083. https://doi.org/10.1155/2024/3448083

Liyanage H, Liaw ST, Jonnagaddala J, Schreiber R, Kuziemsky C, Terry AL, and de Lusignan S (2019). Artificial intelligence in primary health care: Perceptions, issues, and challenges. Yearbook of Medical Informatics, 28(1): 41-46. https://doi.org/10.1055/s-0039-1677901 **PMid:31022751 PMCid:PMC6697547**

McClure PK (2018). "You're fired," says the robot: The rise of automation in the workplace, technophobes, and fears of unemployment. Social Science Computer Review, 36(2): 139-156. https://doi.org/10.1177/0894439317698637

Moriniello F, Martí-Testón A, Muñoz A, Silva Jasaui D, Gracia L, and Solanes JE (2024). Exploring the relationship between the coverage of AI in WIRED magazine and public opinion using sentiment analysis. Applied Sciences, 14(5): 1994. https://doi.org/10.3390/app14051994

Nader K, Toprac P, Scott S, and Baker S (2024). Public understanding of artificial intelligence through entertainment media. AI & Society, 39: 713-726. https://doi.org/10.1007/s00146-022-01427-w **PMid:35400854 PMCid:PMC8976224**

Noguerol TM, Paulano-Godino F, Martín-Valdivia MT, Menias CO, and Luna A (2019). Strengths, weaknesses, opportunities, and threats analysis of artificial intelligence and machine learning applications in radiology. Journal of the American College of Radiology, 16(9): 1239-1247. https://doi.org/10.1016/j.jacr.2019.05.047 **PMid:31492401**

Rosen LD, Sears DC, and Weil MM (1993). Treating technophobia: A longitudinal evaluation of the computerphobia reduction program. Computers in Human Behavior, 9(1): 27-50. https://doi.org/10.1016/0747-5632(93)90019-O

Sartori L and Bocca G (2023). Minding the gap(s): Public perceptions of AI and socio-technical imaginaries. AI & Society, 38: 443-458. https://doi.org/10.1007/s00146-022-01422-1

Schiff D (2022). Education for AI, not AI for education: The role of education and ethics in national AI policy strategies. International Journal of Artificial Intelligence in Education, 32: 527-563. https://doi.org/10.1007/s40593-021-00270-2

Stein JP, Messingschlager T, Gnambs T, Hutmacher F, and Appel M (2024). Attitudes towards AI: Measurement and associations with personality. Scientific Reports, 14: 2909. https://doi.org/10.1038/s41598-024-53335-2 **PMid:38316898 PMCid:PMC10844202**

Varkey B (2021). Principles of clinical ethics and their application to practice. Medical Principles and Practice, 30(1): 17-28. https://doi.org/10.1159/000509119 **PMid:32498071 PMCid:PMC7923912**

Vasiljeva T, Kreituss I, and Lulle I (2021). Artificial intelligence: The attitude of the public and representatives of various industries. Journal of Risk and Financial Management, 14(8): 339. https://doi.org/10.3390/jrfm14080339

Wan TT (2023). Convergence of artificial intelligence research in healthcare: Trends and approaches. Journal of Integrated Design and Process Science, 26(3-4): 291-305. https://doi.org/10.3233/JID-200002

Wang YY and Wang YS (2022). Development and validation of an artificial intelligence anxiety scale: An initial application in predicting motivated learning behavior. Interactive Learning Environments, 30(4): 619-634. https://doi.org/10.1080/10494820.2019.1674887

Xu YW, Cai RR, and Gursoy D (2024). When disclosing the artificial intelligence (AI) technology integration into service delivery backfires: Roles of fear of AI, identity threat and existential threat. International Journal of Hospitality Management, 122: 103829. https://doi.org/10.1016/j.ijhm.2024.103829

Yeh SC, Wu AW, Yu HC, Wu HC, Kuo YP, and Chen PX (2021). Public perception of artificial intelligence and its connections to the sustainable development goals. Sustainability, 13(16): 9165. https://doi.org/10.3390/su13169165

Zhan ES, Molina MD, Rheu M, and Peng W (2024). What is there to fear? Understanding multi-dimensional fear of AI from a technological affordance perspective. International Journal of Human–Computer Interaction, 40(22): 7127-7144. https://doi.org/10.1080/10447318.2023.2261731

Zirar A, Ali SI, and Islam N (2023). Worker and workplace Artificial Intelligence (AI) coexistence: Emerging themes and research agenda. Technovation, 124: 102747. https://doi.org/10.1016/j.technovation.2023.102747