Hope or Doom AI-ttitude? Examining the Impact of Gender, Age, and Cultural Differences on the Envisioned Future Impact of Artificial Intelligence on Humankind

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ABSTRACT

Artificial Intelligence (AI) has become increasingly prominent in the contemporary digital era, affecting various aspects of daily life across the globe. Public perceptions of AI encompass a diverse array of individual attitudes toward this technology, ranging from favorable to unfavorable. Given the strong predictive relationship between attitudes toward technology and its acceptance and usage, it is vital to understand the factors that shape these attitudes. This article investigates the potential impact of sociodemographic factors, such as country (UK and USA), age, and gender differences, on future perspectives of AI, focusing on the extent to which individuals perceive AI technology as a threat to humans or as a positive for humanity. By comparing samples of respondents from the United Kingdom (UK) and the United States (USA), the study aimed to understand how these factors might contribute to variations in attitudes toward AI across diverse cultural contexts. The study examined three main hypotheses, proposing that cultural context, age, and gender influence future perspectives of AI as a potential threat or benefit for humanity. The findings revealed distinct patterns of attitudes towards AI technology among respondents from the UK and the USA, as well as across gender groups. These results contribute to a better understanding of the factors shaping attitudes toward AI. In conclusion, the study underscores the importance of considering cultural context, age, and gender differences in shaping future perspectives on AI, potentially providing valuable insights for further research on the acceptability and deployment of this technology.

CCS CONCEPTS

• **Artificial Intelligence**; • **Attitude**; • **Acceptability**;

KEYWORDS

Artificial Intelligence (AI), Gender Differences, Cultural Differences, Technology

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1 INTRODUCTION

Artificial intelligence (AI) has been described as a technology that allows machines and software to simulate human intelligence [1]. Such technology is becoming increasingly integrated into everyday life. As a result, understanding public opinions and perceptions is essential for directing its growth, regulation, and implementation [2-4]. High-tech innovations such as self-driving cars [5], voice-command services like Siri and Alexa [6], and humanoid robots [7-9] have emerged from AI's rapid progress. These advancements bring numerous benefits, including enhanced driving safety [10] and better healthcare [11]. However, AI's expansion poses challenges, including job displacement [12] and differing opinions on its benefits and drawbacks [13]. As the debate around AI continues, researchers in human-computer interaction and technology adoption must understand public attitudes toward AI. Furthermore, such understanding can help develop educational initiatives and awareness campaigns addressing misconceptions and concerns while emphasizing AI's potential for positive impact.

In psychological research, attitude is understood as an individual's predisposition toward an object shaped by previous experiences. First impressions are typically enduring and not easily altered by additional observations or evaluations. These impressions also influence subsequent judgments about the object [14]. Therefore, examining people's attitudes towards AI is essential in understanding their acceptance of AI in daily life, informing AI implementation, and developing of ethically sound AI systems. Although the AI field is expanding rapidly, with studies focusing on AI usage emerging frequently, there is no unifying, common tradition. Social robotics, which shares numerous characteristics with AI usage, can be seen as embodied AI since these robots often take anthropomorphic forms and are expected to interact like humans. Research on attitudes towards social robotics and human-robot interaction (HRI) has a longer and more established tradition. Some attempts to develop psychometrically valid measures of attitude and robot acceptability have been conducted since the early 2000s but are still relatively new [15]. Some instruments, like adaptations of the Technology Acceptance Model (TAM), directly measure acceptance and intention to use robots, assuming that behavioral choice is based on perceived ease of use and usefulness [16]. Others focus on ethical aspects, such as the Ethical Acceptability Scale, primarily employed to evaluate therapeutic robotic partners for children affected by autism [17, 18].

The Negative Attitude Towards Robots Scale (NARS) [19] is the most frequently used instrument. NARS is a 14-item questionnaire

that assesses participants' general attitudes toward robots and has been widely used in cross-cultural studies. Despite criticism for its negative orientation [15], NARS does measure both negative and positive aspects. A few scales have been developed in recent years to assess AI attitudes specifically, including the General Attitudes Towards Artificial Intelligence Scale (GAISS) by [20], the Attitude Towards Artificial Intelligence Scale (ATAI) by [21], and the Threat of Artificial Intelligent Scale (TAI; [22]), and the Artificial Intelligence Attitude Scale (AIAS; [23]) for assessing fear in AI technology. These scales (especially ATAI and TAI) have a quite strong focus on evaluating emotions elicited by AI systems, especially fear and a general sense of threat towards humanity. For example, one of the items of the ATAI scale is "Artificial intelligence will destroy humankind" ([21]), explicitly suggesting the doom of mankind as a risk connected to AI.

Several scientists (see, e.g., [24]) have speculated whether AI will enhance humankind or ultimately cause its demise. As Tesla CEO Elon Musk has noted, AI does not need to be malevolent to threaten humanity; if human interests conflict with AI's goals, the technology may decide to eliminate humanity and autonomous weapons systems, which could reduce operational costs, are a growing concern (see e.g., [25]). Rapid advancements in AI weaponization include unmanned vehicles, missile systems, and the automation of various military functions. The security risks associated with AI are being debated at the United Nations, with some calling for a ban on killer robots. These lethal autonomous weapons could become the most potent weapons ever created. The dichotomy of AI as a hope or threat for humanity is also an established debate in the scientific literature (see e.g., [13, 26]).

In the current divisive debate on the future of AI and its impact on humanity, it is important to investigate if AI technology evokes strong negative and positive emotions in the population and the associated negative or positive attitudes towards technology. Furthermore, it is important to understand personal and societal factors associated with positive and negative attitudes towards AI. Investigating the public attitude can provide valuable insights into AI acceptance, resistance, potential benefits, and perceived risks [27, 28].

In this investigation, AI was conceptualized as an abstract "entity" and focused on individuals' general attitudes toward the future impact of AI on humanity. The primary objective of this investigation is to examine the influence of country, age, and gender differences on future perspectives of AI in the UK and the USA.

Research question: How do cultural context (UK vs. USA), age, and gender differences influence future perspectives on artificial intelligence's potential threat or benefit?

Hypothesis 1: Cultural context significantly impacts the perception of AI as a potential threat or benefit for humanity, with respondents from the UK and the USA possibly having different attitudes towards AI technology. This hypothesis assumes that cultural context plays a significant role in shaping individuals' perceptions of technology in general [29] and AI specifically [30-32]. Therefore, it is plausible to expect differences in attitudes and acceptance towards AI technology between respondents in different countries [33].

Hypothesis 2: Age has a significant influence on future perspectives of AI as a potential threat or benefit for humanity, with younger respondents being more likely to perceive AI technology as positive for humankind and older respondents being more likely to perceive AI technology as a threat to humans. This hypothesis is grounded in the observation that age can influence attitudes toward technology in general [34-36]. In previous studies, older people were found to have a more negative attitude towards AI [20] and lower acceptance and higher fear towards AI (but this effect was shown not to be general, but only in some of the data samples reported in the article [21]). Younger individuals have often been described as more accustomed to technology [37] and may be more inclined to perceive AI as positive for humanity. However, a recent study found that positive/negative attitudes toward AI were not associated with participants' age [38].

Hypothesis 3: Gender differences will significantly affect future perspectives of AI as a potential threat or benefit for humanity, with male respondents being more likely to perceive AI technology as positive for society and female respondents being more likely to perceive AI technology as a threat to humans. Hypothesis 4 posits that gender differences can significantly affect perspectives on AI, as males were found to find AI more advantageous compared to females [2] and generally perceived AI as more positive [20, 21, 30]. Previous research has shown that, on average, men tend to perceive technology in a more positive way [39, 40]. A review on gender disparities in technology usage indicates that women tend to experience higher levels of anxiety regarding IT use compared to men, which in turn diminishes their sense of self-efficacy and amplifies the perception that IT necessitates more effort [41]. Consequently, it is reasonable to expect that male respondents may be more likely to perceive AI technology as more positive for humanity. In contrast, female respondents may be more likely to perceive it as a threat to humans.

2 METHOD

This study utilized a quantitative method to evaluate individuals' outlooks on the future of artificial intelligence (AI), focusing on their beliefs about AI's potential advantages or disadvantages for humanity. To accomplish this, two questions, "AI Hope" and "AI Doom," were integrated into a more extensive survey that delved into the various factors affecting AI perception. Both items have been taken from those initially proposed in the AIAS scale (see the first study discussed in [23]). Please note that prior to the experiment, the participants received a description of what we meant by "AI" to clarify potential sources of misinterpretation. Examples of AI systems were virtual assistants, content recommendation systems on media streaming platforms, and AI-enhanced communication tools like grammar checkers and chatbots.

The specific questions included in the assessment were:

AI technology is positive for humanity (AI Hope): This question is based on the literature exploring the societal ramifications of AI [42] and emphasizes the prospective benefits of AI implementations. It represents the conviction that AI can facilitate societal advancement and well-being by tackling intricate global issues, enhancing healthcare [43], improving, for example, the quality of education [44, 45], and promoting economic growth [46, 47].

I think AI technology is a threat to humans (AI Doom): This question draws upon the literature that examines the perils of super-intelligent AI [48] and the risk perception related to technology [49]. These theoretical viewpoints highlight the significance of grasping individuals' concerns regarding the potential dangers AI presents. Such apprehensions may involve job loss, privacy infringement, ethical dilemmas, or existential risks arising from AI advancements.

2.1 Participant Recruitment and Survey Procedure

In the first study, a gender-balanced convenience sample of 230 UK adults was gathered using Prolific, an online platform for participant recruitment. All participants reported using a computer or laptop with a physical keyboard. The sample size was determined based on the variables analyzed in a broader survey on AI-generated data perception, which included the questions examined in this article. For the second study, a separate convenience sample of 300 US adults, mirroring the UK sample's characteristics, was recruited through the same platform. The sample size was likewise based on the number of variables assessed in an extensive survey focusing on human-computer and human-AI interaction, incorporating the questions explored in this article.

In both studies, participants were required to declare fluency in English and be over 18 years old to participate. All participants in both studies were asked to read and explicitly accept an informed consent form before participating. They were informed about the tasks they would be performing and reminded of their right to withdraw from the study at any point. Both studies adhered to the Declaration of Helsinki for scientific studies on human participants and complied with local and national regulations. No personal data or information allowing the identification of study participants was collected. For both studies, the surveys were developed using Psyktoolkit [50, 51]. The surveys included a questionnaire battery containing attention check questions, such as "Select the highest value for this item" or "Select the lowest value for this item." Participants who failed one or more attention checks were excluded from the sample and replaced until the pre-determined final samples were reached. In the first study, six participants had to be replaced, while in the second study, eighteen participants needed replacement due to failing one or more attention checks. In the final data, 9 participants reported not recognizing themselves as male or female (2 in the UK and 7 in the USA datasets). Data for these participants were not used for the statistical analysis, as the small sample size did not allow for adequate comparison with the male and female groups. Therefore data analysis was performed on 228 UK and 293 USA participants.

2.2 Data analysis

Descriptive statistics were first computed. Two separate analyses of covariance (ANCOVA) were performed to establish the effect of the independent nominal variables gender (male, females), country (UK, USA), and the continuous variable (age), with the two dependent variables of interest: AI Hope and AI Doom. Data analysis was performed using the statistical software Jamovi 2.3.21 (The Jamovi project, 2022), while the figures were created using JASP 0.17.1 (JASP Team, 2023).

3 RESULTS

The descriptive statistics reveal differences in AI Hope and AI Doom scores across gender and country. For AI Hope, male participants from the UK (M = 5.92, SD = 2.03) and the USA (M = 6.59, SD = 2.16) reported higher scores than female participants from the UK (M = 5.26, SD = 1.87) and the USA (M = 5.75, SD = 2.19), indicating that males from both countries have a more positive outlook on AI technology compared to females. Additionally, the average age of participants across gender and country was relatively similar, with the only notable difference being female participants from the USA, who were slightly older (M = 43.5, SD = 15.3) compared to other groups. For AI Doom, male participants from the UK (M = 5.77, SD = 2.44) and the USA (M = 6.12, SD = 2.58) reported relatively similar scores, as did female participants from the UK (M = 5.89, SD = 2.51) and the USA (M = 5.91, SD = 2.57). These results suggest no substantial differences in the perception of AI as a potential threat between males and females or between the UK and the USA. Descriptive statistics are shown in Table 1.

The results relative to the ANCOVA for the dependent variable "AI Hope" demonstrated a significant effect of Gender on AI Hope, $F(1, 516) = 16.159$, $p < .001$, signifying a notable difference in optimism towards AI systems between men and women. A significant effect of Country on AI Hope scores was also found, $F(1, 516) = 10.191$, $p = .001$, suggesting a variation in the level of hopefulness for AI technology between participants from the UK and the US. Age, however, did not significantly impact AI Hope, $F(1, 516) = 1.122$, $p = .290$, indicating that age is not a crucial determinant of hope toward AI. Moreover, there was no significant interaction effect between gender and country on AI Hope, $F(1, 516) = 0.194$, $p = .660$, implying that the relationship between gender and AI Hope remains consistent across both nations. Subsequent contrast analyses for Gender revealed that women exhibited lower levels of hope for AI systems than men, with an estimate of -0.739, SE = 0.184, t = -4.02, and $p < .001$. In terms of Country, the contrast analysis indicated that respondents from the US demonstrated higher levels of hope for AI systems than their UK counterparts, with an estimate of 0.587, SE = 0.184, t = 3.19, and p = .001. Data distribution can be seen in Figure 1. ANCOVA analysis is shown in Table 2.

The results from the ANCOVA for the dependent variable "AI Doom" demonstrated no significant effects of Gender, Country, or Age on AI Doom, nor was there a significant interaction effect between Gender and Country. The overall model showed no significant differences, $F(4, 516) = 0.361$, $p = .836$, indicating that none of the factors substantially influenced the AI Doom variable. Specifically, the effect of Gender on AI Doom was not significant, $F(1, 516) = 0.052$, $p = .820$, suggesting that there was no considerable difference in pessimism towards AI systems between men and women. Similarly, the effect of Country on AI Doom scores was insignificant, $F(1, 516) = 0.673$, $p = .412$, indicating that the level of pessimism for AI technology did not vary between participants from the UK and the US. Age also did not significantly impact AI Doom, $F(1, 516) = 0.165$, $p = .685$, signifying that age is not a critical determinant of pessimism towards AI. Moreover, there was no significant interaction effect between Gender and Country on AI Doom, $F(1, 516) = 0.545$, $p = .461$, implying that the relationship between Gender and

Table 1: Presentation of descriptive statistics.

	Gender	Country	AI Hope	AI Doom	Age
Mean	Male	UK	5.92	5.77	40.4
		USA	6.59	6.12	40.0
	Female	UK	5.26	5.89	40.3
		USA	5.75	5.91	43.5
Standard deviation	Male	UK	2.03	2.44	14.8
		USA	2.16	2.58	14.5
	Female	UK	1.87	2.51	14.5
		USA	2.19	2.57	15.3

Table 2: ANCOVA results for AI Hope as the dependent variable.

	Sum of Squares	df	Mean Square	F	p	η^2p
Overall model	119.577	4	29.894	7.084	< .001	0.030
Gender	69.842	1	69.842	16.159	< .001	0.019
Country	44.049	1	44.049	10.191	0.001	0.002
Age	4.850	1	4.850	1.122	0.290	0.000
Gender ∗ Country	0.836	1	0.836	0.194	0.660	
Residuals	2230.292	516	4.322			

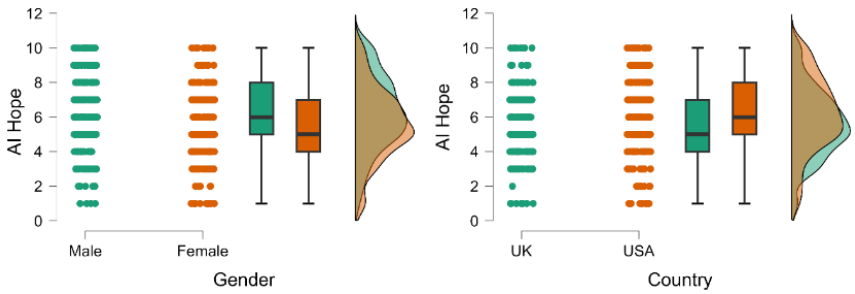

Figure 1: Data distribution, divided for gender (left chart) and country (right chart).

Table 3: ANCOVA results for AI Doom as the dependent variable.

	Sum of Squares	df	Mean Square	F	p	η^2p
Overall model	9.197	4	2.299	0.361	0.836	
Gender	0.333	1	0.333	0.052	0.820	0.000
Country	4.314	1	4.314	0.673	0.412	0.001
Age	1.057	1	1.057	0.165	0.685	0.000
Gender ∗ Country	3.493	1	3.493	0.545	0.461	0.001
Residuals	3305.377	516	6.406			

AI Doom remains consistent across both nations. Data distribution can be seen in Figure 2. ANCOVA analysis is shown in Table 3

4 DISCUSSION

The primary aim of this study was to examine the influence of cultural context (UK vs. USA), age, and gender differences on future perspectives of AI as a potential threat or benefit for humanity. The study results support Hypothesis 1 and Hypothesis 3, while Hypothesis 2 was not supported.

In line with Hypothesis 1, the results indicated a significant effect of cultural context on AI Hope, with respondents from the USA demonstrating higher levels of hopefulness for AI technology compared to those from the UK. This finding suggests that cultural context does play a role in shaping individuals' perceptions of

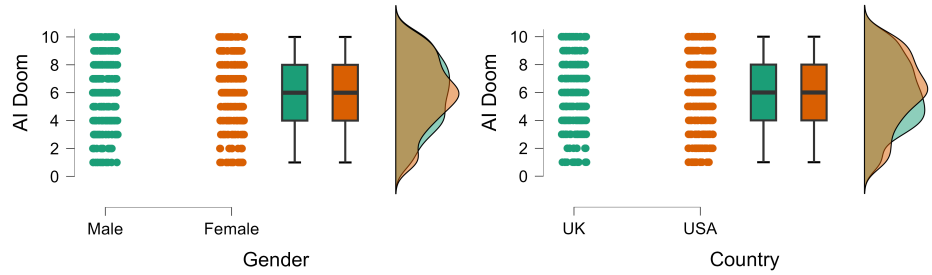

Figure 2: Data distribution, separated for gender (left chart) and country (right chart).

AI technology, which is consistent with the notion that cultural differences can influence attitudes toward technology and AI [29-32]. Although it could be argued that the UK and the USA share similar social norms, the present study adds to the literature by revealing a significant difference in attitudes towards AI technology between these two countries, contrary to the findings by Persson et al. [52] in the comparison of Sweden and Japan. The disparity between the UK and USA attitudes toward AI could be attributed to differences in educational systems, media portrayals of AI, or other policies or initiatives related to AI and technology adoption. Leading companies in developing AI systems, such as Microsoft, OpenAI, Google, and Meta, are based in the United States. This may positively impact the trust and overall perception of American citizens towards these products as these products may be perceived as inherently American. Such preference for national or "patriotic" products has been observed for other products [54, 55].

Supporting Hypothesis 3, a significant gender effect on AI Hope was observed, with male respondents exhibiting higher hopes for AI systems than female respondents. This finding is consistent with previous research, which reported that males perceive AI as more useful [2] and generally more favorable than females [20, 21, 30]. This gender difference in AI attitudes may be attributed to the fact that women tend to experience higher anxiety regarding IT use, resulting in a diminished sense of self-efficacy and an amplified perception that IT necessitates more effort [41]. However, it is worth noting that some studies have found that the gender gap when it comes to technology attitude seems to have diminished or disappeared in recent years (see the 2017 meta-analysis of Cai and colleagues [53]). The observed gender differences in AI attitudes may also be influenced by societal factors, such as gender roles and stereotypes, affecting women's self-confidence and interest in technology. Addressing these gender disparities in AI attitudes will require targeted interventions, such as promoting female role models in AI, fostering girls' interest in STEM fields early, and creating inclusive work environments in the technology sector.

Contrary to Hypothesis 2, age did not show a significant impact on AI Hope or AI Doom. This finding is, however, in line with the recent study by Park and Woo [38], which reported no association between age and attitudes toward AI. Although age has been reported to influence attitudes towards technology and AI [20, 21, 34-36, 54], the present study did not find age to be a critical determinant of hopefulness or pessimism towards AI. The lack of age effect may be due to the increasing ubiquity of AI technologies in daily life, which might be closing the generational gap in AI attitudes.

Additionally, the reported results did not reveal any significant effects of Gender, Country, or Age on AI Doom, nor a significant interaction effect between Gender and Country, suggesting that these factors do not substantially influence the perception of AI as a potential threat for humanity.

Given the current study's findings, several future research directions are worth considering. Firstly, it would be beneficial to extend the scope of the research by examining other dimensions of AI attitudes, such as trust, ethical concerns, and perceived control over AI technologies. This would provide a more comprehensive understanding of the factors shaping individuals' attitudes toward AI. Secondly, future studies should investigate the underlying reasons for gender and cultural differences in AI attitudes. For instance, exploring the role of gender-specific socialization processes or cultural norms surrounding technology could provide valuable insights into the factors contributing to these disparities. Furthermore, exploring the potential moderating and mediating effects of factors such as education, occupation, and personal experience with AI technologies on individuals' AI attitudes is crucial. By examining these factors, future research can contribute to a more nuanced understanding of the complex interplay between various factors shaping attitudes toward AI and how these attitudes might evolve. Personality factors may also serve as potential moderators and should be analyzed in future research.

This study has several limitations. First, the sample was limited to UK and USA respondents, which may constrain the generalizability of findings to other cultural contexts. Future research should include participants from diverse cultural backgrounds, such as Asia, Africa, and Latin America. Second, the study used single-item questions for dependent variables, which may not capture the complexity of AI attitudes. Multi-item questionnaires or validated scales could provide more accurate and reliable measurements. Third, the cross-sectional design limits causal inferences and observation of AI attitude changes over time. Longitudinal studies could offer more insights into attitude evolution and external factors' impact. Finally, the study relied on self-reported measures, which may be inaccurate. Future research could incorporate objective measures, such as engagement with AI applications or psychophysiological measures, to provide a more robust understanding of AI attitudes

and real-world behavior. Future studies should assess the role of AI literacy in modulating the effects we have reported in the present article.

5 CONCLUSION

In conclusion, this study provides valuable insights into factors influencing AI attitudes, highlighting the significance of gender and cultural differences. The findings call for further research into the reasons for these disparities and other potential factors influencing attitudes towards AI. By understanding varying AI attitudes among demographics and cultures, stakeholders can tailor strategies to address concerns and maximize benefits. This includes designing targeted educational programs and awareness campaigns, developing AI systems that cater to diverse users' needs, and fostering responsible AI adoption. In short, this study emphasizes the importance of considering demographic and cultural factors in AI attitude research.

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