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ORIGINAL ARTICLE

Beyond Fear and Feelings Toward Technological Singularity: Understanding Psychological Factors Shaping Attitudes Toward AI

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Abstract

Artificial Intelligence (AI) has advanced rapidly in recent years and is now embedded in everyday life. However, its novelty and widespread impact make it crucial to explore the psychological factors underlying its acceptance and integration. In the present research (N=159), we aim how fear and feelings toward technological singularity – the point at which AI surpasses human intelligence and becomes self-improving – are related to the perceived consequences of technological singularity. As expected, people with more positive attitudes towards AI also perceived technological singularity as more positive and showed lower fear toward it. Next, we tested the proposed model with fear and feelings as predictors, perceived consequences as mediators, and attitudes toward AI as the outcome. We also included the use of AI as an additional predictor of attitudes. The model showed good fit (e.g., CFI and TLI=.99); most predictions were supported. By providing a more in-depth understanding of key factors rooted in the idea of technological singularity and how they influence our attitudes toward AI, our findings can help develop targeted education and awareness campaigns to address concerns and misconceptions about AI.

Keywords Artificial intelligence · Attitudes · Fear · Feelings · Consequences · Singularity

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Introduction

Artificial Intelligence (AI) development has been boosted over the past years, and its use is now part of our everyday lives. We have witnessed remarkable advancements in various technologies and applications that incorporate AI. These include voice-controlled systems such as Amazon's Alexa (Kozuch, 2023); apps that provide a range of recipes based on the ingredients you list, such as Yummly (Trattner & Elsweiler, 2017); and most recently, sophisticated language models such as generative pre-trained transformers—ChatGPT (OpenAI, 2023). They impact us even without our knowledge, for example, through credit score systems. These advances have elicited various responses, from enthusiasm to apprehension, among individuals and society. Those more concerned raised debates on to what extent AI can continue to develop and if it can become more intelligent than humans, generating speculations about the potential implications for the human race (Kurzweil, 2005; Vinge, 1993).

This hypothetical notion is known as the technological singularity, and it refers to the point at which AI surpasses human intelligence and becomes self-improving (Tegmark, 2017). Recent research shows that AI such as ChatGPT performs comparably, if not better, than humans on a range of tests considered unique human abilities. For instance, when comparing results in the theory of mind test or a creativity test (Haase & Hanel, 2023; Kosinski, 2023), suggesting that technological singularity is becoming a more plausible possibility (but see Haase et al., 2025; Peters & Chin-Yee, 2025; for more recent evidence suggesting that AI performance might have even declined in past years). Rapid technological advances can threaten the identity of humans (e.g., what makes us humans unique?) and therefore elicit fears (McClure, 2018).

In a rapidly digitizing world, comprehending the psychological nuances of AI perceptions is critical for ensuring its harmonious integration and addressing potential societal worries. In the present research, we aim to understand better how psychological variables related to the perception of technological singularity influence our attitudes towards AI. Attitudes are our predisposition to assess something positively or negatively (Maio et al., 2018). We focus on psychological factors such as fear, general feelings, perceived consequences of technological singularity, and experience in using AI. These variables present a complex interplay of affective, cognitive, and behavioral components essential to forming and changing attitudes (Maio et al., 2018) and have previously been linked to attitudes towards AI. Thus, we predict they will give us further insights into the psychological factors influencing how we perceive AI.

The Psychology Behind AI and Technological Singularity

Researchers have frequently addressed AI's ethical (e.g., responsible and ethical use of AI; Mhlanga, 2023), economic (e.g., impacts on the labor market; De Cremer & Kasparov, 2021), and social consequences (e.g., reinforcing social injustices; Hagerty & Rubinov, 2019). However, psychological factors underpinning

individuals' attitudes toward AI and the prospect of technological singularity have often been neglected. For instance, researchers have found that agreeableness, having an younger age (Stein et al., 2024), introversion and higher general trust in people are linked to positive attitudes toward AI (Schepman & Rodway, 2022), whereas a higher tendency to conspirancy beliefs (Stein et al., 2024) and a corporate distrust is linked to more negative attitudes (Schepman & Rodway, 2022). Furthermore, AI learning anxiety negatively predicts more positive attitudes toward AI (Kaya et al., 2022). Nevertheless, people are generally positive toward AI (Gnambs et al., 2025; Nader et al., 2022), not afraid of it (Guingrich & Graziano, 2025), indicating a trend toward its acceptance. However, research in the realm of psychology and AI remains in its infancy, and studies explicitly focusing on the concept of technological singularity are virtually nonexistent, to the best of our knowledge.

In this regard, it is essential to understand what explains the level of acceptance of AI—that is, people's attitudes toward this technology—since attitudes strongly influence the use and adoption of new technologies (Gnambs et al., 2025). As previously stated, the notion of technological singularity can raise fear among people about what the unknown might bring. AI is often negatively portrayed in popular media, especially in television and films. Stereotypical representations of AI are seen in movies such as "The Terminator" (by James Cameron) and "The Matrix" (by the Wachowski sisters), perpetuating a malevolent perception of AI and ultimately fostering resistance towards AI adoption (Fast & Horvitz, 2017). Thus, a closer look at the role of fear of a technological singularity is critical, as these dystopian media representations of AI might influence individuals (see Dieter & Gessler, 2021; Ouchchy et al., 2020). Fear, which often arises from the feeling of uncertainty caused by something unfamiliar or unknown (Carleton, 2016), can be a powerful driver of positive and negative perceived consequences and attitudes toward AI. Affective components (e.g., fear, feelings, emotions) directly influence how people assess risks and benefits (Slovic et al., 2004), as affective reactions to stimuli are intuitive and automatic, shaping subsequent evaluations (Zajonc, 1980). Thus, the greater the fear and negative feelings, the higher the perceived risk and the lower the perceived benefits of AI.

The fear of singularity can happen due to the perception that higher use of AI can lead to unemployment due to automation (Brynjolfsson & McAfee, 2014) or concerns about losing privacy and autonomy (Bostrom, 2014). This fear, in turn, can impact our attitudes toward AI. Similarly, examining feelings regarding technological singularity is vital, as they, too, contribute to the affective components of attitudes toward AI. Feelings and attitudes are deeply interconnected. Feelings can drive attitudes, while attitudes can also affect how individuals interpret and evaluate new information, further reinforcing their feelings (e.g., Crites et al., 1994; Rocklage & Luttrell, 2021). For instance, individuals with more negative feelings regarding technological singularity may adopt more negative attitudes toward using AI. On the other hand, those who present more positive feelings may present, in return, more positive attitudes, observing AI and the potential singularity as a promising opportunity for human advancement.

Nevertheless, as previously noted, affective variables (such as fear and emotions) influence people's perceptions of risk and benefit (Slovic et al., 2004; Zajonc, 1980). These perceptions are beliefs that reflect the information individuals have about the world around them and form the basis of their attitudes (Ajzen & Cote, 2008).

Therefore, it is important to consider how individuals perceive the consequences of technological singularity, and how such perceptions may mediate the relationship between affective variables and attitudes. Previous studies have shown that a specific technology's (such as those who adopt AI) perceived benefits and drawbacks influence how people evaluate it as positive or negative (Schepman & Rodway, 2022). In contrast, those who perceive these concepts and their consequences as predominantly negative, leading to global issues such as increased inequality, reduced human agency, or existential risks, may develop more unfavorable attitudes (Bostrom, 2014; Tegmark, 2017).

The intricate relations between fear, feelings, beliefs and attitudes create a complex interplay that influences our attitudes toward AI and technological singularity. Providing a more in-depth assessment of these interconnections can help better understand the psychological factors impacting how we perceive AI, technological singularity, and their societal influence, ultimately informing policy-making, public education, and technology development.

The Present Research

In light of the above, the present research investigates the interplay between feelings, fear, and positive and negative perceived consequences of technological singularity in shaping individuals' attitudes toward AI. To assess these interplays, we propose a structural model that uses fear and feelings toward the singularity (affective components) to explain the perceived negative and positive consequences of singularity (cognitive components), explaining attitudes toward AI. We also add the use of AI as a behavioral predictor of attitudes, covering the main aspects that help understand how they are formed (Maio et al., 2018). We hypothesize that individuals with higher fear and more negative feelings toward the technological singularity will also perceive it as more negative and consequently have more negative attitudes towards AI. On the other hand, lower fear and more positive feelings toward the technological singularity will lead to perceiving its consequences as more positive, which positively influences attitudes toward AI. We also assessed how the variables relate to other demographic items (i.e., age, gender, the highest level of education, religiosity, political orientation), and familiarity with AI. We also compared two sub-groups of our sample, based on whether they have or not programming skills, as familiarity can be positively associated with attitudes (Olya et al., 2021).

Even though the relations between some of these variables have been extensively researched (e.g., Olya et al., 2021; Rocklage & Luttrell, 2021), they have not included technological singularity or attitudes toward AI. Understanding the role of these psychological factors related to a technological singularity is crucial for addressing public concerns, tailoring educational programs, and informing policy-making in AI. Additionally, insights from this research can help technology developers and researchers anticipate and mitigate potential societal resistance to AI adoption (Fast & Horvitz, 2017). Finally, this research can provide a more comprehensive understanding of the psychology underlying attitudes toward AI. It can help to foster a more informed and constructive dialogue on the future of AI and its implications in our lives (Bostrom, 2014; Tegmark, 2017).

Method

Participants and Procedure

A total of 159 participants from the United States took part in this study, with an average age of 44.43 ($SD = 13.12$). The sample consisted of 79 women (49.7%), 72 men (45.3%), six individuals identifying as other (3.8%), and two who preferred not to disclose their gender. The majority of participants held a Bachelor's degree as their highest level of education ($n = 69$; 43.4%), self-identified as not at all religious ($n = 71$; 44.7%), and tended to be politically left-leaning ($n = 89$; 56%). Additionally, 61% ($n = 97$) of the participants reported having no programming skills.

To assess whether the sample size was adequate for conducting the SEM, we used a specific sample size calculator (Soper, 2025). Based on the number of variables in the model (five latent and 23 observed variables), the expected medium effect size (0.30), a significance level of 0.05, and statistical power of 0.80, the calculator estimated a minimum required sample size of 150 participants to detect the specified effect. Therefore, the sample used in the present study is adequate to detect the expected effect.

Data were collected using the Prolific crowdsourcing platform, and several prescreening criteria were applied for the study: (1) restricted to US citizens; (2) participation in at least 30 previous Prolific studies; (3) a 100% approval rate on those studies; and (4) self-reported programming skills, or lack thereof. These criteria were used to ensure data quality and to get a diverse sample in terms of programming skills. Participants who met these criteria were invited to complete an online questionnaire consisting of self-reported measures. All participants gave informed consent prior to participating. The local ethics committee approved the study at one author's institution.

Material

Participants answered several questionnaires created by the researchers for the exclusive purpose of this study. To ensure that these questionnaires were reliable, we assessed their McDonald's omega (ω; reported below), with values over 0.70 indicating a questionnaire with good internal consistency (Kline, 2013).

To assess Attitudes towards AI ($\omega = 0.94$), we asked participants to answer four bipolar items (i.e., *Negative–Positive, Unfavorable-Favorable, Bad-Good, Dangerous-Safe*), using a seven-point scale (-3 to $+3$). Answers placed closer to an end (e.g., *negative*) are more representative of this end, whereas answers placed in the middle represent a neutral attitude toward AI.

To assess Fear of Singularity ($\omega = 0.95$), we created seven items covering current concerns about the use of AI that could lead to singularity (e.g., *I am concerned that artificial intelligence (AI) will surpass human intelligence and become uncontrollable; I fear for future generations if the technological singularity comes to reality*). Participants answered their level of agreement with each of these items using a five-point scale (1 = *Strongly disagree*; 5 = *Strongly agree*).

To assess Feelings toward Singularity (ω = 0.87), participants answered four items (e.g., *I feel optimistic when thinking about the technological singularity; Technological singularity makes me feel good*) covering their general assessment of singularity. Even though fear is also a feeling, we chose to separate it from general feelings to assess the construct better, frequently highlighted when discussing technological singularity. Participants answered their level of agreement with each of these items using a five-point scale (1 = *Strongly disagree*; 5 = *Strongly agree*).

To assess the Perceived Consequences of Singularity, we asked participants to answer eight items equally distributed on positive (ω = 0.78; e.g., *Technological singularity would increase the number of jobs*) and negative (ω = 0.77; e.g., *Technological singularity would increase loneliness*) consequences. Participants answered their level of agreement with each of these items using a five-point scale (1 = *Strongly disagree*; 5 = *Strongly agree*).

Data Analysis

We analyzed the data using the open-source, free software JASP (https://jasp-stats.org/) and R (R Core Development Team, 2024). With JASP, we conducted multiple Spearman's correlations and Mann–Whitney tests. With R, we performed a Structural Equation Modeling (SEM) analysis using the DWLS estimator (lavaan package; Rosseel, 2012), which is appropriate for ordinal data and violations of normality. This model tested whether Feelings and Fear predict Attitudes toward AI, mediated by Perceived Consequences of Technological Singularity.

Results

First, we correlated all variables with each other (see Table 1). People with more positive attitudes toward AI also reported more positive feelings about technological singularity (ρ = 0.57, $p < 0.001$, Fisher's z = 0.65) and were more likely to perceive its consequences as positive (ρ = 0.58, $p < 0.001$, Fisher's z = 0.67). They also reported less fear of singularity (ρ = −0.30, $p < 0.001$, Fisher's z = −0.31) and were less likely to perceive its consequences as negative (ρ = −0.35, $p < 0.01$, Fisher's z = −0.37). Individuals with more positive attitudes also reported greater use of AI (ρ = 0.23, $p < 0.01$, Fisher's z = 0.23), and the more one uses AI, the more likely they are to perceive its consequences as positive (ρ = 0.18, $p < 0.05$, Fisher's z = 0.19).

Interestingly, most demographic variables—including political orientation—were not significantly correlated with attitudes, perceived consequences, or feelings. Exceptions included religiosity and programming skills: more religious individuals (ρ = 0.21, $p < 0.01$, Fisher's z = 0.21) and those without programming skills (ρ = 0.16, $p < 0.05$, Fisher's z = 0.16) perceived the consequences of technological singularity as more negative.

Next, we tested the proposed model with fear and feelings (affective components) toward technological singularity as predictors, perceived consequences (cognitive

Table 1 Descriptive statistics and correlations

				Spearman Correlations				
	Variables	*M*	*SD*	1	2	3	4	5
1	Attitudes towards AI	4.79	1.27	-				
2	Fear of Singularity	3.38	1.13	−0.30**				
3	Feelings	2.61	0.91	0.57**	−0.58**			
4	Consequences (Positive)	3.01	0.77	0.58**	−0.28**	0.62**		
5	Consequences (Negative)	3.67	0.84	−0.35**	0.51**	−0.56**	−0.38**	
6	Age	44.43	13.12	−0.06	0.14	−0.19*	−0.18*	0.06
7	Level of Education	4.34	1.34	−0.02	−0.04	−0.03	−0.03	−0.09
8	Religiosity	2.82	2.01	0.07	0.15	−0.11	0.04	0.21**
9	Political Orientation	3.14	1.60	0.03	0.11	−0.04	−0.07	0.14
10	Programming Skills	1.61	0.49	0.00	0.14	−0.07	0.04	0.16*
11	Use of AI	3.48	1.331	0.23**	−0.11	0.09	0.18*	−0.10

* $p < 0.05$, ** $p < 0.01$

components) as mediators, and attitudes toward AI as the outcome. We also included the use of AI (behavioral component) as an additional predictor of attitudes. To run the model, we conducted an SEM using the DWLS estimator, appropriate for ordinal data and deviations from normality, with bootstrapped 5000 samples. The full model and its standardized estimates can be seen in Fig. 1. Results indicated a good fit (CFI = 0.99; TLI = 0.99; RMSEA = 0.092 [90%CI 0.082–0.103]. Also, most regression coefficients were significant, except for the paths linking negative perceived consequences and fear of technological singularity to attitudes.

The analysis revealed that the indirect effects of Feelings ($\lambda = 0.332$; SE = 0.075; z = 4.434; $p < 0.001$) and Fear ($\lambda = 0.105$; SE = 0.029; z = 3.655; $p < 0.001$) on Attitudes were mediated by Positive Perceived Consequences. In contrast, these indirect effects were not mediated by Negative Perceived Consequences (Feelings: $\lambda = -0.016$, $p = 0.658$; Fear: $\lambda = 0.008$, $p = 0.645$). Finally, significant total effects of Feelings ($\lambda = 0.794$, $p < 0.001$) and Fear ($\lambda = 0.317$, $p < 0.001$) on Attitudes were observed.

Furthermore, we conducted multiple Mann–Whitney tests to assess the differences in gender and programming skills regarding singularity and AI-related variables. For programming skills, the only significant difference was in Negative Perceived Consequences, $U = 2441.50$, $p = 0.045$, with a small effect size (Rank-Biserial Correlation [$r_{(rβ)}$] = 0.19). Participants with programming skills held less negative perceptions (Mean Rank = 70.88) than those without such skills (Mean Rank = 85.83). Regarding gender, we found two significant differences (both with small effect sizes; Rank-Biserial Correlations [$r_{(rβ)}$] between 0.10 and 0.30). Men reported lower levels of fear and more positive feelings than women (Fear, $U = 2078.00$, $r_{(rβ)} = 0.27$, $p = 0.004$, $Mean\ Rank_{men} = 66.30$, $Mean\ Rank_{women} = 86.64$;

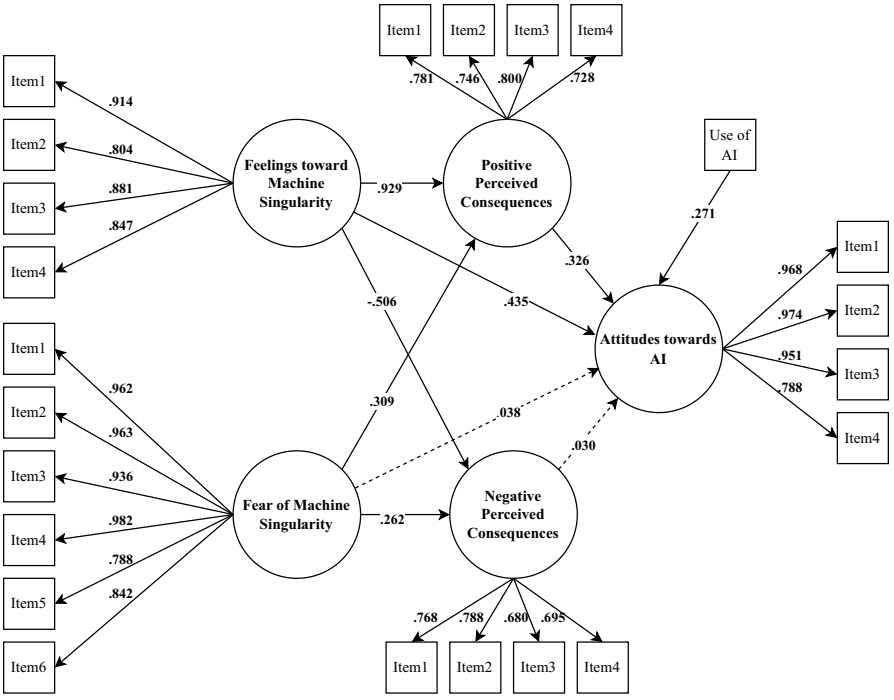

Fig. 1 Structural equation model

Feelings, $U = 3476.50$, $r_{(rβ)} = 0.22$, $p = 0.018$; *Mean Rank*$_{men} = 84.00$, *Mean Rank*$_{women} = 67.21$).

Discussion

Over the past years, artificial intelligence has become a part of our everyday lives in many forms, such as apps, chatbots, automated machines, and recommendation systems (e.g., Spotify, Netflix). However, with this increased use and presence, many questions about how AI can be used are raised. For instance, in a pool survey conducted in 2022 in the United States, 78% of respondents from the general population answered that they were very or somewhat concerned about AI being used for malicious purposes, whereas 77% were worried about its use to generate "*deepfakes*" (MITRE, 2023). In line with this, people also started wondering whether the continuous development of AI could lead it to eventually become more intelligent than humans, a hypothetical scenario known as the technological singularity. Therefore, assessing whether this hypothetical scenario of a technological singularity might impact and eventually lead to a negative perception of AI is vital to better understanding our attitudes toward AI. Hence, adopting a psychological approach to the issue, our research attempted to assess how fear, feelings, and perceived consequences of technological singularity can shape attitudes toward AI.

We first performed a series of correlations between the main variables (feelings, fear, perceived consequences, attitudes) and other sociodemographic questions (e.g., age, gender, level of education). First, people afraid of singularity and who perceived the consequences of a technological singularity negatively reported less positive attitudes towards AI. These findings somewhat align with previous studies. For instance, Kaya et al. (2022) studied how anxiety toward AI, a construct closely related to fear, predicts attitude toward AI. Their findings suggest that AI learning anxiety negatively predicts more positive attitudes. Such findings are not surprising once the fear of what might happen with the continuous development of AI might lead people to be more reticent about using it. The same reasoning applies to negative perceived consequences. Seeing technological singularity as something that might negatively impact society might generate negative attitudes towards technologies such as AI. On the other hand, feelings and perceiving the consequences of technological singularity as more positive were associated with more positive attitudes. That is, people feeling more optimistic or good about using AI and the potential technological singularity, and seeing it as having positive consequences for society, are more likely to have more positive attitudes towards AI.

Interestingly, people's political orientation and religiosity were uncorrelated with attitudes towards AI. This is partly surprising given that right-wingers and more religious people are more traditional (Caprara et al., 2006; Saroglou et al., 2004), and therefore one might expect that they also tend to be more skeptical towards AI. The latter seems to apply only to political conservatives (Cui & van Esch, 2022; Van Assche et al., 2023). In the present study, we found that more religious individuals hold more negative perceptions of AI. Previous studies have reached mixed conclusions, finding that religiosity is associated with more positive attitudes toward AI (Minton et al., 2022) as well as with negative emotions (Feel & Kozak, 2025). These partly conflicting results call for more research to clarify the direction of the effect. Regarding political orientation, it is worth noting that 82.39% of participants identified as ranging from the far left to the political center: far left (16.98%), left (25.15%), center-left (13.83%), and center (26.41%). Therefore, future studies would benefit from more balanced samples including both left- and right-leaning individuals in order to more adequately explore political influences on AI attitudes.

We found significant associations between demographic variables and feelings toward technological singularity. For instance, age is negatively related to feelings toward technological singularity. In other words, younger people and men are likelier to hold positive feelings toward technological singularity. This aligns with previous research (Stein et al., 2024). Even though older adults recognize the importance of adopting new technologies, they also mention issues such as too much and too complex technology and compare themselves to younger generations (Vaportzis et al., 2017).

Furthermore, we developed a structural model, using fear and feelings (affective components) to explain perceived consequences (cognitive components), which in turn explained attitudes towards AI. We also added the use of AI (behavioral component) to predict attitudes. Covering all these components helps to provide a clearer picture of attitudes, as they are formed on affective, behavioral, and cognitive components (Maio et al., 2018). Our results showed a good model, with most

of the path links being significant, except those connecting negative perceived consequences and fear of technological singularity to attitudes. More specifically, the most robust path in our model was the link between feelings and positive perceived consequences, suggesting that holding more positive emotions when thinking about technological singularity can lead to perceiving it as more beneficial to society, suggesting that affective components shape perceptions of risks and benefits (Slovic et al., 2004; Zajonc, 1980), influencing attitudes and ultimately affecting technology adoption (Ajzen & Cote, 2008; Guingrich & Graziano, 2025).

Furthermore, the significant relations of fear and feelings on attitudes through perceived consequences highlight the importance of considering both affective and cognitive components when studying attitudes toward AI and the perception of technological singularity. This provides evidence that individuals' emotions and perceptions about the potential consequences of technological singularity directly affect their understanding and evaluation of AI technologies. Additionally, the inclusion of AI use in the model shows the importance of examining people's experiences in this complex interplay.

We also assessed differences in attitudes towards AI based on whether participants had programming skills (yes or no) and their gender (men and women), with results showing significant differences between the two pairs of groups. Those with programming skills had more positive attitudes, presumably because they perceived AI as safer and more beneficial (MITRE, 2023). This also aligns with work on the contact hypothesis (Allport, 1954): Contact under the right circumstances can improve attitudes (Pettigrew & Tropp, 2006; Van Assche et al., 2023). The effect size was small, again in line with the literature. Furthermore, men presented higher positive feelings and lower fear toward AI than women. This can be explained by a meta-analysis of gender and attitudes toward technology use (Cai et al., 2017). The authors indicated that men tend to hold more positive attitudes than women, albeit the effect sizes were small. Previous research has also shown that women tend to report more fear of AI and lower acceptance levels (Babiker et al., 2024; Hitsuwari & Takano, 2025; Sindermann et al., 2022). Russo et al. (2025) found that women express more negative attitudes, report less knowledge, use AI less frequently, and experience greater anxiety about it. These authors suggest that such differences may stem from socialization processes that shape women's relationships with technology—for example, gender stereotypes that discourage women from entering technology-related fields (e.g., engineering, mathematics, computer science), thereby limiting their knowledge and skill development in this area.

Limitations, Future Studies, and Implications

Despite our significant and novel findings, our study is not without limitations. Firstly, our study's cross-sectional prevents us from drawing causal inferences. Future studies can address this issue by employing longitudinal or experimental designs to explore causal relationship relations among the variables. Second, the sample consisted of only 159 US-Americans. Future studies could attempt to collect data from a more extensive and diverse sample, allowing further subgroup

comparisons. Finally, our study consisted only of self-report measures, and participants' responses might have been influenced by social desirability. However, as the topic is new, their answers are less likely to be influenced by social desirability or response biases because it is less clear what a socially desirable response is (e.g., unlike self-reported pro-environmental behavior). Nevertheless, future research might benefit from incorporating objective measures or behavioral observations to complement and validate the self-report data to provide a more comprehensive picture of the factors influencing attitudes toward AI and technological singularity. Moreover, future studies could investigate the role of personal values in explaining attitudes and intentions to use AI, as well as conduct experimental research to test interventions aimed at reducing fear and negative feelings toward this technology. Furthermore, it would be interesting to test to what extent feelings predict attitudes beyond variables from established theories such as the theory of planned behavior (Ajzen, 1991) or the technology acceptance models (e.g., Davis, 1989; Venkatesh & Davis, 2000). For example, perceived behaviour control or perceived usefulness might explain variance above and beyond feelings in attitudes.

Our study has implications for policymakers, AI developers, and educators. By providing a more in-depth understanding of key factors rooted in the idea of technological singularity and how they influence our attitudes toward AI, our findings can help develop targeted education and awareness campaigns to address concerns and misconceptions about AI. As it has become present daily, fostering positive attitudes and understanding among different demographic groups can encourage a more inclusive and diverse AI ecosystem. For instance, our findings highlight the importance of addressing affective components such as fear and feelings toward the technological singularity to shape more positive attitudes. That is, emotional aspects should not be overlooked when designing communication strategies. The same happens regarding perceived consequences, reinforcing the importance of debunking misinformation and exaggerated claims surrounding AI and the hypothetical technological singularity.

AI is already integrated into everyday life and is used for a wide range of purposes (e.g., work, education, healthcare)—a trend that is expected to grow as the technology advances. Understanding what fosters acceptance and use of AI is therefore essential for designing affect-based interventions. For instance, increased understanding and familiarity with AI may reduce fear and anxiety (Lund et al., 2024), thereby promoting more positive attitudes and greater use. It is crucial that individuals become informed about AI and are empowered to benefit from its full potential (Lund et al., 2024). As people become more aware of what AI can offer, emotional responses such as fear tend to diminish (Wang et al., 2025). On the other hand, amplifying fear and negative emotions toward AI in a world increasingly shaped by it is likely to create numerous challenges. Individuals who rarely use AI and who hold negative perceptions of it report higher levels of existential anxiety (Alkhalifah et al., 2024), and anxiety about AI may also lead to dysfunctional use (Chen, 2025).

Our findings help address public concerns about AI (Bostrom, 2014), and promote a balanced understanding of AI's potential benefits and risks to foster more positive attitudes and support for AI technologies. For example, the primarily non-significant associations between our key psychological variables and demographic

variables, including political orientation and religiosity, show that programs to increase the acceptance of AI would not be tailored toward people with different political beliefs.

Conclusion

The increasing prevalence of AI in our daily lives has prompted necessary assessments of our attitudes toward its use, especially in the context of the threatening concept of a technological singularity. Our study underscores the pivotal role of multiple psychological variables in shaping these attitudes. It is evident that while individuals might possess reservations and fears about the future of AI and the possibility of a technological singularity, these feelings do not always directly translate to negative attitudes toward AI. The findings that neither perceived negative consequences of AI nor fear of technological singularity significantly influenced attitudes suggests a complex relationship between these factors. Perceiving negative consequences would be expected to generate fear (Maner & Gerend, 2007), and fear is often linked to avoiding threats (Huddy et al., 2005; Kleres & Wettergren, 2017). Therefore, the lack of a significant link between perceived negative consequences and fear may indicate that public resistance to further AI development is relatively low. Interestingly, specific demographics, such as age and gender, influenced these sentiments, but broader cultural markers like political orientation and religiosity did not. This hints at a widespread acknowledgement of the importance of AI across various sectors of society, irrespective of personal beliefs or affiliations. Understanding these attitudes becomes even more critical as AI technologies evolve and embed themselves further into societal frameworks. This understanding will guide crafting inclusive, comprehensive, and practical strategies for AI adoption, ensuring that society can harness its benefits while navigating its challenges.

Author Contributions All authors contributed equally.

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Data Availability The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations

Ethical Approval All procedures performed in this study involving human participants were in accordance with the 1975 Helsinki Declaration. This study was covered by ethics approval at the University of Essex (n ETH2223-106).

Informed Consent Informed consent was obtained from all participants.

Conflict of interest The authors have no conflict of interest to declare.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*, 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Ajzen, I., & Cote, N. G. (2008). Attitudes and the prediction of behavior. In W. D. Crano & R. Prislin (Eds.), *Attitudes and attitude change* (pp. 289–311). Psychology Press.

Alkhalifah, J. M., Bedaiwi, A. M., Shaikh, N., Seddiq, W., & Meo, S. A. (2024). Existential anxiety about artificial intelligence (AI): Is it the end of humanity era or a new chapter in the human revolution: Questionnaire-based observational study. *Frontiers in Psychiatry, 15*, 1368122. https://doi.org/10.3389/fpsyt.2024.1368122

Allport, G. W. (1954). *The Nature of Prejudice*. Addison-Wesley Publishing Company.

Babiker, A., Alshakhsi, S., Al-Thani, D., Montag, C., & Ali, R. (2024). Attitude towards AI: Potential influence of conspiracy belief, XAI importance and availability, and locus of control. *International Journal of Human–Computer Interaction*. Advance online publication. https://doi.org/10.1080/10447318.2024.2401249

Bostrom, N. (2014). *Superintelligence: Paths, dangers*. Oxford University Press.

Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies* (p. 306). W W Norton & Co.

Cai, Z., Fan, X., & Du, J. (2017). Gender and attitudes toward technology use: A meta-analysis. *Computers & Education, 105*, 1–13. https://doi.org/10.1016/j.compedu.2016.11.003

Caprara, G. V., Schwartz, S., Capanna, C., Vecchione, M., & Barbaranelli, C. (2006). Personality and politics: Values, traits, and political choice. *Political Psychology, 27*(1), 1–28. https://doi.org/10.1111/j.1467-9221.2006.00447.x

Carleton, R. N. (2016). Fear of the unknown: One fear to rule them all? *Journal of Anxiety Disorders, 41*, 5–21. https://doi.org/10.1016/j.janxdis.2016.03.011

Chen, Y. H. (2025). Exploring the influence of generative artificial intelligence anxiety on problematic ChatGPT use: The fear of missing out and personality traits. *Universal Access in the Information Society*. Advance online publication. https://doi.org/10.1007/s10209-025-01205-7

Crites, S. L., Fabrigar, L. R., & Petty, R. E. (1994). Measuring the affective and cognitive properties of attitudes: Conceptual and methodological issues. *Personality and Social Psychology Bulletin, 20*, 619–634. https://doi.org/10.1177/0146167294206001

Cui, Y., & van Esch, P. (2022). Autonomy and control: How political ideology shapes the use of artificial intelligence. *Psychology & Marketing, 39*(6), 1218–1229. https://doi.org/10.1002/mar.21649

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*, 319–340. https://doi.org/10.2307/249008

De Cremer, D., & Kasparov, G. (2021). AI should augment human intelligence, not replace it. Retrieved May 9, 2025, from https://www.daviddecremer.com/wp-content/uploads/HBR2021_AI-Should-Augment-Human-Intelligence-Not-Replace-It.pdf.

Dieter, D. G., & Gessler, E. C. (2021). A preferred reality: Film portrayals of robots and AI in popular science fiction. *Journal of Science & Popular Culture, 4*(1), 59–76. https://doi.org/10.1386/jspc_00025_1

Fast, E., & Horvitz, E. (2017). Long-term trends in the public perception of artificial intelligence. *Proceedings of the Thirty-First AAAI Conference on Artificial Intelligence*, 963–969. https://doi.org/10.1609/aaai.v31i1.10635

Fel, S., & Kozak, J. (2025). Religion and emotions towards artificial intelligence: Christians, non-Christians and non-believers. *Scientia Et Fides, 13*, 75–103. https://doi.org/10.12775/SetF.2025.005

Gnambs, T., Stein, J.-P., Zinn, S., Griese, F., & Appel, M. (2025). Attitudes, experiences, and usage intentions of artificial intelligence: A population study in Germany. *Telematics and Informatics, 98*, 102265. https://doi.org/10.1016/j.tele.2025.102265

Guingrich, R. E., & Graziano, M. S. A. (2025). P(doom) versus AI optimism: Attitudes toward artificial intelligence and the factors that shape them. *Journal of Technology in Behavioral Science*. Advance online publication. https://doi.org/10.1007/s41347-025-00512-3

Haase, J., & Hanel, P. H. P. (2023). *Artificial muses: Generative artificial intelligence chatbots have risen to human-level creativity* (arXiv:2303.12003). arXiv. https://doi.org/10.48550/arXiv.2303.12003

Haase, J., Hanel, P. H. P., & Pokutta, S. (2025). Has the creativity of large-language models peaked? An analysis of inter-and intra-LLM variability. arXiv preprint arXiv:2504.12320. https://doi.org/10.48550/arXiv.2504.12320

Hagerty, A., & Rubinov, I. (2019). Global AI ethics: A review of the social impacts and ethical implications of artificial intelligence (arXiv:1907.07892). arXiv. https://arxiv.org/abs/1907.07892

Hitsuwari, J., & Takano, R. (2025). Associating attitudes towards AI and ambiguity: The distinction of acceptance and fear of AI. Research Square. https://doi.org/10.21203/rs.3.rs-6007527/v1

Huddy, L., Feldman, S., Taber, C., & Lahav, G. (2005). Threat, anxiety, and support of antiterrorism policies. *American Journal of Political Science, 49*(3), 593–608. https://doi.org/10.1111/j.1540-5907.2005.00144.x

Kaya, F., Aydin, F., Schepman, A., Rodway, P., Yetişensoy, O., & Demir Kaya, M. (2022). The roles of personality traits, ai anxiety, and demographic factors in attitudes toward artificial intelligence. *International Journal of Human–Computer Interaction*, *0*(0), 1–18. https://doi.org/10.1080/10447318.2022.2151730

Kleres, J., & Wettergren, Å. (2017). Fear, hope, anger, and guilt in climate activism. *Social Movement Studies, 16*(5), 507–519. https://doi.org/10.1080/14742837.2017.1344546

Kline, P. (2013). *Handbook of Psychological Testing*. Routledge.

Kosinski, M. (2023). *Theory of mind may have spontaneously emerged in large language models* (arXiv:2302.02083). arXiv. https://doi.org/10.48550/arXiv.2302.02083

Kozuch, K. (2023). *The 30 best Alexa skills in 2023*. Tom's Guide. https://www.tomsguide.com/round-up/best-alexa-skills

Kurzweil, R. (2005). *The Singularity is Near: When Humans Transcend Biology*. Viking.

Lund, B. D., Mannuru, N. R., & Agbaji, D. A. (2024). AI anxiety and fear: A look at perspectives of information science students and professionals towards artificial intelligence. *Journal of Information Science*. Advance online publication. https://doi.org/10.1177/01655515241282001

Maio, G., Haddock, G., & Verplanken, B. (2018). *The psychology of attitudes and attitude change* (3rd ed.). SAGE Publications. https://us.sagepub.com/en-us/nam/the-psychology-of-attitudes-and-attitude-change/book240842

Maner, J. K., & Gerend, M. A. (2007). Motivationally selective risk judgments: Do fear and curiosity boost the boons or the banes? *Organizational Behavior and Human Decision Processes, 103*(2), 256–267. https://doi.org/10.1016/j.obhdp.2006.08.002

McClure, P. K. (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

Mhlanga, D. (2023). Open AI in education, the responsible and ethical use of ChatGPT towards lifelong learning. In: FinTech and Artificial Intelligence for Sustainable Development. Sustainable Development Goals Series. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-031-37776-1_17

Minton, E. A., Kaplan, B., & Cabano, F. G. (2022). The influence of religiosity on consumers' evaluations of brands using artificial intelligence. *Psychology & Marketing, 39*(11), 2055–2071. https://doi.org/10.1002/mar.21727

MITRE. (2023). *MITRE-Harris poll survey on AI trends*. MITRE. https://www.mitre.org/news-insights/news-release/mitre-harris-poll-finds-lack-trust-among-americans-ai-technology

Nader, K., Toprac, P., Scott, S., & Baker, S. (2022). Public understanding of artificial intelligence through entertainment media. *AI & SOCIETY*. https://doi.org/10.1007/s00146-022-01427-w

Olya, H., Altinay, L., Farmaki, A., Kenebayeva, A., & Gursoy, D. (2021). Hotels' sustainability practices and guests' familiarity, attitudes and behaviours. *Journal of Sustainable Tourism, 29*(7), 1063–1081. https://doi.org/10.1080/09669582.2020.1775622

OpenAI. (2023). *ChatGPT (Mar 14 version) [Large language model]*. https://chat.openai.com/chat

Ouchchy, L., Coin, A., & Dubljević, V. (2020). AI in the headlines: The portrayal of the ethical issues of artificial intelligence in the media. *AI & SOCIETY, 35*(4), 927–936. https://doi.org/10.1007/s00146-020-00965-5

Peters, U., & Chin-Yee, B. (2025). Generalization bias in large language model summarization of scientific research. *Royal Society Open Science, 12*, 241776. https://doi.org/10.1098/rsos.241776

Pettigrew, T. F., & Tropp, L. R. (2006). A meta-analytic test of intergroup contact theory. *Journal of Personality and Social Psychology, 90*(5), 751–783. https://doi.org/10.1037/0022-3514.90.5.751

R Core Team. (2024). R: A language and environment for statistical computing (versão 4.3.2) [Software]. R Foundation for Statistical Computing. https://www.r-project.org/

Rocklage, M. D., & Luttrell, A. (2021). Attitudes based on feelings: Fixed or fleeting? *Psychological Science, 32*(3), 364–380. https://doi.org/10.1177/0956797620965532

Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software, 48*, 1–36. https://doi.org/10.18637/jss.v048.i02

Russo, C., Romano, L., Clemente, D., Iacovone, L., Gladwin, T. E., & Panno, A. (2025). Gender differences in artificial intelligence: The role of artificial intelligence anxiety. *Frontiers in Psychology, 16*, 1559457. https://doi.org/10.3389/fpsyg.2025.1559457

Saroglou, V., Delpierre, V., & Dernelle, R. (2004). Values and religiosity: A meta-analysis of studies using Schwartz's model. *Personality and Individual Differences, 37*(4), 721–734. https://doi.org/10.1016/j.paid.2003.10.005

Schepman, A., & Rodway, P. (2022). The general attitudes towards artificial intelligence scale (GAAIS): Confirmatory validation and associations with personality, corporate distrust, and general trust. *International Journal of Human–Computer Interaction*, *0*(0), 1–18. https://doi.org/10.1080/10447318.2022.2085400

Sindermann, C., Yang, H., Elhai, J. D., Yang, S., Quan, L., Li, M., & Montag, C. (2022). Acceptance and fear of artificial intelligence: Associations with personality in a German and a Chinese sample. *Discover Psychology, 2*, 8. https://doi.org/10.1007/s44202-022-00020-y

Slovic, P., Finucane, M., Peters, E., & MacGregor, D. G. (2004). Risk as analysis and risk as feelings: Some thoughts about affect, reason, risk, and rationality. *Risk Analysis, 24*, 311–322. https://doi.org/10.1111/j.0272-4332.2004.00433.x

Soper, D. S. (2025). A-priori sample size calculator for structural equation models [Software]. Retrieved May 5, 2025, from https://www.danielsoper.com/statcalc

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

Tegmark, M. (2017). *Life 3.0: Being Human in the Age of Artificial Intelligence*. Alfred A. Knopf.

Trattner, C., & Elsweiler, D. (2017). Investigating the healthiness of internet-sourced recipes: implications for meal planning and recommender systems. *Proceedings of the 26th International Conference on World Wide Web*, pp. 489–498. https://doi.org/10.1145/3038912.3052573

Van Assche, J., Swart, H., Schmid, K., Dhont, K., Al Ramiah, A., Christ, O., Kauff, M., Rothmann, S., Savelkoul, M., Tausch, N., Wölfer, R., Zahreddine, S., Saleem, M., & Hewstone, M. (2023). Intergroup contact is reliably associated with reduced prejudice, even in the face of group threat and discrimination. *The American Psychologist, 78*, 761. https://doi.org/10.1037/amp0001144

Vaportzis, E., Giatsi Clausen, M., & Gow, A. J. (2017). Older adults perceptions of technology and barriers to interacting with tablet computers: A focus group study. *Frontiers in Psychology, 8*, 1687. https://doi.org/10.3389/fpsyg.2017.01687

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science, 46*, 186–204. https://doi.org/10.1287/mnsc.46.2.186.11926

Vinge, V. (1993, December 1). *The coming technological singularity: How to survive in the post-human era*. https://ntrs.nasa.gov/citations/19940022856

Wang, G., Obrenovic, B., Gu, X., & Godinić, D. (2025). Fear of the new technology: Investigating the factors that influence individual attitudes toward generative Artificial Intelligence (AI). *Current Psychology*. Advance online publication. https://doi.org/10.1007/s12144-025-07357-2

Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist, 35*, 151–175. https://doi.org/10.1037/0003-066X.35.2.151