



The effects of anthropomorphic framing on senior news consumers' attitudes towards health AI systems: a mediation of psychological distance

Yanrun Xu and Tingting Jiang

DOI: <https://doi.org/10.47989/ir30iConf47128>

Abstract

Introduction. Mass media plays a critical role in demonstrating the advancements of AI technologies to the public. Anthropomorphic framing, a verbal technique involving attributing human characteristics to non-human entities, has been increasingly adopted to describe various health AI systems, but there still lacks empirical evidence regarding its effectiveness in enhancing AI acceptance among senior news consumers.

Method. This study conducted a controlled experiment based on a single-factor (human- vs. machine-like framing) within-subject design. 37 senior participants were asked to watch short-form video news discussing health AI systems, and their attitudes towards, intentions to use, and psychological distance from health AI systems were measured using appropriate scales.

Results. Describing a health AI system like a human being elicited more positive attitudes towards AI among the elderly, which further increased their intentions to use AI. The positive effect of anthropomorphic framing on AI attitudes was mediated by psychological distance.

Conclusions. Anthropomorphic framing has great potential in the AI literacy education for older adults. This study not only extends research on AI anthropomorphism but also provides practical implications for media outlets to create persuasive news content.

Introduction

The world's population is ageing (United Nations, 2022). This implies a greater need for social and technological resources to address healthcare-related issues for the elderly (Huang & Huang, 2020). Artificial intelligence (AI) offers new opportunities for older adult healthcare practices, aiding in the enhancement of elderly patient care, streamlining medical processes, and improving overall health outcomes (O'Connor, 2022). However, there are significant barriers to promoting medical AI among seniors. A survey of adults over the age of 50 found that 49% of participants felt uneasy about using AI systems for diagnosing medical issues (NORC, 2023). Despite acknowledging the increasing prevalence of AI, elderly patients show much higher skepticism of the technology and remain reluctant to allow AI to handle their primary care and therapy (McKnights, 2023). Thus, enhancing older adults' attitudes toward and willingness to use medical and healthcare AI systems has become a pressing issue.

News is a crucial source for older adults to learn about AI and its applications in healthcare. However, news media are not neutral observers and they shape perceptions, understanding, and attitudes towards technology through news framing (Groves et al., 2016; Nguyen & Hekman, 2024). These frames have been noted as an important mental shortcut that influences how people think about emerging technologies of which they lack direct experiences and clear understanding (Choi, 2024). In recent years, news reports on the application of AI in the healthcare sector have tended to adopt an '**anthropomorphic framing**' to describe AI, essentially personifying AI as a human being. For instance, a *Wall Street Journal* article introducing a medical AI system was titled 'The AI Doctor Will See You Now' (Mims, 2018). A qualitative analysis of 365 coverages related to AI in medicine, published between 1980 and 2019, found that anthropomorphism has gradually become one of the most commonly used frames in AI-related news reporting (Bunz & Braghieri, 2022).

Prior studies from human-computer interaction and psychology provided conflicting evidence regarding the impact of anthropomorphic framing of AI on user perceptions in non-healthcare contexts (Barone et al., 2024; Kopp et al., 2022; Roesler, 2023). Moreover, these related studies have primarily focused on younger adults, while the effects of anthropomorphic news framing of AI on older adults may significantly differ from those on younger people. Thus, how to describe healthcare AI in news reports is a crucial consideration for practitioners when writing news articles.

This study specifically focused on older adults, a key demographic for AI healthcare services, and explored whether and how anthropomorphic framing in healthcare AI news influences the older adults' attitudes toward AI. Drawing on the related literature of anthropomorphism, this study posits that the anthropomorphic news framing of AI can influence the older adults' attitudes through the pathway of psychological distance. When AI is endowed with human-like attributes, people perceive a higher similarity with AI, thereby reducing the psychological distance between themselves and AI (Ahn et al., 2021).

Currently, news media emphasize the new opportunities that AI brings to the healthcare services for older adults. Therefore, this study examined the impact of anthropomorphic news framing on older adults' attitudes toward AI and its underlying mechanisms in the context of positive news. The conceptual framework can be seen in **Figure 1**. This study extends research on AI anthropomorphism by shifting the focus from '*designed social cues*' to '*described social cues*'. The former refers to social cues embedded in AI systems, allowing participants to directly interact with the system using these cues. In contrast, the latter are presented in textual form, where participants cannot interact with the AI directly but instead imagine it based on the textual descriptions provided. Additionally, this study offers valuable implications for journalists on how to write news about medical and healthcare AI systems. The specific research questions are as follows:

- ⑩ **RQ1.** Does AI anthropomorphic news framing influence the older adults' attitudes toward health AI system?
- ⑩ **RQ2.** Does psychological distance mediate the impact of the AI anthropomorphism framing on the older adults' attitudes toward health AI system?
- ⑩ **RQ3.** How do older adults' attitudes toward health AI system influence their intention to use it?

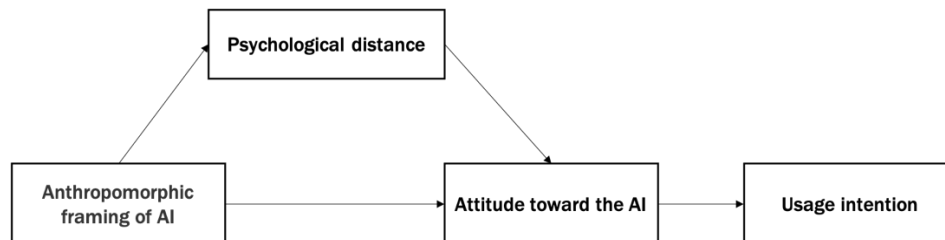


Figure 1 The conceptual framework

Literature review

Anthropomorphic framing of AI

The research focus on AI anthropomorphism has gradually shifted from the anthropomorphic design of AI social cues to anthropomorphic descriptions, which is the use of anthropomorphic rhetoric to describe AI features in text. Players read written instructions about a robot and the game rules before collaborating with the robot to complete a math game. The purpose of the human-like framed robot was perceived more positively after experiencing a comprehensible failure than the machine-like framed robot (Roesler, 2023). However, another study that conducted the same experiment found opposite results, indicating that participants were more willing to donate to a robot described using machine-like framing (Onnasch & Roesler, 2019). Moreover, a collaborative robot described with human-like framing significantly increased company employees' trust in their robot colleagues, but this effect only existed when the human-robot relationship was perceived as collaborative. When employees perceived the relationship with their robot colleagues as competitive, the human-like framing actually reduced their trust in the robot colleagues (Kopp et al., 2022). These mixed findings suggest a need to explore the consequences of anthropomorphic news framing of healthcare AI.

Older adults' attitudes towards AI

Older adults are generally considered to be technologically inadequate. They tend to adhere more strongly to old habits and resist changes brought about by new technologies (Broady et al., 2010). Evidence for an effect of AI anthropomorphic design on the elderly's attitudes toward AI is also scarce and somewhat inconsistent. For instance, when robots provide care services to the elderly, older adults tend to exhibit more positive attitudes towards robots with a lower degree of anthropomorphic appearance (Lehmann et al., 2021). Conversely, in the context of robots depicted in movies, the higher the degree of anthropomorphic appearance, the more positive the attitudes of older adult viewers towards the robots (Sundar et al., 2016). Therefore, it is hard to determine how AI anthropomorphic framing influences the attitudes of older adults towards AI.

Mediator: psychological distance

Psychological distance refers to the subjective experience of something or someone being close to or far from the self, here, and now (Trope & Liberman, 2010). Previous research has also provided empirical evidence for the mediating role of psychological distance between AI anthropomorphism and user responses. Anthropomorphic AI shopping assistants can strengthen the relationship

between consumers and brands by reducing the psychological distance between consumers and AI (Jham et al., 2023). Users exhibit more positive attitudes towards highly anthropomorphic AI assistants, and this effect is mediated by psychological distance (Li & Sung, 2021). In chatbot health counseling, users experience a closer psychological distance with highly anthropomorphic chatbots compared to low-anthropomorphic ones, making them more willing to follow the mental health advice provided by the highly anthropomorphic chatbots (Park et al., 2023). Therefore, it can be inferred that, compared to machine-like framing, human-like framing can reduce the psychological distance between older adults and AI, thereby leading to more positive attitudes towards AI among older adults.

Methods

This study conducted a controlled experiment to manipulate anthropomorphic framing in a single-factor (human-like framing vs. machine-like framing) within-subjects design. Senior participants were asked to watch short-form videos discussing health AI systems. These videos introduced the main functions and application advantages of AI-aided surgical robots and guided robots. These two health AI systems have been widely promoted and implemented in hospitals globally, yet older adults generally remain unfamiliar with them.

Participants

Participants for this experiment were recruited from several residential communities in China. Eligibility criteria included: (1) 55 years of age or older; (2) normal or corrected-to-normal visual acuity; (3) no hearing impairments; (4) good cognitive status; and (5) capable of unobstructed communication. A total of 37 individuals met all the requirements and expressed interest in participating. Since 5 individuals were excluded for failing to complete certain steps of the experiment, the final sample comprised of 32 participants, including 17 males and 15 females aged between 55 and 89 ($M_{age} = 59.38$). The participants were distributed as follows in terms of their educational background: 15.63% ($N = 5$) had a lower than a high school education, 37.5% ($N = 12$) had completed high school, and 46.88% ($N = 5$) held a bachelor's degree or higher.

Materials

This study collaborated with a professional video production team to create short videos featuring health AI. Information was conveyed through voiceovers and keywords displayed in the video. The difference between the human-like framing and machine-like framing videos was only in the script, while keeping all other aspects of the videos identical. This experiment used two real news reports about surgical robots (People.cn, 2023) and guided robots (People.cn, 2018) as prototypes, with appropriate content reductions and adaptations. Specific information such as surgery names, disease names, and hospital names were omitted to avoid interference with the experimental results.

Manipulation of anthropomorphic framing. The anthropomorphic description of AI primarily takes two forms (Bunz & Braghieri, 2022): (1) Name anthropomorphism, which involves giving the AI a human-like name; (2) Behavior anthropomorphism, which involves describing the AI's actions as if it were a human. Therefore, this study manipulated the anthropomorphic framing by altering the robot's name (e.g., mechanical device vs. robot doctor), body parts (e.g., storage system vs. brain), and the description of behaviors (e.g., the control console of the surgical robot can present many minute details vs. the surgeon's eyes can see many minute details). A total of four health AI short videos were produced, featuring the following combinations: human-like framing with a surgical robot, machine-like framing with a surgical robot, human-like framing with a guided robot, and machine-like framing with a guided robot. All videos were kept to a duration of approximately one minute.

An additional 18 participants (10 males, 8 females, $M_{age} = 61.28$) who met the experimental requirements were recruited to test whether the manipulation of the anthropomorphic framing was successful. Each participant watched the four videos in a random order. After watching each video, they were asked to rate the degree of AI anthropomorphism on a 7-point semantic differential scale (Li et al., 2023). The results of the paired samples t-test show that participants perceived the human-like framed surgical robot as significantly more anthropomorphic than the machine-like framed surgical robot ($M_{human-like} = 12.06$, $M_{machine-like} = 9.17$, $p = 0.039 < 0.05$). Similarly, participants perceived the human-like framed guided robot as significantly more anthropomorphic than the machine-like framed guided robot ($M_{human-like} = 12.61$, $M_{machine-like} = 9.11$, $p = 0.018 < 0.05$). There is no significant difference in the perceived anthropomorphism between the human-like framed surgical robot and the human-like framed guided robot ($p = 0.593 > 0.05$). Similarly, there is no significant difference in the perceived anthropomorphism between the machine-like framed surgical robot and the machine-like framed guided robot ($p = 0.963 > 0.05$). These results indicate that the manipulation of the anthropomorphic framing was successful.

Tasks and procedures

This experiment was conducted offline using a tablet to play the videos. Given that many older adults had difficulty accurately comprehend the questionnaire items, researcher verbally presented the questions in a more comprehensible manner and recorded their responses accordingly. To eliminate any influence of the questioning way on participants' answers, data collection was performed by a single researcher.

The specific procedures are as follows: first, demographics of the participants, including gender and age, was collected. Then, each participant was required to randomly watch one human-like framing video and one machine-like framing video, with different types of AI in each video (e.g., human-like framing and surgical robot, machine-like framing, and guided robot). After watching each video, participants filled out a questionnaire measuring their perception of AI anthropomorphism (Li et al., 2023), psychological distance (Aron et al., 1992), attitudes towards the AI (Li & Sung, 2021), and usage intention (Liu et al., 2022).

All participants signed a consent form and a confidentiality agreement prior to the experiment and were compensated with 20 CNY (approximately 3 USD) upon completion. This experiment was granted approval from the University Research Ethics Committee and adhered strictly to the general ethical guidelines.

Results

Reliability analysis

Cronbach's alpha was used to assess the reliability of the scales used in this study. The Cronbach's alpha value of anthropomorphism (Cronbach's $\alpha = 0.868$), attitude toward the AI (Cronbach's $\alpha = 0.864$), and usage intention (Cronbach's $\alpha = 0.942$) all exceed the recommended threshold value of 0.7, which suggests high construct reliability. Psychological distance is measured using a single item, thus there is no need for a reliability analysis.

Manipulation check

The results of the paired samples t-test showed that participants perceived the human-like framed health AI as significantly more anthropomorphic than the machine-like framed health AI ($M_{human-like} = 21.94$, $M_{machine-like} = 20.16$, $p < 0.05$). Therefore, the anthropomorphic framing was successfully manipulated in this experiment.

The effects of anthropomorphic framing on AI attitude

The repeated-measures ANOVA revealed a significant effect of anthropomorphic framing on senior participants' attitudes towards health AI ($F(1, 31) = 5.244$, $p = 0.029 < 0.05$). Specifically,

compared to machine-like framed health AI ($M = 17.16$, $SD = 3.79$), participants had more positive attitudes towards human-like framed health AI ($M = 17.97$, $SD = 2.99$).

Mediation analysis of psychological distance

To explore whether the effect of anthropomorphic framing on AI attitude is mediated by psychological distance, this study used PROCESS Model 4 (parallel mediation model) with a bootstrapped sample of 5000 (Hayes, 2015). As in **Figure 2**, both the effect of anthropomorphic framing on psychological distance ($b = -0.531$, $p < 0.05$) and that of psychological distance on AI attitude ($b = -0.427$, $p < 0.05$) were significant. Thus, the effect of anthropomorphic framing on AI attitude was mediated by psychological distance ($b = 0.774$, Boot SE = 0.415, 95% Boot CI [0.083, 1.705]). Furthermore, the direct effect was not significant ($b = 0.039$, $p = 0.962$), suggesting complete mediation in which psychological distance fully explained the relationship between anthropomorphic news framing and AI attitude.

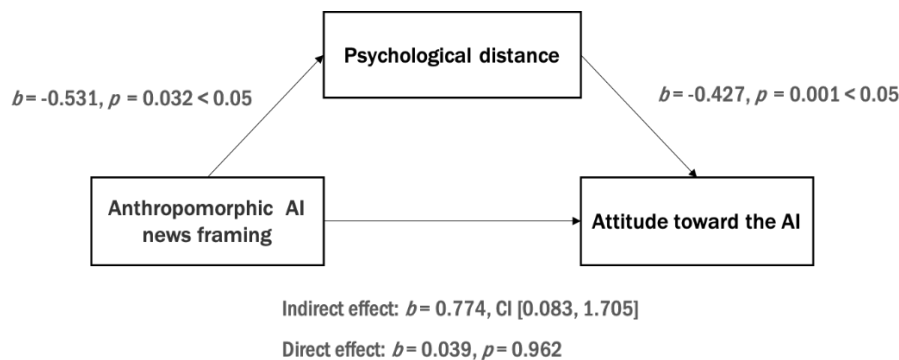


Figure 2. Mediation analysis results

The effects of AI attitude on usage intention

This study treated AI attitude as the independent variable in the regression analysis, with usage intention as the dependent variable, while age, gender, and education level were controlled for as covariates. The results showed that the attitudes of senior participants towards health AI significantly and positively influenced their willingness to use it ($\beta = 0.656$, $p < 0.05$). In other words, a positive attitude towards health AI can transform into a willingness to use it among the older adults.

Discussion

This study explored how anthropomorphic framing influences older adults' attitudes towards healthcare AI and the underlying mechanism. The major findings are summarized as follows.

For RQ1, this study found that older adults have a more favorable attitude towards healthcare AI in human-like framing messages. This finding extends previous human-AI interaction research based on the Computers are Social Actors Paradigm (CASA), demonstrating that whether humans interact directly with AI or indirectly (e.g., reading textual descriptions about AI, watching videos about AI), they exhibit more social perception and responses towards AI with more social cues.

For RQ2, it was found that the influence of anthropomorphic framing on older adults' AI attitudes is mediated by psychological distance. Compared to machine-like framing, human-like framing can signal low distance that reduce the psychological distance between older adults and AI, thereby improving their attitudes towards AI. This result supports previous research on psychological distance, demonstrating that psychological distance is an important mechanism between AI anthropomorphism and users' social responses (Jham et al., 2023; Li & Sung, 2021). However, unlike previous studies, this research focused on describes social cues of AI rather than designed social

cues. This subtle difference indicates that it is not the anthropomorphic form itself that changes users' psychological distance, but the social perception that anthropomorphism brings.

For RQ3, older adults' attitudes towards AI in the messages can positively influence their intention to use it. This finding basically echoes those of previous studies that focused on people's usage intention of healthcare or medical technologies (Bondzie - Micah et al., 2022; Lee & Lee, 2020). Although AI possesses higher autonomy and intelligence compared to ordinary medical devices, it essentially remains a tool for providing healthcare services. Human-AI interaction will continue to be primarily user-driven for the foreseeable future. Improving users' attitudes towards AI is critical to increasing their actual usage behavior.

Conclusions

This study aimed to explore the application of anthropomorphic framing in healthcare AI news. Results from a controlled experiment indicate that older adults exhibit more positive attitudes towards AI in human-like framing messages rather than machine-like framing messages. Such effect was mediated by psychological distance. Furthermore, older adults' positive attitudes towards health AI can transform into their willingness to use it.

The experimental research presented in this paper is a pioneering attempt to examine the roles of anthropomorphic framing in enhancing older adults' attitudes towards healthcare AI. Unlike most studies on anthropomorphic design of AI social cues, this study considers a relatively new form of anthropomorphism—anthropomorphic framing. The findings indicated that practitioners can adopt anthropomorphic descriptions of AI when the healthcare AI news targeting older adults.

Future research could explore the impact of different AI framings on audience attitudes and behavioral intentions. Moreover, considering personal characteristics, such as cultural background and gender, would provide a more comprehensive understanding of how described AI social cues influence individual perceptions and reactions.

Acknowledgements

This research has been made possible through the financial support of the National Natural Science Foundation of China under Grants no. 72074173.

About the authors

Tingting Jiang is a professor at the School of Information Management, Wuhan University, China. She received her Ph.D. from the University of Pittsburgh. Her current research interests include human-AI interaction, information behavior, user experience, and data analytics. She has published extensively in international journals, including *Government Information Quarterly*, *Information Processing and Management*, *Journal of Documentation*, *Internet Research*, and *International Journal of Medical Informatics*. She can be contacted at tij@whu.edu.cn.

Yanrun Xu is a Ph.D. candidate at the School of Information Management, Wuhan University, China. Her current research focuses on human-AI interaction and health information behavior. Her research has been published in *information processing and management* and *iConference Proceedings*, etc. She can be contacted at yarunx@whu.edu.cn.

References

- Ahn, J., Kim, J., & Sung, Y. (2021). AI-powered recommendations: the roles of perceived similarity and psychological distance on persuasion. *International Journal of Advertising*, 40(8), 1366-1384. <http://doi.org/10.1080/02650487.2021.1982529>
- Aron, A., Aron, E. N., & Smollan, D. (1992). Inclusion of Other in the Self Scale and the structure of interpersonal closeness. *Journal of Personality and Social Psychology*, 63(4), 596-612. <http://doi.org/10.1037/0022-3514.63.4.596>
- Barone, A. M., Stagno, E., & Donato, C. (2024). Call it robot: anthropomorphic framing and failure of self-service technologies. *Journal of Services Marketing*, 38(3), 272-287. <http://doi.org/10.1108/JSM-05-2023-0169>
- Bondzie - Micah, V., Qigui, S., Arkorful, V. E., Lugu, B. K., Bentum - Micah, G., & Ayi - Bonte, A. N. A. (2022). Predicting consumer intention to use electronic health service: An empirical structural equation modeling approach. *Journal of Public Affairs*, 22(4), e2677. <https://doi.org/10.1002/pa.2677>
- Broady, T., Chan, A., & Caputi, P. (2010). Comparison of older and younger adults' attitudes towards and abilities with computers: Implications for training and learning. *British Journal of Educational Technology*, 41(3), 473-485. <https://doi.org/10.1111/j.1467-8535.2008.00914.x>
- Bunz, M., & Braghieri, M. (2022). The AI doctor will see you now: assessing the framing of AI in news coverage. *AI & SOCIETY*, 37(1), 9-22. <http://doi.org/10.1007/s00146-021-01145-9>
- Choi, S. (2024). Temporal Framing in Balanced News Coverage of Artificial Intelligence and Public Attitudes. *Mass Communication and Society*, 27(2), 384-405. <http://doi.org/10.1080/15205436.2023.2248974>
- Groves, T., Figuerola, C. G., & Quintanilla, M. (2016). Ten years of science news: A longitudinal analysis of scientific culture in the Spanish digital press. *Public Underst Sci*, 25(6), 691-705. <http://doi.org/10.1177/0963662515576864>
- Hayes, A. F. (2015). An index and test of linear moderated mediation. *Multivariate Behavioral Research*, 50(1), 1-22. <http://doi.org/10.1080/00273171.2014.962683>
- Huang, T., & Huang, C. (2020). Elderly's acceptance of companion robots from the perspective of user factors. *Universal Access in the Information Society*, 19(4), 935-948. <http://doi.org/10.1007/s10209-019-00692-9>
- Jham, V., Malhotra, G., & Sehgal, N. (2023). Consumer-brand relationships with AI anthropomorphic assistant: role of product usage barrier, psychological distance and trust. *The International Review of Retail, Distribution and Consumer Research*, 33(2), 117-133. <https://doi.org/10.1080/09593969.2023.2178023>
- Kopp, T., Baumgartner, M., & Kinkel, S. (2022). How Linguistic Framing Affects Factory Workers' Initial Trust in Collaborative Robots: The Interplay Between Anthropomorphism and Technological Replacement. *International Journal of Human-Computer Studies*, 158, 102730. <https://doi.org/10.1016/j.ijhcs.2021.102730>
- Lee, S. M., & Lee, D. (2020). Healthcare wearable devices: an analysis of key factors for continuous use intention. *Service Business*, 14(4), 503-531. <https://doi.org/10.1007/s11628-020-00428-3>
- Lehmann, S., Ruf, E., & Misoch, S. (2021). Emotions and Attitudes of Older Adults Toward Robots of Different Appearances and in Different Situations. In *Proceedings of the Information and Communication Technologies for Ageing Well and e-Health*, 21-43.

- Li, Q., Luximon, Y., & Zhang, J. (2023). The Influence of Anthropomorphic Cues on Patients' Perceived Anthropomorphism, Social Presence, Trust Building, and Acceptance of Health Care Conversational Agents: Within-Subject Web-Based Experiment. *J Med Internet Res*, 25, e44479. <http://doi.org/10.2196/44479>
- Li, X., & Sung, Y. (2021). Anthropomorphism brings us closer: The mediating role of psychological distance in User-AI assistant interactions. *Computers in Human Behavior*, 118, 106680. <https://doi.org/10.1016/j.chb.2021.106680>
- Liu, Y.-l., Yan, W., Hu, B., Li, Z., & Lai, Y. L. (2022). Effects of personalization and source expertise on users' health beliefs and usage intention toward health chatbots: Evidence from an online experiment. *DIGITAL HEALTH*, 8, 20552076221129718. <http://doi.org/10.1177/20552076221129718>
- McKnights (Producer). (2023). Seniors still skeptical of AI-led healthcare, new study shows. Retrieved from <https://www.mcknightsseniorliving.com/news/seniors-still-skeptical-of-ai-led-healthcare-new-study-shows/>
- Mims, C. (2018). The AI Doctor Will See You Now. *The Wall Street Journal*. Retrieved from <https://www.wsj.com/articles/the-ai-doctor-will-see-you-now-1526817600>
- Nguyen, D., & Hekman, E. (2024). The news framing of artificial intelligence: a critical exploration of how media discourses make sense of automation. *AI & SOCIETY*, 39(2), 437-451. <http://doi.org/10.1007/s00146-022-01511-1>
- NORC (Producer). (2023). Older Adults Express Mixed Views on Artificial Intelligence. Retrieved from <https://www.norc.org/research/library/older-adults-express-mixed-views-artificial-intelligence.html>
- O'Connor, S. (2022). Artificial Intelligence for Older Adult Health: Opportunities for Advancing Gerontological Nursing Practice. *J Gerontol Nurs*, 48(12), 3-5. <http://doi.org/10.3928/00989134-20221107-01>
- Onnasch, L., & Roesler, E. (2019). Anthropomorphizing Robots: The Effect of Framing in Human-Robot Collaboration. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 63(1), 1311-1315. <http://doi.org/10.1177/1071181319631209>
- Park, G., Chung, J., & Lee, S. (2023). Human vs. machine-like representation in chatbot mental health counseling: the serial mediation of psychological distance and trust on compliance intention. *Current Psychology*, 1-12. <https://doi.org/10.1007/s12144-023-04653-7>
- People. cn. (2018). The first intelligent medical guide robot is on duty at Mianyang Central Hospital in Sichuan province. Retrieved from <http://health.people.com.cn/n1/2018/1011/c421589-30334783.html>
- People. cn. (Producer). (2023). Domestic robots move from laboratory to operating table. Retrieved from <http://kpzg.people.com.cn/n1/2023/0914/c404214-40077496.html>
- Roesler, E. (2023). Anthropomorphic framing and failure comprehensibility influence different facets of trust towards industrial robots. *Front Robot AI*, 10, 1235017. <http://doi.org/10.3389/frobt.2023.1235017>
- Sundar, S. S., Waddell, T. F., & Jung, E. H. (2016). *The Hollywood Robot Syndrome media effects on older adults' attitudes toward robots and adoption intentions*. In *Proceedings of the 2016 11th ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, 343-350. <http://doi.org/10.1109/HRI.2016.7451771>

Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological review*, 117(2), 440-463. <http://doi.org/10.1037/a0018963>

United Nations. (Producer). (2022). Ageing. Retrieved from <https://www.un.org/en/global-issues/ageing>

© [CC-BY-NC 4.0](#) The Author(s). For more information, see our [Open Access Policy](#).