

UNCOVERING THE RESEARCH ON THE ARTIFICIAL INTELLIGENCE-HUMAN RELATIONSHIP

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ABSTRACT

Artificial intelligence (AI) technology is recognized as essential in the 4th industrial revolution (Schwab, 2017), which is capable of interacting with the environment and processing and transforming data information to inform goal-directed behavior (Paschen, Kietzmann, & Kietzmann, 2019). Due to the advances in intelligent systems and the incorporation of AI agents in smart devices, more than eight billion digital voice assistants will be used globally by 2024 (Thormundsson, 2022; Gilkson & Woolley, 2020). For successful and positive consumer-brand relationships, constructs such as trust, satisfaction, and commitment are vital (Garbarino & Johnson, 1999; Nyadzayo & Khajehzadeh, 2016). Unlike humans, Artificial intelligence agents could achieve relationship marketing engagement by encouraging users to anthropomorphize the other parties in their technology-mediated interactions, such as applications like chatbots, virtual assistants, and service robots (Steinhoff et al., 2019). Those applications can also use humanoid traits to engage customers in organizations (van Doorn et al., 2017).

Previous literature applied psychological characteristics of trust to investigate users' adoption of AI applications and their behavioral intentions in marketing (e.g., Pelau et al., 2021; Moussawi et al., 2021; Cai et al., 2022). Trust as an essential construct of technology adoption can predict the level of reliance on technology. The level of correspondence between users' trust and the technology's capabilities can influence the outcomes of technology use (Glikson & Woolley, 2020). Close relationships between humans and AI contribute to consumers' passion for the new technology and enhance the level of intimacy and commitment; consumer intimacy and commitment lead to consumer service loyalty (Hernandez-Ortega & Ferreira, 2021).

Nevertheless, other researchers discovered differentiations in human and AI trust relationships with various focus considerations. Topics such as AI gender attractiveness (Lunardo, Bressolles, & Durrieu, 2016), sharing personal information with AI robots (Song & Kim, 2022), relationship commitment and perceived sacrifice (Ameen et al., 2021), and perceived attractive value (Birnbbaum et al., 2016). Some theories propose trusted relationships through factors such as the hedonic value and utilitarian value of AI (Etemad-Sajadi, 2014). In contrast, others suggest additional components, such as

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the attractiveness of AI applications and social presence (RenaudLunardo, Bressolles, & Durrieu, 2016).

Previous research found that close and intimate relationships usually go through a dynamic process. Past papers considered various facets of the close relationship, and only a few research represent the strength of the need for close, validating experiences and interactions (Laurenceau, Barrett, & Pietromonaco, 1998). Therefore, the current research gap needs a general theoretical framework and no applicable parsimonious process of closeness in human and AI relationships (Hernandez-Ortega & Ferreira, 2021). To fill in this research gap, the present study aims to: 1) investigate the past literature that has been conducted on human and AI relationships, 2) Analyze the main theories and topics, and investigate the applications of each topic, 3) identify the critical antecedents to the development of human and AI relationships 4) clarify the main consequent of human and AI relationships applications and 5) suggest the promising paths for future research.

Therefore, the current literature investigates this field further and discovers more research on the close relationship between humans and AI. The systematic literature review uses Scopus and Web of Science (WOS) online search platforms. The search string is focused on the human perceived intimate relationship (intimacy, relationship belief) with applications on artificial intelligence (e.g., chatbot, robot, virtual agent). Consequently, the review conducted an in-depth analysis of peer-reviewed articles selected from 2009 and 2022, chosen from The Chartered Association of Business Schools (ABS) journal list. Among the selected papers, 4 articles belong to 4-star journals, 5 papers are from ABS 4 journals, 83 papers are from ABS 3 journals, and the rest papers belong to ABS 2 and ABS1 journals. Under the inclusion and exclusion criteria, the final number of 127 papers is confirmed for the systematic review.

The current study provides insight into the determinants of human and AI close relationships in business environments, especially in marketing. It also reveals the dimensions of human and AI interaction. Moreover, the review categorizes the theories' application on each topic, indicating the role of the AI technologies on practical implications. The finding suggests that human and AI close relationship research covers a wide range of subjects, mainly on trust relationships (e.g., Nordheim et al., 2019; Gilkson & Woolley, 2020; Chi et al., 2021). In contrast, 40 percent of the research papers applied theories on users' behavioral intentions and perceived ease of use (i.e. utilitarian value) (Etemad-Sajadi, 2014). Behavior intentions are the main consequences, consisting of purchase intention, intention to use, adoption intention, Word of Mouth intention, and patronage intention. Robots' anthropomorphism and trust attitude are considered significant antecedents (McLean, Osei-Frimpong, & Barhorst, 2021). It is worth noting that in some human and AI close relationship frameworks, the interaction quality as moderator affects the relationship between anthropomorphism of the AI application and psychological closeness (e.g., trust, companionship, friendship, intimacy) (Beak et al., 2022) (see Table 1).

The data analysis used R software to identify the most appeared word combinations, count the percentage of each topic, construct, research method, and research theory. The result shows that most papers used quantitative research, and only a few used qualitative research. Over half of the selected papers conducted experiments and surveys to collect data; ANOVA and structural equation models are the most popular data analytics methods. The most frequently applied theories in the papers about human and AI close relationships are human and robot interaction (HRI), computers are social actors' theory

(CASA), and the technology acceptance model (TAM). Moreover, the existing papers covered a wide range of constructs subjects. The most applied construct is trust, in which at least half of the papers used the trust paradigm. Another most apparent construct is behavioral intentions. While this construct is usually considered as consequent, which includes reuse intention, behavior intentions, purchase intention, and adoption intention.

The limitations of the past literature are also noted: trust is studied more using experimental studies (Hohenstein & Jung, 2020) and there is a lack of studies using longitudinal research to data collection from different time points (e.g., Nguyen & Malik, 2022; de Bellis & Johar, 2020; Mustak et al., 2021). This research addresses the existing research on the human and AI close relationship in marketing and discovers the link between psychological closeness and behavioral intentions, which may support applications to future research. We recommended future research to cover more influential constructs when examining human-computer relationships, such as intimacy, romantic relationships, companionship, and friendship (Hernandez-Ortega & Ferreira, 2021; Uysal et al., 2022). Furthermore, some physical aspects to evaluate human-AI relationships can be explored using indicators such as trust and AI facial expressions and facial features (Song & Luximon, 2021), the AI tone of voice, and the presented public persona.

Table 1. Main findings of Theories, antecedents, consequences, moderators, and mediators

Characteristic	Name/Constructs	Applications examples	Authors
Theory	Robot Interaction (HRI), Computers are social actors theory (CASA), and Technology acceptance model (TAM), Social presence theory	Service robot interaction; AI-mediated communication; AI-created advertisement; Social robots performance errors	Chi et al., 2021; (Hohenstein & Jung, 2020); (Wu & Wen, 2021); (Cameron, et al., 2021)
Antecedents	Social presence Anthropomorphism; Trust	Personal intelligent agents; OTA chatbot adoption	(Cai et al., 2022) (Moussawi, Koufaris, & Benbunan-Fich, 2021)
Consequences	Behavioural intentions e.g., purchase intention, intention to use, adoption intention, reuse intention, Word of Mouth intention, and patronage intention	Virtual agents in retail websites; Artificially Intelligent Recommendation systems;	(Chattaraman, Kwona, & Gilbert, 2012); (Shi, Gong, & Gursoy, 2021)
Moderators	Interaction qualities, e.g., interaction comfort, Interaction modality, Customer feature interaction orientation	Artificial intelligence service recovery; Proactive service robots	(Lv, Yang, Qin, Cao, & Xu, 2022); (Li, Liu, & Xie, 2022)

Mediators	Trust e.g., cognitive trust; emotional trust, initial trust	Robot creepiness; psychological Ownership; Personal intelligent agents	(RenaudLunardo, Bressolles, & Durrieu, 2016); (Delgosha & Hajiheydari, 2021)
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Keywords: Artificial Intelligence, Human-AI Relationship, Close Relationships, Anthropomorphism, Trust

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