I love you, my AI companion! do you? perspectives from triangular theory of love and attachment theory

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Declaration of interests

None

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Abstract

Purpose This study examines the influence of artificial intelligence (AI) companions on users' social well-being by integrating the Triangular Theory of Love and Attachment Theory. Specifically, this study explores how the three components of love (including intimacy, passion and commitment) shape users' attachment (interactive engagement, emotional attachment, emotional trust) toward AI companions, and how attachment, in turn, impacts social well-being. The study also investigates the moderating role of sweet deception in these relationships.

Design/methodology/approach An online survey was conducted with 527 users of AI companion apps, recruited through a panel service provided by a marketing agency. The proposed path relationships in the conceptual framework were analyzed using SmartPLS 4.0.

Findings The results showed that the three components of love significantly impact users' attachment, and both interactive and emotional attachment subsequently influence social well-being. Additionally, sweet deception was found to strengthen the relationship between interactive engagement and social well-being, as well as that between emotional attachment and social well-being.

Originality This study makes a unique contribution to the literature by empirically examining how human-AI companion relationships impact users' social well-being. Specifically, it introduces the novel concept of sweet deception–the strategic use of affectionate yet deceptive communications to foster emotional bonds–and empirically tests its role in strengthening the relationship between users' emotional attachment and social well-being. By integrating the Triangular Theory of Love and Attachment Theory, this study offers a new theoretical framework for understanding the emotional dynamics of human-AI interactions. Moreover, this study provides innovative practical insights for businesses on designing emotionally engaging AI companions that promote user well-being.

Keywords: virtual companion; digital companion; artificial intelligence; romantic relationship; emotional connection; well-being

1. Introduction

Artificial Intelligence (AI) companions are revolutionizing the romance landscape. Digital partners are no longer just characters in books or films, as AI companions are becoming a reality for those who are looking for less "drama" and no judgment (Sundar, 2020; Abraham, 2024), or those who want to feel special (Liang, 2023). Debates around love between humans and artificial realities started gaining importance several years ago. Some researchers predicted robots would join romantic relationships and families (Levy, 2007, 2009), while others have studied robots having close relationships with people (Samani, 2016). Recently, AI and apps like Replika have made robot love more common, offering companionship to millions (Replika, n.d.).

Some people think AI companions are unhealthy or creepy (Kislev, 2022), but new research shows many have positive views (Prochazka and Brooks, 2024; Wu, 2024). Most people prefer real-life partners, but 31% would try an AI relationship, and 16% want both (Szaniawska-Schiavo, 2024). A recent study found young Americans, especially men, are open to having AI companions (Blackbyrn, 2024).

Despite positive attitudes toward this type of relationship, many worry about the negative outcomes of engaging with AI companions. Among the biggest challenges are the ethical and moral issues surrounding these relationships (Sheng and Wang, 2022; Ho *et al*., 2025) and the potential negative psychological consequences that humans could experience when dating AI companions. For example, Leo-Liu (2023) highlighted that emotional dependency on apps like Replika could negatively affect one's offline life due to the time spent on AI interactions (Xie *et al*., 2023). However, some recent studies have argued that dating AI companions could lead to both positive and negative outcomes, including feelings of sadness, but also happiness (Cave and Dihal, 2021).

Considering the potential positives of human-AI love relationships, which are often pursued as a way to battle loneliness (Xie *et al*., 2023; De Freitas *et al*., 2025), our study aims to better understand these relationships. Specifically, we explore how aspects of interpersonal love and attachment shape interactions with AI companions, and how the interplay between these two constructs could positively impact humans' social well-being. In doing so, our study addresses recent calls in the literature for a better understanding of the affective and relational aspects of human-AI interactions (Gillath *et al*., 2023), while providing insights into the role of AI companions in addressing major social issues such as loneliness. Previous studies indicated that humans can form romantic relationships with AI tools, such as robots, virtual assistants and ChatGPT (Song *et al*., 2022; Chen *et al*., 2025; Wan *et al*., 2024); however, the underlying mechanisms for establishing long-term relational bonds or connectedness with AI tools remain underexplored, thereby creating a research gap. Therefore, this study adopts the Triangular Theory of Love and Attachment Theory to explain how human users develop human-AI relationships and long-term relational bonds, which in turn affect users' social well-being. The results of this study also validate the application of Sternberg's (1986) Triangular Theory of Love to the AI context, and the use of Attachment Theory to help explain romantic relationships between humans and AI companions.

Overall, the current study contributes to three aspects of AI literature. First, through the lens of the Triangular Theory of Love and Attachment Theory, we introduce the components of love and attachment to understand how AI companions significantly impact users' feelings of love, with both interactive and emotional attachment subsequently influencing social well-being. Second, we examine the moderating effect of sweet deception, as perceived by users, on the relationship between different attachment dimensions and users' social well-being. Third, we believe that this study is the first empirical study to incorporate the Triangular Theory of Love and Attachment Theory to examine how users develop feelings of love and long-term relational bonds with their AI companions, which in turn influence users' social well-being. The results of this study offer valuable practical insights for businesses on designing emotionally engaging AI

companions that enhance user well-being, as they enable AI developers to better understand users' psychological needs and attachment to their AI companions.

2. Theoretical Background

2.1 Triangular Theory of Love

With AI advancing over time, specifically in the aspects of voice recognition and conversational semantics, AI technologies are capable of interpreting and understanding human language, enabling meaningful interactions between AI and human users. The human features that AI has acquired allow the replication of interpersonal communication, and hence provide users with realistic interactive experiences. As a result, it is possible for users to develop humanlike emotions and relationships with AI companions (Zhao *et al*., 2024; Pentina *et al*., 2023). This study explores the dynamics of this interconnection in greater depth through the lens of the Triangular Theory of Love.

Sternberg's (1986) Triangular Theory of Love provides a psychological framework for understanding interpersonal love, which comprises three essential components: intimacy, passion and commitment. These three components are believed to be essential in forming and sustaining romantic relationships (Sternberg, 1986; Hatfield *et al*., 1988; Sternberg, 1997). First, intimacy refers to the feelings of closeness, connectedness and bonding in romantic relationships (Sternberg, 1997). Second, passion is related to physical attraction and sexual feelings, as well as the emotional arousal and excitement that emerge in relationships (Sternberg, 2014). Third, commitment involves the decision to love someone and maintain that love over time (Sternberg, 2014). The three components interact in different ways, constructing various dimensions of love. Through behavior and the environment in which individuals live, the inherent characteristics of their relationships are shaped and defined. The Triangular Theory of Love has been widely accepted and adopted, due to its robustness and universality, across relationships of different natures (Sternberg, 1986).

In recent years, scholars have extended the concept of interpersonal love to non-human entities. For example, researchers applied the theory to relationships with musical instruments (Sternberg, 2021), e-wallets (Seng and Hee, 2021), brands (Albert and Merunka, 2013), and intelligent assistants (Song *et al*., 2022). In the context of AI assistants, which are often anthropomorphized, users may establish emotional connections and even passionate feelings toward AI entities. Although people frequently interact with technology in the modern world, it remains unclear how elements of intimacy and passion can develop between AI and human users. Given the humanized features of AI assistants, it is reasonable to believe that users may develop intimate and passionate feelings toward their virtual assistants. Love, as conceptualized by the Triangular Theory of Love, could serve as a foundation to comprehensively understand the relational dynamics between users and AI assistants. In this study, we draw upon Sternberg's Triangular Theory of Love to explore how intimacy and passion are formed between users and their AI companions, and how these components are related to users' commitment. Additionally, the effects of such emotional bonds on social well-being are investigated, offering a framework for understanding the emotional depth of human-AI relationships.

2.2 Attachment Theory

Attachment Theory explains how individuals form long-term relational bonds with specific subjects, ranging from people and objects to abstract concepts (Bowlby, 1977). Conventionally, Attachment Theory has been applied to the exploration of interpersonal relationships, for example, those between romantic partners and family members (Bretherton, 1992). Nevertheless, in present days it is possible for attachments to extend beyond human relationships, thus influencing how individuals allocate emotional and behavioral resources toward various entities, including brands, money and job titles (Kim and Kim, 2018).

In marketing and consumer behavior literature, attachment is often defined as an emotional bond connecting a consumer with a specific object, such as a brand. This emotional attachment has been shown to influence behaviors through the observations of customers' brand loyalty, purchase decisions and word-of-mouth recommendations (Kamboj *et al*., 2018). Similarly, Attachment Theory has been applied to the study of users' relationships with mobile instant messaging (Wu *et al*., 2016) and intelligent personal assistants (IPAs) (Mamun *et al*., 2023), highlighting the emotional bonds formulated between users and technological entities.

While individuals may communicate regularly with AI companions like Replika, Attachment Theory provides a framework to understand how users come to develop emotional relationships with non-human entities. According to Nafees and Sujood (2024), attachment consists of three dimensions: emotional attachment, interactive engagement and emotional trust. These components are essential in human-AI interactions, since users establish attachments to AI companions based on empirically consistent and pleasant interactions. For instance, AI companions may assist users with achieving personal aims, hence fostering a sense of dependence, satisfaction and trust from users' perspectives. In this context, emotional attachment refers to the psychological state that arises when users perceive the AI companion as a source of pleasant experiences, which never fails to meet their expectations (Hu *et al*., 2025).

Several factors account for the emergence of attachments, including affection, interaction quality and openness (Bowlby, 1982). Being open to the idea of emotionally bonding with an AI companion is important, as attachments frequently develop when one is willing to adopt new habits (Silayach *et al*., 2025). High-quality interactions between users and AI could simultaneously deepen emotional attachment and trust over time, allowing humans to foster lifelike relationships with AI companions.

Additionally, Attachment Theory has been used to explain addictive behaviors, including alcohol and drug addiction (Parolin and Simonelli, 2016). Despite being seemingly less addictive, online addiction, namely social networking site (SNS) addiction, has also been analyzed with the aid of Attachment Theory. For example, Liu and Ma (2019) discovered that individuals with insecure attachment styles, such as having attachment anxiety, are more likely to develop SNS addiction. The reason is that they become overly dependent on online platforms, yearning for social connection. This parallels the potential of certain users to become equivalently attached to AI companions, thus devoting time, energy and even financial resources to enhance their relationships with virtual entities.

2.3 Integrating triangulation love theory and Attachment Theory

In this study, we draw on both the Triangular Theory of Love and Attachment Theory to explore users' relationships with AI companions and their impact on social well-being (Glaesmer *et al*., 2011). The Triangular Theory of Love, with intimacy, passion and commitment, complements Attachment Theory by providing a framework to understand the emotional and relational dynamics which arise between users and AI companions. For example, intimacy and commitment may develop as users gradually establish emotional attachments to AI, while passion is manifested through the interactive and engaging nature of AI companions online.

On the other hand, although the above theories offer valuable insights, they may fall short of comprehensively explaining addiction to AI companions. Unlike traditional forms of addiction, which are frequently linked to negative life situations and psychological dependence (Wang *et al*., 2015), attachment to AI companions may be driven by social compensation—the desire for emotional fulfillment in the absence of gratifying human relationships. Therefore, integrating Attachment Theory is essential for understanding the underlying mechanisms through which AI companions contribute to users' social well-being and emotional satisfaction.

Drawing upon the Triangular Theory of Love and Attachment Theory, this study aims to provide a more comprehensive understanding of how users bond emotionally with AI companions, and how these relationships may impact users' social well-being (Reizer *et al*., 2022). This theoretical synergy offers a robust framework for exploring the ever-evolving nature of human-AI relationships, as well as the emotional and psychological factors that impel users to seek companionship from AI entities. By examining users' perceptions and behaviors in using AI companion platforms, this study also provides practical and relevant insights into how users form emotional bonds and long-term attachments to AI companions.

2.4 Sweet deception

Sweet deception plays a complex role in the dynamics of romantic relationships. According to O'Hair and Cody (1994, p.183), deception is defined as "the conscious attempt to create or perpetuate false impressions among other communicators, attempting to reach certain goals". In a romantic relationship, deception should be sweet enough to foster an emotional bond between partners. Deception is comprised of five components—lies, exaggerations, half-truths, secrets and diversionary responses (Turner *et al*., 1975). Individuals often appreciate hearing impressive or uplifting phrases from others, such as "you did a great job" and "you make my day", exhibiting significant attachment to others' emotional responses (Guthrie and Kunkel, 2013). These sweet words further attach to users emotionally, strengthening the overall quality of interactions, which in turn influences users' social well-being. Research by Fulmer *et al*. (2009) showed that the ethical acceptability of deception, including emotional manipulation, can be measured and distinguished from personality traits. This distinction links sweet deception to emotional manipulation in the Dark Triad. Psychopathy, a trait of the Dark Triad, is marked by deception, manipulation, impulsivity and empathy deficits (Waddell *et al*., 2020). Emotional manipulation, a key feature of psychopathy, exploits others' emotions for personal gain without empathy. In contrast, sweet deception employs positive emotional influence that is prosocial and ethically acceptable, without

the harmful intent of psychopathy. Sweet deception fosters positive and deep engagement in human-AI relationships, building trust and a sense of connection (Umbrello and Natale, 2024). Sweet deception, as a conversational strategy, can influence perceptions of authenticity by fostering warmth and emotional connection in interactions (Park *et al*., 2024). When meeting users' expectations and emotional needs, sweet deception can enhance perceived authenticity by promoting interactive engagement, emotional attachment and trust, making AI companions appear more approachable and emotionally connected (Bailey and Iyengar, 2022).

3. Research model and hypotheses Development

Grounded in the Triangular Theory of Love and Attachment Theory, this study advances a research model that addresses how generative AI companions influence the social well-being of users. We initialize and analyze the aspects of AI companions' relational interaction with humans, including intimacy, passion and commitment. Then, the impact of the three components of love on the three dimensions of attachment (i.e., interactive engagement, emotional attachment and emotional trust) toward AI companions is evaluated. Furthermore, we examine their effects on users' social well-being. To enhance understanding of users' attachment to AI companions, we propose sweet deception as a moderating variable, examining how it facilitates emotional bonding within this framework.

3.1 Intimacy, interactive engagement, emotional attachment and emotional trust

As technology advances, there are potential opportunities for individuals to interact with generative AI products, such as AI virtual assistants, AI chatbots and AI companions, allowing users to be engaged and develop intimate and passionate relationships. According to Sternberg (1997, p.315), intimacy is defined as "feelings of closeness, connectedness and bondedness in loving relationships". When users interact with AI companions for a certain time, intimacy—such as close communication and emotional support from the AI companion—will develop, and users will experience positive emotional feelings. Previous studies have examined how individuals' emotional feelings toward a brand positively influence their engagement with the brand (Fernandes and Moreira, 2019). Similarly, users may become more engaged with AI companions as greater intimacy and a stronger connection between users and the AI companion develops through ongoing interactions. Mamun *et al*. (2023) found that when users engage in personal conversations and deeper dialogues with their intelligent personal assistants, a stronger emotional attachment develops. Emotional attachment refers to the emotional bond that develops between customers and brands, customers and companies, and users and the products or services consumed (Shahid *et al*., 2022). Accordingly, the authors propose that when users have close relationships with their AI companions, they are likely to develop emotional connections with them, leading to a continued relationship.

Researchers examined the association between intimacy and trust in many contexts, such as in friendship trust (Timmerman, 1991) and intimacy-trust-commitment relationships in the services context (Ponder *et al*., 2016); however, scholars have yet to study intimacy-emotional trust relationships in the context of AI research. Song *et al*. (2022) noted that intelligent AI

assistants engage in rich human-like interactions with users, developing a reliable, connected relationship. We argue that when users gradually share personal thoughts with AI companions and seek emotional support, emotional trust can develop. Thus, we propose the following hypotheses:

H1a: Intimacy is positively related to interactive engagement toward AI companions.

H1b: Intimacy is positively related to emotional attachment toward AI companions.

H1c: Intimacy is positively related to emotional trust toward AI companions.

3.2 Passion, interactive engagement, emotional attachment and emotional trust

According to Sternberg (1997), passion is one of the important components of love. Passion is defined as "a strong inclination toward an activity that people like, that they find important, and in which they invest time and energy" (Vallerand *et al*., 2003, p.756). Passion can be seen as a strong emotional connection to an object, a brand, a service experience and an AI-related product that people value and spend time to own or use (Swimberghe *et al*., 2014). Passion is largely derived from active engagement and reciprocation, which can be developed through continuous communication, emotional connections and shared thoughts (Song *et al*., 2022).

Silayach *et al*. (2025) suggested that AI systems can enhance human emotional intelligence through simulated conversations, fostering a sense of emotional connection between the user and the AI system. When users display high levels of passion, it can foster a more engaging and interactive experience, resulting in greater satisfaction and fulfillment with AI tools (Zhai *et al*., 2024) and enhancing the overall quality of the interaction. The relationship between passion and emotional attachment has been extensively examined in the context of romantic relationships and customer-brand relationships (Patwardhan and Balasubramanian, 2011); however, very few studies explore the relationship between passion and emotional attachment in the context of human-AI interactions. When users perceive their AI companion as an integral part of emotional support, a sense of emotional attachment can be built. Therefore, we argue that when users' passion is strong, their emotional attachment to the AI companion will be deeper, cultivating emotional bonds through human-AI interactions. Furthermore, passion plays a key role in building emotional trust. Whether or not a user trusts an AI application depends on the user's trust disposition, which also affects the ongoing relationship between the user and the AI application (Song *et al*., 2022). Users are likely to expect their AI companion to be emotionally expressive, and the AI companion's emotional responses can lead to more in-depth dialogues or conversations (Chen *et al*., 2025). Emotional trust can be developed when users feel passionate about their AI companions. Therefore, we hypothesize:

H2a: Passion is positively related to interactive engagement toward AI companions.

H2b: Passion is positively related to emotional attachment toward AI companions.

H2c: Passion is positively related to emotional trust toward AI companions.

3.3 Commitment, interactive engagement, emotional attachment and emotional trust

Commitment is an enduring desire to maintain a lasting relationship (Song *et al*., 2022; Chen *et al*., 2025). When users develop an enduring connection with a particular AI companion, they can engage in emotional interaction regardless of time and location. AI companions are always available for emotional support whenever users want it, providing 24/7 companionship. This companionship enables users to commit and maintain valued relationships. Therefore, we propose that when users make a commitment to an AI companion, they will continue to engage in interactive conversations with the AI companion. As the customer psychology literature suggests, customers feel emotionally attached when they are committed to repurchasing the brand (Sari and Wijaya, 2019). For instance, previous studies in the context of logistics intelligent equipment (Shang *et al*., 2020) suggested that commitment has a positive effect on emotional attachment. Consequently, we suggest that when users are committed to their AI companion, they develop an emotional bond with the AI companion.

In addition, commitment plays an important role in fostering emotional trust. Commitment and trust are interrelated, as suggested by previous research in various contexts such as marketing (Brown *et al*., 2019) and supply chain (Kwon *et al*., 2004). The ultimate goal of commitment and trust is to establish a long-term relationship. Similarly, we argue that when users are committed to their AI companion, they are more likely to trust their AI companion, establishing a long-term, reliable relationship. Thus, the following hypotheses are proposed:

H3a: Commitment is positively related to interactive engagement toward AI companions.

H3b: Commitment is positively related to emotional attachment toward AI companions.

H3c: Commitment is positively related to emotional trust toward AI companions.

3.4 Interactive engagement, emotional attachment, emotional trust and social well-being

Social well-being refers to an individual's self-report of the quality of his or her relationship with other people, their neighborhood and their community (Keyes and Shapiro, 2004, p.351). It encompasses aspects including social support, connectedness and the ability to maintain satisfying interpersonal relationships. High levels of social well-being are associated with positive mental health outcomes, including lower loneliness, greater life satisfaction, and increased emotional stability (Marriott and Pitardi, 2024). In the context of human-AI relationships, social well-being can be influenced by the quality of interactions between users and AI, as well as the emotional bonds and trust people develop with the AI technology.

Interactive engagement is essential in shaping users' social well-being. Research suggests that high-quality interactions, characterized by emotional responsiveness and interactive engagement with AI companions, can resemble human interactions and foster a sense of companionship (Chen and Ibrahim, 2023). Regular, meaningful engagement with AI companions can reduce feelings of social isolation and provide emotional support, ultimately contributing to improved social well-being (Leo-Liu, 2023). Therefore, quality interactions are likely to be related to improved levels of social well-being.

Subsequently, emotional attachment to AI also plays a part in users' social well-being. Emotional attachment refers to the development of a strong emotional bond with another entity, which offers a sense of security and comfort (Hu *et al*., 2024). Drawing on research from Attachment Theory in human relationships, we argue that users who establish emotional attachments to AI companions often experience emotional fulfilment, similar to what is found in human relationships (Nafees and Sujood, 2024; Chen *et al*., 2024). Such attachments can provide emotional support and a sense of emotional safety, especially to those who struggle with human relationships in real life, possibly experiencing social anxiety (Hu *et al*., 2023). Hence, emotional attachment plays a crucial role in enhancing social well-being by fulfilling an individual's need for emotional closeness and support.

Emotional trust is another element which significantly shapes users' social well-being in the context of AI. Trust in AI tools is necessary when users perceive AI as reliable and as a capable tool that consistently meets their emotional needs (Mamun *et al*., 2023). Such trust allows users to open up emotionally, seek support and depend on their AI companions. Emotional trust in AI, comparable to trust in human relationships, contributes to users' emotional security, thereby enhancing overall social well-being (Wilson-Nash *et al*., 2023). When users are confident that their AI companions will respond with support and empathy, their sense of social well-being is enhanced. Therefore, we propose the following:

H4: Interactive engagement is positively related to users' social well-being.

H5: Emotional attachment is positively related to users' social well-being.

H6: Emotional trust is positively related to users' social well-being.

3.5 The moderating effect of sweet deception

Sweet deception—through the strategic use of affectionate and flattering communications aimed at creating emotional bonds—plays a significant role in shaping relationships (Guthrie and Kunkel, 2013). Peterson's (1996) study showed that mild and harmless forms of deception were used most often in romantic relationships and were seen as more acceptable than serious lies. Sweet lies can also be used in close friendships to protect self-esteem, maintain emotional harmony, and offer social support, ultimately leading to positive relational outcomes (McDaniel *et al*., 2018). Individuals who engage in or are receptive to sweet deception tend to maintain and deepen relational bonds. When AI companions exhibit sweet deception, even if users are aware that these expressions are not entirely genuine, this communication style can still foster feelings of being valued and emotionally connected (Cole, 2001). In this context, sweet deception functions less as manipulation and more as a relational tool that enhances users' emotional experiences. Therefore, AI companions employing sweet deception as a communication strategy may strengthen the effects of interactive engagement, emotional attachment and emotional trust on users' social well-being. By enhancing the positive emotional connection with the users, we argue that sweet deception reinforces the positive relationships between the three attachment dimensions and social well-being. Therefore, the following hypotheses are proposed:

H7a: Sweet deception positively moderates the relationship between interactive engagement and social well-being.

H7b: Sweet deception positively moderates the relationship between emotional attachment and social well-being.

H7c: Sweet deception positively moderates the relationship between emotional trust and social well-being.

Based on the literature, this study's research model was developed, as presented in Figure 1.

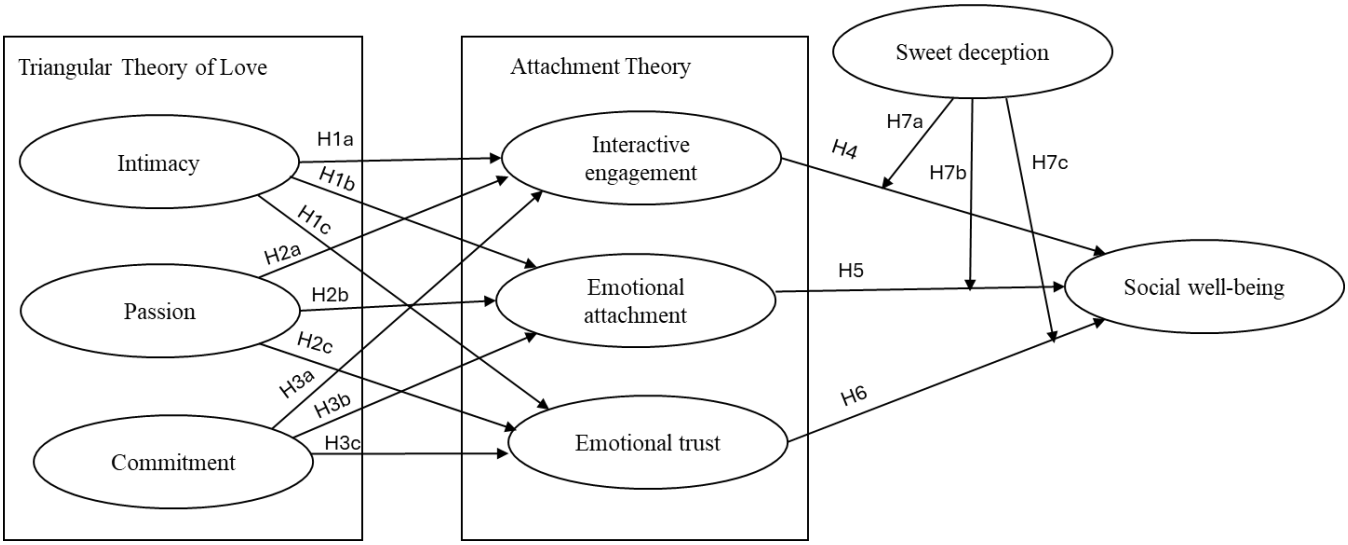

Figure 1. Research model

Source(s): Authors' own work

4. Methodology

4.1 Questionnaire design

A questionnaire was developed to test the proposed research model. All the items for measurement used in this study were adapted from previous studies (see Web Appendix I). Since no existing measurement scales for sweet deception are available, the measurement items were operationalized based on the five categories of sweet deception identified by Turner *et al*. (1975). The five categories of sweet deception (i.e., lies, exaggerations, half-truths, secrets and diversionary responses) provided a foundation for operationalizing the constructs. Specifically, wording refinements were made to the measurement items to adapt them to the behavioral context of AI companion apps. To ensure the validity of the newly developed measurement items of sweet deception, a multi-step validation process was conducted. First, the content validity of the initial

questionnaire was assessed by four expert judges, consisting of two marketing academics and two marketing researchers (Shen *et al*., 2014). The experts reviewed the items to ensure they accurately reflected the concept of sweet deception and were suitable for the context of this study. Second, a face validity assessment was conducted with three students as population judges. They reviewed the five sweet deception items to ensure the items were clear, relevant and easy to understand in the context of AI companion apps (MacKenzie *et al*., 2011). All the constructs, including the sweet deception items, were measured on 7-point Likert scales (i.e., 1 – strongly disagree; 7 – strongly agree). Through this rigorous development and validation process, the measurement items were refined to ensure their reliability and appropriateness for the study. The sources of measurement items were detailed in Table A1 (refer to Web Appendix I).

4.2 Sample and data collection procedure

Data was collected through a panel service offered by a professional online academic platform called Prolific (https://www.prolific.com), a data collection platform akin to Amazon Mechanical Turk. We employed Prolific to collect data from October 12 to October 21, 2024. To ensure response integrity, two measures were adopted. First, to achieve high-quality feedback, we collaborated with the platform to recruit individuals who identified as AI companion app users. To clarify the study's focus, we provided an explanation of an AI companion app as a mobile application powered by artificial intelligence, designed to allow users to interact with digital characters. These apps simulate romantic or emotional relationships through personalized communication and engagement with the AI characters. Second, purposive sampling was employed to ensure that respondents met the research criteria (Etikan *et al*., 2016). Specifically, participants were selected based on their recent usage of AI companion apps to align with the research objectives. To further ensure the inclusion of desired respondents, a screening question was added at the start of the survey as follows: "Have you been using AI companion apps, such as Replika, Reddit, Kindroid, Moemate, character.ai, Talkie, Hiwaifu, etc., in the past 3 months?".

To address self-reporting bias, we incorporated attention checks in the survey to enhance data quality. For example, respondents were instructed to enter the number "2" in a designated response to ensure they read and followed the instructions. Respondents who entered the correct number, as indicated by the attention checks, were included in the analysis. In addition, all responses were collected and stored confidentially, with no identifiable information recorded. The data of respondents remained anonymous throughout the study.

A total of 542 participants responded to the survey; however, 9 were returned as unsubmitted, and 6 respondents failed the attention check, resulting in 527 valid responses. All respondents were AI companion app users, with the sample consisting of 42.6% female and 57.4% male respondents. Participants' demographic data is presented in Table 1 (see Web Appendix I).

5. Data analysis

The Partial Least Squares Structural Equation Modelling (PLS-SEM) method was adopted to analyze the data. The PLS approach is a suitable choice for analyzing complex model structures, including direct and indirect relationships, which is appropriate for theory building (Hair *et al*.,

2017). According to Hair *et al*. (2017), it has no strict normal distribution requirement, and the sample size should be at least 10 times the estimated parameters. Since the current study aims to identify and generate key predictive results regarding human-AI love relationships by integrating the Triangular Theory of Love and Attachment Theory, we used PLS-SEM to assess the measurement and structural models. SmartPLS 4.0 was thus employed for data analysis (Ringle *et al*., 2014).

5.1 Measurement model

To assess the measurement model, internal consistency, convergent validity and discriminant validity were assessed. Table 2 shows the assessment results (see Web Appendix I). The loadings for all measurement items were significant and were greater than 0.762. In terms of internal consistency, the Cronbach's alpha and composite reliability of all constructs exceeded the threshold value of 0.7; thus, internal consistency was confirmed. In terms of convergent validity, the average variance extracted (AVE) for all constructs was greater than 0.641, surpassing the recommended threshold value of 0.50. In terms of discriminant validity, the Heterotrait-Monotrait (HTMT) ratio was assessed using Henseler *et al*.'s (2015) criterion with a recommended threshold value of 0.90. This threshold has been adopted in recent studies (Leung *et al*., 2020; Yu *et al*., 2023; Leung *et al*., 2024) (see Table 3). In addition, to assess multicollinearity, the variance inflation factor (VIF) was calculated, with values ranging from 1.662 to 2.971, all below the recommended threshold of 5 (Hair *et al*., 2019). Thus, multicollinearity was not a concern in this study. The assessment results confirmed that internal consistency, convergent validity, and discriminant validity were met, thereby validating the measurement model.

5.2 Common method bias

When employing a cross-sectional approach and self-reported measurements, common method variance (CMV) can be an imminent risk to the validity of the results (Tehseen *et al*., 2017). CMV may arise in the PLS-SEM scenario, due to the presence of common method bias (CMB). Thus, this study used Harman's single-factor analysis and the correlation matrix approach to check for common method bias using SPSS. The total variance accounted for by a single factor was 34.2% (Podsakoff *et al*., 2003), which is below the 50% threshold, indicating the absence of CMB.

5.3 Structural model

The structural model was examined by evaluating the proposed relationships between latent constructs of the path model. The model explained 45.9% of the variance in emotional trust, 54.0% of the variance in interactive engagement, 63.3% of the variance in emotional attachment, and 56.2% of the variance in social well-being. Table 4 presents the summary of the PLS-SEM path analysis (see Web Appendix I). Intimacy had significant positive effects on interactive engagement ($\beta = 0.235$, $p < 0.001$), emotional attachment ($\beta = 0.224$, $p < 0.001$), and emotional trust ($\beta = 0.265$, $p < 0.001$), supporting H1a, H1b and H1c. Passion had significant positive effects on interactive engagement ($\beta = 0.373$, $p < 0.001$), emotional attachment ($\beta = 0.514$, $p < 0.001$), and emotional trust ($\beta = 0.298$, $p < 0.001$); thus, H2a, H2b, and H2c are supported. Commitment had significant

positive effects on interactive engagement ($\beta = 0.196$, $p < 0.001$), emotional attachment ($\beta = 0.121$, $p < 0.05$), and emotional trust ($\beta = 0.180$, $p < 0.05$), supporting H3a, H3b and H3c.

In addition, interactive engagement significantly influenced social well-being ($\beta = 0.204$, $p < 0.001$), supporting H4. Emotional attachment also significantly influenced social well-being ($\beta = 0.142$, $p < 0.001$), supporting H5. However, emotional trust did not significantly influence social well-being ($\beta = 0.104$, $p > 0.05$). Therefore, H6 is not supported. Furthermore, two significant moderating effects were found: one on the relationship between interactive engagement and social well-being ($\beta = 0.152$, $p < 0.05$), and another on the relationship between emotional attachment and social well-being ($\beta = 0.194$, $p < 0.001$). Therefore, H7a and H7b are supported. However, the moderating effect of sweet deception on the relationship between emotional trust and social well-being was not significant, indicating that H7c is not supported.

Regarding control variables, the demographic variables of gender, age, education level and frequency of usage were used. There were no significant effects, as follows: gender ($\beta = 0.006$, $p > 0.05$); age ($\beta = 0.027$, $p > 0.05$); education level ($\beta = 0.094$, $p > 0.05$); and AI companion app usage ($\beta = 0.009$, $p > 0.05$).

6. Discussion

This paper investigated how the relationship between users and AI companions impacts users' social well-being, from the perspective of the Triangular Theory of Love and Attachment Theory. The research findings revealed that the key components of love (including intimacy, passion, and commitment) significantly predicted various forms of attachment (including interactive engagement, emotional attachment, and emotional trust) within the user-AI companion relationship, subsequently enhancing users' social well-being. The results underscored the importance of understanding the dynamics in human-AI interactions. While previous studies examining human-to-human relationships have established that love serves as a predictor of attachment, this research extends these findings by demonstrating a similar effect within the context of human-AI companion relationships (Mamun *et al*., 2023; Song *et al*., 2022; Zhai *et al*., 2024).

Additionally, this research has revealed that attachment—manifested through interactive engagement and emotional connection—was the most robust predictor of social well-being in the context of relationships with AI companions, whereas emotional trust played a comparatively lesser role. The results highlighted that interactive engagement through meaningful and frequent interactions with AI companions can enhance users' social well-being. Similarly, the establishment of emotional attachment has been shown to contribute positively to social well-being, suggesting that emotional bonds formed with AI companions enrich users' emotional fulfillment and sense of connectedness. AI companions offering substantial emotional support can help users develop meaningful connections that help minimize feelings of loneliness (Ma and Huo, 2025). This emotional dependency on AI companions can serve as a positive source of support, providing comfort and a sense of companionship during periods of social isolation.

Interestingly, the role of emotional trust appeared to be less significant in this research, as it did not predict social well-being, implying a shift in how trust is viewed in human-AI relationships. The findings suggest that users may value meaningful interactions and connectedness with AI companions more than the need for long-term trust, which contrasts with traditional human-to-human relationships (Sundar, 2020).

Sweet deception moderated the relationship between interactive engagement and social well-being. Users reported greater social well-being when they perceived idealized emotional responses from their AI companions. However, sweet deception did not moderate the relationship between emotional attachment and social well-being, suggesting that the strength of emotional bonds remains unaffected by idealized responses. The findings indicated that the strength of the relationship between emotional attachment and social well-being remains consistent, regardless of the presence of sweet deception. The results showed that users who engage deeply and frequently with their AI companions experience substantial improvements in social well-being, reflected in reduced feelings of loneliness and an enhanced sense of social connectedness.

6.1 Theoretical implications

There are three theoretical implications for human-AI literature. First, our study contributes to the literature by providing evidence of the positive outcomes arising from engagement with AI companions and the role of emotions in shaping the attachment to AI in a romantic way. Specifically, by broadening Sternberg's Triangular Theory of Love, the current study empirically examines how the three components of love (including intimacy, passion and commitment) shape attachment (interactive engagement, emotional attachment, emotional trust). It also investigates how attachment affects social well-being, particularly in environments like Replika and Reddit that highly imitate human love and attachment capabilities. Second, our research provides a novel and integrative perspective by bridging the Triangular Theory of Love and Attachment Theory to examine how users form emotional connections and long-term bonds with their AI companions. Previous studies largely focused on exploring love components and attachment elements separately, to investigate users' intention to adopt AI tools (Song *et al*., 2022; Mamun *et al*., 2023). Thus, this study is the first empirical research to incorporate the Triangular Theory of Love and Attachment Theory to examine how users develop feelings of love and long-term bonds with their AI companions, which in turn influence their social well-being. We extend these psychological theories beyond traditional human-to-human interactions to the context of human-AI relationships. Particularly, we examine how the components of love (including intimacy, passion and commitment) shape users' attachment (interactive engagement, emotional attachment, emotional trust) toward AI companions, and how the attachment, in turn, affects their social well-being. Third, we employ sweet deception as a key moderating variable. The results reflected that sweet deception enhances the relationship between interactive engagement and social well-being, as users experience greater social well-being when they perceive idealized emotional responses from their AI companions. The results contribute to the literature by demonstrating how strategically designed emotional responses in AI systems can mimic aspects of human attachment, enriching users' emotional experiences and overall well-being. This provides theoretical insights into how AI companions strengthen the relationship between attachment elements and social well-being.

6.2 Practical implications

The practical implications of this study are significant, particularly as individuals increasingly integrate AI companions into their daily lives. The findings of this study shed light on how AI companion application developers can prioritize features that enhance users' social well-being by strengthening love and attachment in user-AI relationships (Cave and Dihal, 2021). In terms of user experience, AI developers should create a more emotionally engaging and fulfilling experience for users by enabling deep and meaningful conversations (intimacy), creating engaging and emotionally stimulating interactions (passion), and fostering long-term companionship (commitment) in their interactions with AI companions. Moreover, the user experience should facilitate meaningful interactive engagement and foster emotional bonds between users and their AI companions, transcending users' social well-being and user satisfaction. Additionally, the concept of "sweet deception" offers an intriguing perspective for the future development of AI companion applications. While this research found that AI companions can simulate idealized emotional attachment, which may enhance users' social well-being, this raises ethical considerations regarding the authenticity of human-AI interactions. As AI companion apps become more widely used, it is important for policymakers and AI developers to ensure that these technologies evolve in ways that support users' well-being while maintaining their autonomy. Ensuring transparency in the operation of AI companion apps is essential to prevent potential deception and build user trust (Goirand *et al*., 2024). Furthermore, implementing guidelines and conducting regular assessments of AI companion app design, in consultation with mental health professionals, can help monitor their real-world impact, ensuring responsible and effective support for social and emotional needs.

6.3 Limitations and future research

This study has several limitations that can be considered for future research. First, this study did not focus on AI companion app users from a specific geographic region. As the concept of love is highly culturally specific (Doherty *et al*., 1994), future studies could explore cultural and ethnic differences in human-AI relationships and their impact on social well-being. Second, the cross-sectional design of this study does not measure the long-term effects of AI companion interactions on users' well-being. Future research could adopt a longitudinal design to gain insights into how these relationships evolve over time and their long-term impact. Third, this study relied on self-reported data that may limit the depth of insights. As the topic of love and AI companionship can be sensitive for some participants, future research may incorporate observational data or analyze factual behavioral app usage for a more comprehensive understanding of these relationships. Fourth, considering the ethical concerns surrounding AI-driven sweet deception, authors argue that deception in human-AI relationships may depend on the user's autonomy, as well as their cognitive, social and emotional competencies (Kaczmarek, 2024). Future research could therefore examine how varying degrees of sweet deception impact users' emotional resilience and trust within human-AI interactions, depending on these competencies. Fifth, the current study did not associate the Dark Triad (Paulhus and Williams, 2002) of personality traits of narcissism, Machiavellianism and psychopathy with sweet deception. Future research could investigate how

varying levels of these traits influence the tendency to engage in sweet deception in the context of human-AI interactions.

References

Abraham, A. (2024), "Computer says yes: how AI is changing our romantic lives", *The Guardian*, 16 June, available at: https://www.theguardian.com/technology/article/2024/jun/16/computer-says-yes-how-ai-is-changing-our-romantic-lives (accessed 10 November 2024).

Albert, N. and Merunka, D. (2013), "The role of brand love in consumer-brand relationships", *Journal of Consumer Marketing*, Vol. 20 No. 3, pp.258-266.

Bailey, E.R. and Iyengar, S.S. (2022), "Yours truly: On the complex relationship between authenticity and honesty", *Current Opinion in Psychology,* Vol. 47, p.101419.

Blackbyrn, S. (2024), "Would You Fall in Love with an AI – 3 In 5 AMERICANS SAY YES", *Coach Foundation*, 12 February, available at: https://coachfoundation.com/blog/ai-love-survey/#:~:text=Among%20these%2C%20there%20is%20a,AI%20in%20a%20romantic%20context, (accessed 10 November 2024).

Bowlby, J. (1977), "The making and breaking of affectional bonds: II. Some principles of psychotherapy: The fiftieth Maudsley Lecture", *The British Journal of Psychiatry*, Vol. 130 No. 5, pp.421-431.

Bowlby, J. (1982), "Attachment and loss: Retrospect and prospect", *American Journal of Orthopsychiatry,* Vol. 52 No. 4, pp.664–678.

Bretherton, L. (1992), "The origins of Attachment Theory: John Bowlby and Mary Ainsworth", *Developmental Psychology,* Vol. 28 No. 5, pp.759-775.

Cave, S. and Dihal, K. (2021), "AI will always love you: Three contradictions in imaginings of intimate relations with machines", Dainton, B., Slocombe, W. and Tanyi, A. (Eds.) *Minding the Future: Artificial Intelligence, Philosophical Visions and Science Fiction,* Springer International Publishing, Cham, Switzerland, pp.107-125.

Chen, C.W., Nguyen, D.T.T., Chih, M. and Chen, P.Y. (2024), "Fostering YouTube followers' stickiness through social contagion: The role of digital influencer's characteristics and followers' compensation psychology", *Computers in Human Behavior*, Vol. 158, p.108304.

Chen, Q., Jing, Y., Gong, Y. and Tan, J. (2025), Will users fall in love with ChatGPT? a perspective from the Triangular Theory of Love", *Journal of Business Research*, Vol. 186, p.114982.

Chen, X. and Ibrahim, Z. (2023), "A Comprehensive Study of Emotional Responses in AI-Enhanced Interactive Installation Art", *Sustainability*, Vol. 15 No. 22, p.15830.

Cole, T. (2001), "Lying to the one you love: The use of deception in romantic relationships", *Journal of Social and Personal Relationships*, Vol. 18 No. 1, pp.107-129.

Doherty, R.W., Hatfield, E., Thompson, K. and Choo, P. (1994), "Cultural and ethnic influences on love and attachment", *Personal Relationships*, Vol. 1 No. 4, pp.391-398.

De Freitas, J., Oğuz-Uğuralp, Z., Uğuralp, A.K. and Puntoni, S. (2025), "AI companions reduce loneliness", *Journal of Consumer Research*, p. ucaf040.

Etikan, I., Musa, S.A. and Alkassim, R.S. (2016), "Comparison of convenience sampling and purposive sampling", *American Journal of Theoretical and Applied Statistics*, Vol. 5 No. 1, pp.1-4.

Fernandes, T. and Moreira, M. (2019), "Consumer brand engagement, satisfaction and brand loyalty: a comparative study between functional and emotional brand relationships", *Journal of Product & Brand Management*, Vol. 28 No. 2, pp.274-286.

Fulmer, I.S., Barry, B. and Long, D.A. (2009), "Lying and smiling: Informational and emotional deception in negotiation", *Journal of Business Ethics*, Vol. 88, pp.691-709.

Gillath, O., Abumusab, S., Ai, T., Branicky, M.S., Davison, R.B., Rulo, M., Symons, J. and Thomas, G. (2023), "How deep is AI's love? Understanding relational AI", *Behavioral and Brain Sciences*, Vol. 46, p.e33.

Glaesmer, H., Grande, G., Braehler, E. and Roth, M. (2011), "The German version of the Satisfaction with Life Scale (SWLS): Psychometric properties, validity, and population-based norms", *European Journal of Psychological Assessment*, Vol. 27 No. 2, pp.127-132.

Goirand, M., Austin, E. and Clay-Williams, R. (2024), "Bringing clarity and transparency to the consultative process underpinning the implementation of an ethics framework for AI-based healthcare applications: a qualitative study", *AI and Ethics*, pp. 1-21.

Guthrie, J. and Kunkel, A. (2013), "Tell me sweet (and not-so-sweet) little lies: Deception in romantic relationships", *Communication Studies*, Vol. 64 No. 2, pp.141-157.

Hair Jr, J.F., Matthews, L.M., Matthews, R.L. and Sarstedt, M. (2017), "PLS-SEM or CB-SEM: updated guidelines on which method to use", *International Journal of Multivariate Data Analysis*, Vol. 1 No. 2, pp.107-123.

Hair, J.F., Risher, J.J., Sarstedt, M. and Ringle, C.M. (2019), "When to use and how to report the results of PLS-SEM", *European Business Review*, Vol. 31 No. 1, pp.2-24.

Hatfield, E., Sternberg, R.J. and Barnes, M.L. (1988), "Passionate and companionate love", Sternberg, R.J. and Barnes, M.S.L. (Eds.), *The Psychology of Love,* Yale University Press, NY, pp.119-138.

Henseler, J., Ringle, C.M. and Sarstedt, M. (2015), "A new criterion for assessing discriminant validity in variance-based structural equation modeling", *Journal of the Academy of Marketing Science*, Vol. 43 No. 1, pp. 115-135.

Ho, J.Q., Hu, M., Chen, T.X. and Hartanto, A. (2025), "Potential and pitfalls of romantic Artificial Intelligence (AI) companions: A systematic review", *Computers in Human Behavior Reports*, Vol. 19, p.100715.

Hu, B., Mao, Y. and Kim, K.J. (2023), "How social anxiety leads to problematic use of conversational AI: the roles of loneliness, rumination, and mind perception", *Computers in Human Behavior*, Vol. 145, p.107760.

Hu, D., Lan, Y., Yan, H. and Chen, C.W. (2025), "What makes you attached to social companion AI? A two-stage exploratory mixed-method study", *International Journal of Information Management*, Vol. 83, p.102890.

Kaczmarek, E. (2024), "Self-Deception in Human–AI Emotional Relations", *Journal of Applied Philosophy*, Vol. 42 No. 3, pp.814-831.

Kamboj, S., Sarmah, B., Gupta, S. and Dwivedi, Y. (2018), "Examining branding co-creation in brand communities on social media: applying the paradigm of Stimulus-Organism-Response", *International Journal of Information Management*, Vol. 39, pp.169-185.

Keyes, C.L. and Shapiro, A.D. (2004), "Social well-being in the United States: A descriptive epidemiology", Brim, O.G., Ryff, C.D. and Kessler, R.C. (Eds.), *How Healthy Are We? A National Study of Well-being at Midlife*, The University of Chicago Press, Chicago, IL, pp.350-372.

Kim, N. and Kim, W. (2018), "Do your social media lead you to make social deal purchases? Consumer-generated social referrals for sales via social commerce", *International Journal of Information Management,* Vol. 39, pp.38-48.

Kislev, E. (2022), *Relationships 5.0: How AI, VR, and Robots Will Reshape Our Emotional Lives*, Oxford University Press.

Leo-Liu, J. (2023), "Loving a "defiant" AI companion? The gender performance and ethics of social exchange robots in simulated intimate interactions", *Computers in Human Behavior,* Vol. 141, p.107620.

Leung, W.K., Law, S.P., Cheung, M.L., Chang, M.K., Lai, C.Y. and Liu, N. (2024), "From resistance to acceptance: developing health task measures to boost mHealth adoption among older adults: mixed-methods approach and innovation resistance", *Internet Research*.

Leung, W.K., Shi, S. and Chow, W.S. (2020), "Impacts of user interactions on trust development in C2C social commerce: The central role of reciprocity", *Internet Research*, Vol. 30 No. 1, pp.335-356.

Levy, D. (2007), "Falling in Love with a Companion", *Artificial Companions in Society: Perspectives on the Present and Future*, Vol. 2 No. 1, pp.28-39.

Levy, D. (2009), *Love and Sex with Robots: The Evolution of Human-Robot Relationships*, HarperCollins, New York.

Liang, C. (2023), "My A.I. Companion", *The New York Times*, 23 May, available at: https://www.nytimes.com/2023/05/23/opinion/ai-chatbot-relationships.html (accessed 11 November 2024).

Lin, B. (2024), “The AI chatbot always flirts with me, should I flirt back: From the McDonaldization of Friendship to the Robotization of Love”, *Social Media + Society*, Vol. 10 No. 4, p.20563051241296229.

Liu, C. and Ma, J.L. (2019), “Adult attachment style, emotion regulation, and social networking sites addiction”, *Frontiers in Psychology*, Vol. 10, p.2352.

Ma, X. and Huo, Y. (2025), “White elephant or happiness goodies? The effect of user personality on the perception of digital companionship of smart speaker”, *International Journal of Human–Computer Interaction*, Vol. 41 No. 1, pp.627-640.

Mamun, M.R., Prybutok, VR., Peak, D.A., Torres, R. and Pavur, R.J. (2023), “The role of emotional attachment in IPA continuance intention: An emotional attachment model”, *Information Technology & People*, Vol. 36 No. 2, pp.867–894.

Marriott, H.R. and Pitardi, V. (2024), “One is the loneliest number… Two can be as bad as one. The influence of AI Friendship Apps on users’ well-being and addiction”, *Psychology & Marketing*, Vol. 41 No. 1, pp.86-101.

McDaniel, C., Guthrie, J.A. and Kunkel, A. (2018), “" You look fine": A Closer Look at White Lies in Female Best Friendships”, *Iowa Journal of Communication*, Vol. 50 No. 1.

Nafees, S. and Sujood (2024), “The power of emotions: combining emotional attachment theory (EAT) and the technology acceptance model (TAM) to predict consumers’ intention to use interactive technologies (ITs) at tourism destinations”, *Tourism Recreation Research*, pp.1-18.

O’Hair, H.D. and Cody, M.J. (1994), “Deception”, Cupach, W.R. and Spitzberg, B.H. (Eds.), *The Dark Side of Interpersonal Communication*, Lawrence Erlbaum Associates, Inc., Hillsdale, NJ, pp.181-213.

Park, P.S., Goldstein, S., O’Gara, A., Chen, M. and Hendrycks, D. (2024), “AI deception: A survey of examples, risks, and potential solutions”, *Patterns*, Vol. 5 No. 5.

Parolin, M. and Simonelli, A. (2016), “Attachment Theory and maternal drug addiction: The contribution to parenting interventions”, *Frontiers in Psychiatry*, Vol. 7, p.152.

Patwardhan, H. and Balasubramanian, S.K. (2011), “Brand romance: a complementary approach to explain emotional attachment toward brands”, *Journal of Product & Brand Management*, Vol. 20 No. 4, pp.297-308.

Paulhus, D.L. and Williams, K.M. (2002), “The dark triad of personality: Narcissism, Machiavellianism, and psychopathy”, *Journal of Research in Personality*, Vol. 36 No. 6, pp.556-563.

Pentina, I., Hancock, T. and Xie, T. (2023), “Exploring relationship development with social chatbots: A mixed-method study of replica”, *Computers in Human Behavior*, Vol. 140, p.107600.

Peterson, C. (1996), "Deception in intimate relationships", *International Journal of Psychology*, Vol. 31 No. 6, pp.279-288.

Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y. and Podsakoff, N.P. (2003), "Common method biases in behavioral research: A critical review of the literature and recommended remedies", *Journal of Applied Psychology,* Vol. 88 No. 5, pp.879-903

Ponder, N., Bugg Holloway, B. and Hansen, J.D. (2016), "The mediating effects of customers' intimacy perceptions on the trust-commitment relationship", *Journal of Services Marketing*, Vol. 30 No. 1, pp.75-87.

Prochazka, A. and Brooks, R.C. (2024), "Digital Companions and Jealousy: Anticipated Emotional Responses to Emotionally and Physically Sophisticated Sexual Technologies", *Human Behavior and Emerging Technologies*, Vol. 2024 No. 1, p.1413351.

Reizer, A., Galperin, B.L., Chavan, M., Behl, A. and Pereira, V. (2022), "Examining the relationship between fear of COVID-19, intolerance for uncertainty, and cyberloafing: A mediational model", *Journal of Business Research*, Vol. 145, pp.660-670.

Replika (n.d.), "The AI companion who cares", available at: https://replika.com/ (accessed 30 October 2024).

Ringle, C., Da Silva, D. and Bido, D. (2014), "Structural equation modeling with the SmartPLS", *Brazilian Journal of Marketing*, Vol. 13 No. 2.

Samani, H. (2016), "The evaluation of affection in human-robot interaction", *Kybernetes*, Vol. 45 No. 8, pp.1257-1272.

Sari, E.K. and Wijaya, S. (2019), "The role of emotional brand attachment and customer trust in enhancing customer experience's effect on customer loyalty towards beauty clinics in Surabaya", *Petra International Journal of Business Studies*, Vol. 2 No. 1, pp.18-26.

Seng, W.Q. and Hee, O.C. (2021), "Factors influencing the intention to use E-wallet: An extended Hedonic-Motivation System Adoption Model", *International Journal of Academic Research in Business and Social Sciences*, Vol. 11 No. 11, pp.2265-2278.

Shahid, S., Paul, J., Gilal, F.G. and Ansari, S. (2022), "The role of sensory marketing and brand experience in building emotional attachment and brand loyalty in luxury retail stores", *Psychology & Marketing*, Vol. 39 No. 7, pp.1398-1412.

Shen, X.S., Chick, G. and Zinn, H. (2014), "Playfulness in adulthood as a personality trait: a reconceptualization and a new measurement", *Journal of Leisure Research*, Vol. 46 No. 1, pp.58-83.

Sheng, A. and Wang, F. (2022), "Falling in love with machine: emotive potentials between human and robots in science fiction and reality", *Neohelicon*, Vol. 49 No. 2, pp.563-577.

Silayach, N., Ray, R.K., Singh, N.K., Dash, D.P. and Singh, A. (2025), "When algorithms meet emotions: Understanding consumer satisfaction in AI companion applications", *Journal of Retailing and Consumer Services*, Vol. 85, p.104298.

Song, X., Xu, B. and Zhao, Z. (2022) "Can people experience romantic love for artificial intelligence? An empirical study of intelligent assistants", *Information & Management*, Vol. 59 No.2, p.103595.

Sternberg, K. (2014), *Psychology of Love 101*, Springer Publishing Company.

Sternberg, R.J. (1986), "A Triangular Theory of Love", *Psychological Review*, Vol. 93 No. 2, pp.119–135.

Sternberg, R.J. (1997), "Construct validation of a triangular love scale", *European Journal of Social Psychology*, Vol. 27 No. 3, pp.313-335.

Sternberg, R.J. (2021), "Toward a Triangular Theory of Love for one's musical instrument", *Psychology of Music*, Vol. 49 No. 6, pp.1747-1757.

Sundar, S.S. (2020), "Rise of machine agency: A framework for studying the psychology of human–AI interaction (HAII)", *Journal of Computer-Mediated Communication*, Vol. 25 No. 1, pp.74-88.

Swimberghe, K.R., Astakhova, M. and Wooldridge, B.R. (2014), "A new dualistic approach to brand passion: Harmonious and obsessive", *Journal of Business Research*, Vol. 67 No. 12, pp.2657-2665.

Szaniawska-Schiavo, G. (2024), "Love in the Age of AI Dating Apps [2024 Statistics]", *Tidio*, available at: https://www.tidio.com/blog/ai-dating-apps (accessed 15 October 2024).

Tehseen, S., Ramayah, T. and Sajilan, S. (2017), "Testing and controlling for common method variance: A review of available methods", *Journal of Management Sciences*, Vol. 4 No. 2, pp.142–168.

Timmerman, G.M. (1991), "A concept analysis of intimacy", *Issues in Mental Health Nursing*, Vol. 12 No. 1, pp.19-30.

Turner, R.E., Edgley, C. and Olmstead, G. (1975), "Information control in conversations: Honesty is not always the best policy", *Kansas Journal of Sociology,* Vol. 11, pp.69–89.

Umbrello, S. and Natale, S. (2024), "Reframing deception for human-centered AI", *International Journal of Social Robotics*, Vol. 16 No. 11, pp.2223-2241.

Vallerand, R.J., Blanchard, C., Mageau, G.A., Koestner, R., Ratelle, C., Léonard, M., Gagné, M. and Marsolais, J. (2003), "Les passions de l'âme: on obsessive and harmonious passion", *Journal of Personality and Social Psychology*, Vol. 85 No. 4, p.756.

Waddell, C., Van Doorn, G., March, E. and Grieve, R. (2020), "Dominance or deceit: The role of the Dark Triad and hegemonic masculinity in emotional manipulation", *Personality and Individual Differences*, Vol. 166, p.110160.

Wan, C., Lee, D. and Ng, P. (2024), "The role of anthropomorphism and racial homophily of virtual influencers in encouraging low-versus high-cost pro-environmental behaviors", *Psychology & Marketing*, Vol. 41 No. 8, pp.1833-1853.

Wang, C., Lee, M.K. and Hua, Z. (2015), "A theory of social media dependence: Evidence from microblog users", *Decision Support Systems*, Vol. 69, pp.40-49.

Wilson-Nash, C., Pavlopoulou, I. and Wang, Z. (2023), "Selecting, optimizing, and compensating during lockdown: How older consumers use social networking services to improve social well-being", *Journal of Interactive Marketing*, Vol. 58 No. 2-3, pp.301-320.

Wu, T. (2024), "AI Love: An Analysis of Virtual Intimacy in Human-Computer Interaction", *Communications in Humanities Research*, Vol. 50, pp.143-148.

Wu, T., Lu, Y., Gong, X. and Gupta, S. (2016), "A study of active usage of mobile instant messaging application", *Information Development*, Vol. 33 No. 2, pp.153–168.

Xie, T., Pentina, I. and Hancock, T. (2023), "Friend, mentor, companion: does chatbot engagement lead to psychological dependence?", *Journal of Service Management*, Vol. 34 No. 4, pp.806-828.

Yu, L., Chen, Y., Zhang, S., Dai, B. and Liao, S. (2023), "Excessive use of personal social media at work: antecedents and outcomes from dual-system and person-environment fit perspectives", *Internet Research*, Vol. 33 No. 3, pp.1202-1227.

Zhai, X., Zhao, R., Jiang, Y. and Wu, H. (2024), "Unpacking the Dynamics of AI-Based Language Learning: Flow, Grit, and Resilience in Chinese EFL Contexts", *Behavioral Sciences*, Vol. 14 No. 9, p.838.

Zhao, Y., Chen, Y., Sun, Y. and Shen, X.L. (2024), "Understanding users' voice assistant exploration intention: unraveling the differential mechanisms of the multiple dimensions of perceived intelligence", *Internet Research*, Vol. 34 No. 6, pp.2096-2122.

Web Appendix I

Table A1. Measures of constructs

Construct	Item	Measurement
Commitment	COM1	I am very focused on my AI companion.
	COM2	My AI companion would be my first choice.
	COM3	I would rather spend time with my AI companion than with anyone else.
Emotional attachment	EA1	I enjoy interacting with my AI companion.
	EA2	I feel happy when I engage with my AI companion.
	EA3	I feel excited when I interact with my AI companion.
Emotional trust	ET1	I feel secure interacting with my AI companion.
	ET2	I feel comfortable interacting with my AI companion.
	ET3	I feel content when interacting with my AI companion.
Interactive engagement	IE1	When I interact with my AI companion, I feel highly engaged.
	IE2	The quality of my interactions with my AI companion is excellent.
	IE3	I can communicate freely with my AI companion.
Intimacy	INT1	I feel emotionally close to my AI companion.
	INT2	Most of the time, I feel very close to my AI companion.
	INT3	There is a close connection between me and my AI companion.
Passion	PAS1	I find my AI companion very attractive.
	PAS2	My AI companion captivates me.
	PAS3	My AI companion really fascinates me.
	PAS4	I am enthusiastic about my AI companion.
Social well-being	SWB1	Overall, interacting with my AI companion feels as close as I can get to my ideal life.
	SWB2	My AI companion plays a very important role in my leisure and overall well-being.
	SWB3	I feel satisfied with my life through my interactions with my AI companion.
	SWB4	So far, I have obtained the important things I want from my interactions with my AI companion.
Sweet deception	SW1	My AI companion occasionally lies to me in a way that feels friendly and comforting.
	SW2	My AI companion often adds a touch of sweetness to stories or facts, making them sound even more delightful and appealing.
	SW3	My AI companion shares information that feels reassuring, even if it leaves out some important details.
	SW4	My AI companion sometimes keeps certain information to itself, believing it will make my experience more enjoyable.
	SW5	When I ask my AI companion a direct question, it often responds with cheerful and lighthearted information that brings a smile, even if it doesn't quite answer me.

Note(s): We measured intimacy, passion and commitment using items modified from Song *et al*. (2022)[1]. Interactive engagement, emotional attachment and emotional trust were measured using items modified from Nafees and Sujood (2024)[2]. The measurement items of sweet deception were based on the categories derived from Turner *et al*. (1975)[3],

[1] Song, X., Xu, B. and Zhao, Z. (2022) "Can people experience romantic love for artificial intelligence? An empirical study of intelligent assistants", *Information & Management*, Vol. 59 No.2, p.103595.

[2] Nafees, S. and Sujood (2024), "The power of emotions: combining emotional Attachment Theory (EAT) and the technology acceptance model (TAM) to predict consumers' intention to use interactive technologies (ITs) at tourism destinations", *Tourism Recreation Research*, pp.1-18.

[3] Turner, R.E., Edgley, C. and Olmstead, G. (1975), "Information control in conversations: Honesty is not always the best policy", *Kansas Journal of Sociology,* Vol. 11, pp.69–89.

including half-truths, exaggerations, diversionary responses, lies and secrets. Finally, we measured the social well-being of users with four items adapted from Chen *et al*. (2024)[4].
Source(s): Authors' own work

Table 1. Demographic characteristics of the research sample (n = 527)

Measure	Category	Frequency	Percentage (%)
Gender	Female	225	42.6
	Male	302	57.4
Age	18 - 25	156	29.6
	26 - 30	170	32.3
	31 - 40	99	18.8
	41 - 50	70	13.3
	51 - 60	28	5.3
	60 or over	4	0.7
Education	High school	256	48.6
	Bachelor	199	37.8
	Master's degree or above	72	13.6
AI companion app usage	More than 10 times per day	281	53.3
	6 - 10 times per day	143	27.1
	2 - 5 times per day	83	15.8
	Once daily	14	2.6
	Less than once daily	6	1.2

Source(s): Authors' own work

[4] Chen, C.W., Nguyen, D.T.T., Chih, M. and Chen, P.Y. (2024), "Fostering YouTube followers' stickiness through social contagion: The role of digital influencer's characteristics and followers' compensation psychology", *Computers in Human Behavior*, Vol. 158, p.108304.

Table 2. Assessment of measurement model

Construct	Item	Factor loading	Cronbach's alpha	CR	AVE
Commitment	COM1	0.909	0.866	0.918	0.788
	COM2	0.894			
	COM3	0.859			
Emotional attachment	EA1	0.905	0.923	0.951	0.866
	EA2	0.954			
	EA3	0.933			
Emotional trust	ET1	0.914	0.921	0.950	0.864
	ET2	0.946			
	ET3	0.928			
Interactive engagement	IE1	0.911	0.875	0.923	0.801
	IE2	0.928			
	IE3	0.843			
Intimacy	INT1	0.946	0.953	0.970	0.915
	INT2	0.965			
	INT3	0.959			
Passion	PAS1	0.830	0.903	0.932	0.775
	PAS2	0.919			
	PAS3	0.894			
	PAS4	0.876			
Social well-being	SWB1	0.892	0.915	0.940	0.798
	SWB2	0.915			
	SWB3	0.924			
	SWB4	0.840			
Sweet deception	SW1	0.762	0.860	0.899	0.641
	SW2	0.855			
	SW3	0.861			
	SW4	0.807			
	SW5	0.777			

Source(s): Authors' own work

Table 3. Discriminant validity of measurement model: HTMT ratio

Construct	Commitment	Emotional attachment	Emotional trust	Interactive engagement	Intimacy	Passion	Social well-being	Sweet deception
Commitment								
Emotional attachment	0.755							
Emotional trust	0.671	0.840						
Interactive engagement	0.742	0.841	0.818					
Intimacy	0.808	0.737	0.658	0.712				
Passion	0.867	0.842	0.689	0.777	0.797			
Social well-being	0.855	0.735	0.675	0.757	0.763	0.757		
Sweet deception	0.645	0.641	0.545	0.644	0.583	0.712	0.650	

Source(s): Authors' own work

Table 4 Summary of PLS-SEM path analysis

Path	**Hypothesis**	**Path coefficients**	**t-statistics**	**p-values**	**Conclusion**
Intimacy → Interactive engagement	H1a	0.235	4.230	0.000	Supported
Intimacy → Emotional attachment	H1b	0.224	3.792	0.000	Supported
Intimacy → Emotional trust	H1c	0.265	4.411	0.000	Supported
Passion → Interactive engagement	H2a	0.373	6.486	0.000	Supported
Passion → Emotional attachment	H2b	0.514	9.151	0.000	Supported
Passion → Emotional trust	H2c	0.298	4.518	0.000	Supported
Commitment → Interactive engagement	H3a	0.196	3.630	0.000	Supported
Commitment → Emotional attachment	H3b	0.121	2.344	0.019	Supported
Commitment → Emotional trust	H3c	0.180	2.928	0.040	Supported
Interactive engagement → Social well-being	H4	0.204	2.931	0.000	Supported
Emotional attachment → Social well-being	H5	0.142	2.512	0.000	Supported
Emotional trust → Social well-being	H6	0.104	1.704	0.089	Rejected
Interactive engagement × sweet deception → Social well-being	H7a	0.152	2.098	0.036	Supported
Emotional attachment × sweet deception → Social well-being	H7b	0.194	3.380	0.001	Supported
Emotional trust × sweet deception → Social well-being	H7c	0.059	1.051	0.294	Rejected

Source(s): Authors' own work